



Implementation of mind mapping learning model through brainstorming technique in improving student's reasoning power in catholic religious education learning grade XI phase F

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ABSTRACT

This study aims to analyze the implementation of the Mind Mapping learning model through brainstorming techniques in enhancing students' reasoning skills in Catholic Religious Education learning for Grade XI Phase F. The research method used is Classroom Action Research (CAR) with two cycles. The research subjects were Grade XI students in a senior high school. Data were collected through observations, tests, and interviews, then analyzed descriptively using quantitative and qualitative approaches. The results indicate an improvement in students' reasoning skills from the pre-action phase to Cycle II. Before the intervention, the average mastery level was only 66%, increasing to 79% in Cycle I and reaching 87% in Cycle II. The most significant improvements were observed in students' abilities to identify, classify, draw conclusions, present evidence, and provide comprehensive statements. Thus, the Mind Mapping learning model through brainstorming techniques effectively enhances students' reasoning skills. The implications of this study suggest that interactive learning strategies can improve students' understanding and active participation in learning.

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INTRODUCTION

Reasoning power is the ability to think that allows individuals to draw logical conclusions based on the information and experience they have. This ability plays an important role in the world of education, especially in forming students' critical thinking patterns so that they can understand concepts more deeply, not just memorize (Panji, 2022). Education that is only oriented towards memorization tends to limit creativity and problem solving, whereas in the modern era, critical and analytical thinking skills are needed to face increasingly complex challenges (Puspitasari et al., 2021). Thus, strengthening students' reasoning abilities is a crucial aspect that needs attention in the learning process, including in Catholic Religious Education subjects.

In the context of Catholic Religious Education learning, reasoning plays a role in helping students understand spiritual and moral values more reflectively. Students are not only directed to master religious teachings memorably, but are also expected to be able to reflect and integrate these values into the realities of everyday life. However, the reality in the field indicates that a large number of students still face obstacles in mastering an understanding of various religious concepts in depth. The results of observations at SMA RK Deli Murni Delitua showed that most students tended to memorize the material rather than analyze and reflect on it. This difficulty can be caused by learning methods that are still conventional and do not encourage students to think critically and creatively (Wirnoto & Ratnaningsih, 2022).

One approach that can be used to improve students' reasoning ability is through the application of the Mind Mapping learning model combined with the Brainstorming technique. Mind Mapping is a method that helps students organize information visually, so that they can understand the relationship between concepts more clearly (Widiyono, 2021). This technique allows students to build links between theory and practice in learning Catholic Religious Education. Meanwhile, the Brainstorming technique can encourage students to think openly and generate creative ideas through group discussions. By combining these two methods, it is hoped that students will not only receive the material passively, but also be actively involved in building their own understanding.

The results of initial observations conducted on January 26, 2025 at SMA RK Deli Murni Delitua showed that students tend to rely heavily on memorization methods in studying Catholic Religious Education. Many students are able to remember factual information, but have difficulty applying or reflecting on these concepts in real situations. Their answers in the test showed shallow understanding, more rote and less in-depth analysis. This empirical evidence strengthens the conclusion that the current learning model tends to be more memorization than a reflective approach, so learning strategies are needed that encourage the involvement of high-level and reflective thinking.

Several studies have shown that the combination of Mind Mapping and Brainstorming is effective in improving students' reasoning skills. According to Rahmawati,(2022), Mind Mapping can help students develop analytical and synthetic thinking skills because its visual structure makes it easier to understand complex concepts. Meanwhile, the Brainstorming technique allows students to explore various perspectives on a topic, improving their ability to think logically and argumentatively (Dharma et al., 2022). Thus, the application of these two techniques in Catholic Religious Education learning is expected to improve the quality of students' understanding of the material, as well as encourage them to be more active in developing reflective and critical thinking.

Compared to other reflective learning methods such as role play and value discussions, the combination of the Mind Mapping model and Brainstorming techniques is considered more practical, efficient, and adaptive to classroom learning conditions. Methods such as role play that have been known in religious learning can indeed develop students' empathy and expression, but their implementation requires more time and skilled facilitators (Gaho et al., 2021). Meanwhile, the value discussion method has not been widely applied in the context of Catholic Religious Education at the secondary school level. On the other hand, the integration of Mind Mapping and Brainstorming allows students to be actively involved in a structured yet creative learning process. Through this approach, students are not only able to reflect on moral values, but can also organize their thoughts systematically. This makes the combination of these methods very suitable for use in the context of Catholic Religious Education learning, where students are expected to be able to internalize and apply faith values critically and reflectively (Saragih et al., 2021; Haidar & Maunah, 2024).

This study focuses on the application of the Mind Mapping learning model through the Brainstorming technique in improving the reasoning power of class XI Phase F students at SMA RK Deli Murni Delitua. The subjects of the study consisted of students who took the Catholic

Religious Education subject. The approach used in this study was the experimental method, by measuring the increase in students' reasoning power before and after the application of the learning model. Data were collected through tests, observations, and interviews with subject teachers to understand the effectiveness of the learning model applied.

Through this research, it is expected to obtain results that show the effectiveness of Mind Mapping and Brainstorming in improving students' reasoning skills. The findings of this study are expected to be able to provide constructive contributions to the development of more innovative learning methods in Catholic Religious Education, as well as being a reference for teachers in determining the most appropriate strategy to optimize the improvement of students' thinking skills. In addition, this study can be a consideration for schools in designing learning programs that emphasize more on strengthening reasoning skills as one of the basic competencies in education.

With the innovation in the learning model, it is expected that students will not only understand religious teachings theoretically, but also be able to apply them in real life with a deeper understanding. Increasing reasoning power through the Mind Mapping and Brainstorming methods can be used as a solution in an effort to create a more interactive, reflective, and relevant learning process for students. Thus, this learning model has the potential to be an approach that has effectiveness in optimizing the quality of religious education at the secondary school level.

RESEARCH METHODOLOGY

This study applies the Classroom Action Research (CAR) approach with the aim of developing students' reasoning skills through the use of the Mind Mapping learning model combined with the Brainstorming technique. The research design refers to the PTK model proposed by Kurt Lewin, which includes four core stages: (1) Planning, (2) Implementation of action, (3) Observation, and (4) Reflection. The cycle process will continue to be carried out until optimal results are obtained in improving students' reasoning skills.

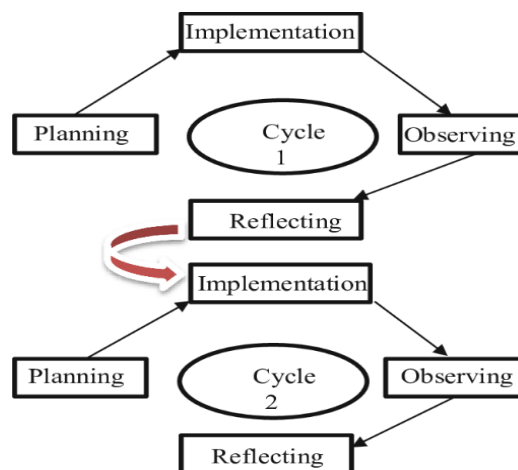


Figure 1. PTK Cycle (Eriska et al., 2023)

The subjects in this study were students of class XI of SMA RK Deli Murni Delitua in the 2024/2025 Academic Year, while the object of the study focused on improving students' reasoning skills through the implementation of the Mind Mapping learning model with the Brainstorming technique. This research will be carried out in two cycles, with each cycle including an improvement process based on the results of reflection from the previous cycle.

Data collection methods in this study include observation, documentation, and analysis of student learning outcomes. Observations were conducted using observation sheets to record student activities during learning. Documentation is in the form of notes on the learning process

and student work results, while analysis of learning outcomes uses evaluation instruments to assess the improvement of students' reasoning skills. The collected data were analyzed using a quantitative descriptive approach to measure the effectiveness of the applied learning model. The success of this study was measured based on the improvement of students' reasoning skills indicators, which include the ability to identify, classify, draw conclusions, present evidence systematically, and provide comprehensive and precise statements.

Although this study was conducted in a relatively short time, the quantitative descriptive data analysis approach was still able to provide an in-depth picture of changes in students' reasoning abilities. The use of structured instruments, repeated observations during two learning cycles, and systematic reflections from teachers and researchers, allowed data interpretation not only based on numbers, but also linked to real learning contexts. In addition, documentation such as observation notes and student group discussion results provided additional understanding of how students think, formulate ideas, and develop arguments during the learning process. This approach approaches the principle of data triangulation, although not formally stated, and helps ensure that the interpretation of the results reflects the actual learning conditions.

The implementation of two PTK cycles in this study was considered sufficient to draw conclusions about the effectiveness of the Mind Mapping and Brainstorming learning models, because each cycle showed consistent and measurable improvements in students' reasoning power indicators. Repeated actions allow for comparison and adjustment between cycles, which strengthens the validity of the observed results.

To reduce the potential for cycle bias, the researcher used consistent assessment instruments and maintained uniform conditions during both cycles, including teacher involvement, materials, and learning objectives. In addition, the analysis did not rely solely on one type of data. Observation notes, teacher reflections, and documentation were used to validate the quantitative results. This triangulation approach ensures that conclusions are not based on a single result, but rather on a pattern of repeated improvement supported by multiple data sources.

RESULTS AND DISCUSSIONS

Results

Based on the data obtained, the results of the assessment of the completeness of students' reasoning ability in Catholic Religious Education learning in class XII of SMA SWASWA DELI MURNI Deli Tua before the implementation of PTK still did not meet the success criteria according to the KKTP learning. This can be seen during the learning process, where many students tend to memorize the material without really understanding it. In addition, there are students who have difficulty understanding the learning, and the methods applied by the teacher are ineffective, thus creating a less conducive classroom atmosphere and disrupting the effectiveness of learning activities. Therefore, the results of students' reasoning ability which are still very low indicate the need to implement classroom action research (PTK). Data on student learning outcomes before PTK can be seen in Table 2. The table shows that the results of Catholic Religious Education learning before PTK in class XII students of SMA SWASTA DELI MURNI Deli Tua are still very worrying based on the low percentage of learning outcomes. Therefore, the implementation of learning improvements through PTK in cycle I with the material "Human Rights in the light of the teachings of the Holy Bible and Church Teachings" and "Developing a Culture of Love" is very necessary. The goal is to improve students' reasoning skills. By applying appropriate methods in learning Catholic Religious Education, it is hoped that students can achieve learning success.

Table 1. Reasoning power before PTK

No	Indicator	Complete		Not Completed	
		Amount	Presentation	Amount	Presentation
1	Ability to identify	28	70%	12	30%
2	Ability to classify	24	60%	16	40%

No	Indicator	Complete		Not Completed	
		Amount	Presentation	Amount	Presentation
3	Ability to draw conclusions	29	73%	11	27%
4	The ability to present evidence or arguments systematically	25	63%	15	37%
5	Ability to provide comprehensive and accurate statements	26	65%	14	35%
	Average		66%		34%

Cycle I PTK is implemented through a series of stages, starting from planning, implementation, observation, analysis, to evaluation. The researcher compiles a module as a reference in implementing PTK, and after the module is completed, the researcher implements PTK. From the implementation of cycle I, the researcher obtained the results of students' reasoning power, namely:

Table 2. Students' reasoning power in cycle I

No	Indicator	Complete		Not Completed	
		Amount	Presentation	Amount	Presentation
1	Ability to identify	33	83%	7	18%
2	Ability to classify	30	75%	10	25%
3	Ability to draw conclusions	34	85%	6	27%
4	The ability to present evidence or arguments systematically	29	73%	11	37%
5	Ability to provide comprehensive and accurate statements	32	80%	8	35%
	Average		79%		34%

After the implementation of the Mind Mapping learning model through the Brainstorming technique in Cycle I, there was an increase in the completeness of students' reasoning ability compared to the results before PTK. This indicates that the learning strategy applied began to provide a constructive influence on students' understanding and thinking skills. In the indicator of the ability to identify, the number of students who achieved completeness increased to 33 students (83%), while 7 students (18%) were still incomplete. The indicator of the ability to classify also increased, with 30 students (75%) who completed it and 10 students (25%) who still needed further guidance.

The indicator of the ability to draw conclusions showed very good results with 34 students (85%) achieving completion and only 6 students (15%) not achieving the expected standard. Meanwhile, the indicator of presenting evidence or arguments systematically increased to 29 students (73%) who completed it, although there were still 11 students (28%) who needed to improve their abilities. Finally, in the indicator of providing comprehensive and precise statements, 32 students (80%) had achieved completion, while 8 students (20%) had not yet completed it.

Overall, the average student completion in Cycle I reached 79%, an increase of 13% from the results before PTK which was only 66%. Meanwhile, the number of students who had not completed decreased to 21%. Although these results show positive developments, there are several aspects that still need improvement to achieve more optimal results in the next cycle.

Table 3. Reasoning power of students in cycle II

No	Indicator	Complete		Not Completed	
		Amount	Presentation	Amount	Presentation
1	Ability to identify	35	88%	7	12%
2	Ability to classify	34	85%	10	15%
3	Ability to draw conclusions	37	93%	6	7%
4	The ability to present evidence or arguments systematically	33	83%	11	18%
5	Ability to provide comprehensive and accurate statements	35	88%	8	13%
	Average		87%		13%

In Cycle II, the implementation of the Mind Mapping learning model through the Brainstorming technique increasingly shows its effectiveness in improving students' reasoning skills. Compared to Cycle I, there was a significant increase in each indicator, with the average

completion increasing to 87%, while students who had not completed it decreased to 13%. In the Ability to Identify indicator, student completion increased to 35 students (88%), with only 5 students (13%) still not reaching the expected standard. The Ability to Classify indicator also experienced development, with 34 students (85%) completing it and 6 students (15%) not completing it.

The most significant improvement occurred in the indicator of the ability to draw conclusions, where 37 students (93%) had achieved completion, while only 3 students (8%) still needed further guidance. This shows that students are increasingly able to understand, process, and conclude information well.

The indicator of presenting evidence or arguments systematically also experienced quite good improvement, with 33 students (83%) completing it, although there were still 7 students (18%) who had not reached the expected standard. Likewise, in the indicator of providing comprehensive and precise statements, completion increased to 35 students (88%), with 5 students (13%) still requiring further improvement.

There is a positive correlation between increasing student engagement during brainstorming sessions and their success in delivering comprehensive and accurate statements. When students actively exchange ideas and respond to the opinions of their group mates, they are increasingly able to formulate thoughts clearly and in a structured manner. Observations show that students who are more active in group discussions are also more successful in compiling complete and meaningful written answers. This shows that brainstorming not only encourages the emergence of ideas, but also strengthens the ability to think coherently and deeply, which is reflected in the improvement in learning outcomes in the "comprehensive statement" indicator.

In general, the results of Cycle II show that the applied learning model is more effective in helping students improve their reasoning skills. This development proves that the Mind Mapping and Brainstorming approaches can improve students' critical and analytical thinking skills in learning Catholic Religious Education for grade XI Phase F.

The improvement in the achievement of indicators in Cycle II is interpreted as a real strengthening of students' reasoning power, not merely an improvement due to familiarity with the learning method. This can be seen from the quality of student outcomes, such as more structured arguments, deeper conclusions, and the ability to link concepts across topics results that do not only arise from procedural familiarity.

In addition, improvements occur not only in completing assignments, but also in the way students reason, discuss, and apply understanding to new content (for example, from Human Rights in the Light of Scripture and Church Teachings to Developing a Culture of Love). The consistent use of indicators in each cycle and teacher reflections reinforce that these changes are cognitive developments, not merely mechanical adaptations to the techniques used.

CONCLUSION

The results of this study indicate that the application of the Mind Mapping learning model through Brainstorming can significantly improve students' reasoning ability. Before the action, the average student completion rate only reached 66%, while after the implementation of the first cycle it increased to 79%, and in the second cycle it increased again to 87%. This increase shows that the Mind Mapping strategy is effective in helping students understand concepts, classify information, and draw conclusions better.

This study is in line with the findings of Hazaymeh & Alomery (2022) which showed that the Mind Mapping strategy improves students' critical thinking skills in English learning, especially in reading comprehension. This is also supported by Buran & Filyukov (2015) who found that Mind Mapping contributes to improving the structure of thinking and understanding of concepts in language learning.

In addition, De Jesus' (2024) research, which is a meta-analysis of various studies related to Mind Mapping, confirms that this method improves students' reasoning and creativity. In the context of science education, Zhang & Chen (2022) found that the use of Mind Mapping facilitates a deeper understanding of concepts, which ultimately strengthens students' critical thinking skills.

The Brainstorming strategy used in this study has also proven effective in increasing student interaction and participation. According to Ruiz-Primo & Shavelson (2015), this technique allows students to be more active in presenting evidence and drawing logical conclusions based on group discussions. The study by Nesbit & Adesope (2022) also revealed that Mind Mapping, when combined with discussion methods, can significantly improve cognitive understanding.

Furthermore, Eppler's (2022) study compared the effectiveness of various concept visualization methods, including Mind Mapping, and found that this method was superior in improving students' understanding and memory compared to traditional methods. Meanwhile, Chularut & DeBacker (2010) highlighted that students with learning disabilities also experienced increased self-confidence and logical thinking skills after using the Mind Mapping strategy. In addition, (Hyerle's, 2022) study showed that visual strategies such as Mind Mapping can reduce students' cognitive load and improve learning effectiveness.

Specifically, the improvement in cycle II shows that the application of the Brainstorming technique in Mind Mapping not only improves students' reasoning skills, but this model also plays a role in facilitating the development of students' critical thinking skills. As explained (Johnson, 2022), social interactions that occur in brainstorming can improve conceptual understanding and strengthen logical thinking skills. In the context of this study, a significant increase in the ability to draw conclusions and present evidence is an indicator that students are able to process information more deeply after going through the discussion and concept mapping stages.

The findings in this study support the development of the thematic-integrative learning model by showing that the combination of Mind Mapping and Brainstorming encourages students to relate abstract religious values to real-life contexts. Through group discussions and visual organization of ideas, students engage in a reflective thinking process that not only improves cognitive aspects but also fosters character values such as cooperation, empathy, and moral responsibility.

By integrating moral topics such as human rights and compassion for others in structured reasoning activities, the learning process becomes holistic—combining aspects of knowledge, reflection, and internalization of values. This model is very much in line with the objectives of thematic-integrative learning that is contextual, value-based, and centered on the overall development of students.

However, this study also has some limitations. One of them is the need for a longer time in implementing the Mind Mapping method through Brainstorming so that students can be more accustomed to this technique. In addition, the effectiveness of this method may vary depending on the characteristics of students and their learning styles. Therefore, further research is recommended to explore the application of this method over a longer period of time and in different learning contexts.

Thus, based on the results obtained and analysis of relevant theories, it can be concluded that the application of Mind Mapping through the Brainstorming technique has a positive impact on improving students' reasoning power in learning Catholic Religious Education. This study not only confirms the effectiveness of this learning model, but also makes a significant contribution to the development of a more innovative and interactive learning methodological approach in religious education.

Although this study shows the strong potential of combining Mind Mapping and Brainstorming in improving students' reasoning skills, these findings need to be interpreted in the context of Classroom Action Research with two cycles and limited time. For wider application, it is recommended that Catholic Religious Education teachers integrate this model gradually in

semester teaching modules, for example through weekly discussion activities and concept mapping on reflective topics. Further research is also needed to see the long-term impact, compare different student characteristics, and examine the adaptation of this model in various school contexts.

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