

## Systematic Literature Review: Guided Inquiry Learning Model on Students' Mathematical Communication Ability in Inclusion Classes

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### Abstract

The study aims to do a systematic literacy study on the influence of incubation study models to the students' mathematical communication abilities in the inclusion class. Incubating learning models are approaches that use research questions, experiments and group discussions to involve students actively in the mathematical learning process. The study of this literature uses descriptive analysis methods to collect and analyze research journals related to the use of incubation study models led to improved student mathematical communication capabilities in the inclusion class. Literature studies suggest that a good incubation study model can lead to a student's mathematical communication ability in the inclusion class in the following several ways: increase student involvement, incubation learning models are led to include students actively in group discussions and mathematical communication. This provides opportunities for students to actively participate, ask questions, and share their insights, which eventually enhance their ability to communicate mathematically. Encourage concept understanding: in incubating learning models, students are called to search for information, ask questions, and experiment. Through this process, students understand math concepts more deeply, and their ability to communicate that understanding is also increasing. It provides opportunities for students to be actively involved in group discussions, to understand mathematical concepts and to work in collaborative ways with classmates. The implication of this find is that the use of an incubation model of learning can be an effective strategy in math study in the inclusion class.

**Keywords:** *guided inquiry learning model, mathematical communication abilities, inclusion classes*

### 1. Introduction

In this era of globalization, the development of technology and information is increasingly rapid. This requires each individual to have good communication abilities, including in the field of mathematics. Mathematical communication abilities are very important for students, especially in expressing and understanding mathematical concepts appropriately. However, not all students have good mathematical communication abilities. One of the factors that affect students' mathematical communication abilities is the learning model used. Learning models are one of the important things in improving students' mathematical communication abilities. One of the learning models that can be used is the guided inquiry learning model.

The guided inquiry learning model is a learning model that gives students the opportunity to think critically, try, and discover their own knowledge through

structured stages. In this model, the teacher has the role of facilitator who helps students in discovering new knowledge through activities that actively involve students. The application of guided inquiry learning model in mathematics learning in the inclusion class has a very important value. Inclusion classes are classes that integrate students with different abilities and special needs. In inclusion classes, teachers need to pay attention to the diversity of students, including their mathematical communication abilities.

In the inclusion class, there are variations in the level of mathematical communication abilities of students. Some students may have good mathematical communication abilities, while other students may experience obstacles in expressing their understanding in mathematics. It requires a different approach in learning mathematics. The guided inquiry learning model can be an effective solution in improving students' mathematical communication abilities in inclusion classes. This model can develop students' critical thinking abilities, engage them actively in learning, and provide opportunities for each student to express their understanding in mathematics.

Through guided inquiry learning, students are taught to dare to try, ask questions, discuss, and give explanations to their friends. Thus, students can develop their mathematical communication abilities gradually. They will learn to convey their understanding by using correct and clear mathematical language. In addition, the guided inquiry learning model can also overcome the tendency of some inclusion students who are only passive listeners in learning. In this model, students are invited to actively participate in each stage of learning, both in asking questions, trying, and discussing. Students' activeness in learning mathematics will encourage them to develop mathematical communication abilities.

In this systematic literature review, the researcher will discuss various previous studies that have been conducted on the guided inquiry learning model and its effect on the mathematical communication abilities of students in inclusion classes. The studies will be analyzed systematically and critically to gain a deeper understanding of the topic. By conducting this systematic literature review, it is expected to provide a clear picture of the guided inquiry learning model and its benefits for the mathematical communication abilities of students in inclusion classes. The results of this study are expected to be a reference for teachers and educators in designing effective learning strategies to improve students' mathematical communication abilities in inclusion classes.

## **2. Method**

The research method used in this literature review is a systematic literature review. Systematic literature review is a systematic approach in collecting, evaluating, and synthesizing relevant research results in a particular field. The stages carried out in this systematic literature review are as follows:

- a. Identification of research themes: researchers identify the theme or topic to be studied, namely the influence of guided inquiry learning model on the mathematical communication abilities of students in the inclusion class.
- b. Literature search: researchers conduct related literature searches using various sources such as databases of journals, books, as well as related scientific articles

and publications. Searches were conducted using relevant keywords such as "guided inquiry learning model", "mathematical communication abilities" and "inclusion class".

- c. Literature selection: researchers conduct literature selection based on inclusion and exclusion criteria that have been determined. Literature that is relevant and in accordance with the objectives of the study is selected for further analysis.
- d. Literature analysis: the researcher analyzes the selected literature critically and systematically. Analysis includes reading and understanding in depth the content of the literature, assessment of the quality of research methodology, as well as the preparation of a summary or synopsis of each literature analyzed.
- e. Literature synthesis: the researcher synthesizes or combines the results of the analysis of relevant literature. Synthesis is done to produce conclusions or findings comprehensively about the effect of guided inquiry learning model on the mathematical communication abilities of students in the inclusion class.
- f. Report writing: the researcher prepares a literature review report that includes the background of the research, the objectives of the research, the methods used, the findings of the literature analysis, and the resulting conclusions.

By using the systematic literature review method, this study can collect and analyze relevant literature systematically, so as to present a comprehensive picture of the influence of guided inquiry learning model on the mathematical communication abilities of students in the inclusion class.

### 3. Research Question

- a. Are there any advantages and disadvantages in the application of the guided inquiry learning model in the inclusion class?
- b. How is the effectiveness of inquiry learning model guided in improving students' mathematical communication abilities in inclusion classes?
- c. Are there any recommendations for further development and research related to the guided inquiry learning model in improving students' mathematical communication abilities in inclusion classes?

### 4. Results and Discussion

Table 1. Articles related to guided inquiry learning model, students' mathematical communication ability and inclusion classes

Author	Title	Results
Ningtias, S. W. and Soraya, R.	<i>Pengaruh Model Inkuiri Terbimbing terhadap Kemampuan Komunikasi Matematis</i>	The guided inquiry model has a significant effect on students' mathematical communication skills. There is a significant increase in students' ability to explain, understand and present mathematical information after being taught using the guided inquiry model.
Riyadi, et al.	<i>Pengaruh Pembelajaran Inkuiri Terbimbing terhadap Kemampuan</i>	Provides insight into how guided inquiry learning can influence students'

<b>Author</b>	<b>Title</b>	<b>Results</b>
	<i>Penalaran dan Komunikasi Matematis Siswa</i>	mathematical reasoning and communication abilities.
Asri, P. N., et al	<i>Pengaruh Model Pembelajaran Terbimbing Meningkatkan Kemampuan Komunikasi Matematis Siswa</i>	The guided inquiry learning model has a significant influence in improving students' mathematical communication abilities. An increase in students' mathematical communication abilities can be seen from the results of the t test which shows the calculated value = 6.87 > table 2.02 with degrees of freedom (dk) 38 at a significance level of 5%.
Fauzy, et al.	<i>Penerapan Metode Inkuiri untuk Meningkatkan Kemampuan Komunikasi Matematik Siswa SMP di Kabupaten Cianjur</i>	The t test results show that the value of $t = 4.53 > t$ table 2.045 with degrees of freedom (dk) 29 at a significance level of 5%. This shows that there are significant differences between the experimental and control groups. Therefore, it can be concluded that the application of the inquiry method has a positive influence in improving students' mathematical communication abilities.
Sefalianti, B.	<i>Penerapan Pendekatan Inkuiri Terbimbing terhadap Kemampuan Komunikasi dan Disposisi Matematis Siswa</i>	There is a significant increase in the mathematical communication abilities of students who receive learning with a guided inquiry approach. The t test results show that the calculated value = 5.27 > table 2.00 with degrees of freedom (dk) 59 at a significance level of 5%. There is also a significant increase in the mathematical disposition of students who receive learning with a guided inquiry approach. The results of the t test show that the value of $t = 3.83 > t$ table 2.00 with degrees of freedom (dk) 59 at a significance level of 5%.
Fatmariyani, et al.	<i>Perbandingan Kemampuan Komunikasi Matematis Menggunakan Pendekatan Terbimbing dan Pendekatan Saintifik Siswa Kelas VII di SMP Wahyu Makassar</i>	There is a significant difference between the mathematical communication abilities of students who use a guided inquiry approach and students who use a scientific approach. The t test results show that the calculated t value = 4.56 > t table 2.00 with degrees of freedom (dk) 58 at a significance level of 5%.

Author	Title	Results
Hartatik, et al.	<i>Pengaruh Model Pembelajaran Inkuiri Terbimbing terhadap Aktivitas dan Hasil Belajar Matematika Kelas XI Inklusi SMK</i>	The use of the guided inquiry learning model has a significant influence on the activities and mathematics learning outcomes of inclusive class XI students at vocational schools. The t test results show that the value of $t = 4.98 > t$ table 2.00 with degrees of freedom (dk) 58 at a significance level of 5%.
Dwitami, M.	<i>Keefektifan Penggunaan Strategi Inkuiri Terbimbing terhadap Kemampuan Menyelesaikan Soal Cerita Pecahan pada Siswa Diskalkulia Kelas IV di SD Negeri Gadingan</i>	There was a significant increase in the ability to solve fraction word problems in the group of students with dyscalculia who used the guided inquiry strategy. The results of the different tests show that there is a significant difference between the posttest results of the experimental and control groups, with a sig value. (2-tailed) of $0.001 * p < 0.05$ . This shows that the use of guided inquiry strategies is effective in increasing the ability to solve fraction word problems in students with grade IV dyscalculia at Gadingan State Elementary School.

### **Advantages and disadvantages in the application of guided inquiry learning model in the inclusion class**

Based on literature reviews from several previous journals, answering from research questions that the advantages in the application of guided inquiry learning models in inclusion classes:

- a. Increase active participation: the guided inquiry model encourages students to be active in the learning process. They are invited to think critically, ask questions, and conduct independent research. This can motivate students to learn and increase their participation in learning activities.
- b. Strengthen critical thinking abilities: in the guided inquiry model, students are invited to think critically when trying to find solutions or answers to a given problem. They are invited to analyze, conclude, and evaluate the results of their research. This helps students develop critical thinking abilities that are essential to everyday life.
- c. Improve collaboration and cooperation: in the guided inquiry model, students are invited to work together in teams or small groups. They learn to work together, share ideas, and solve problems together. This helps improve students' collaborative abilities and strengthen relationships between students in the inclusion classroom.
- d. Accommodating individual differences: guided inquiry models can be applied flexibly, allowing teachers to accommodate individual differences in the inclusion

classroom. Teachers can provide guidance that suits the level of ability and needs of each student, thus allowing all students to be actively involved in the learning process.

Disadvantages in the application of guided inquiry learning model in the inclusion class:

- a. Takes longer: guided inquiry models take longer to implement than conventional learning models. This is because students need to do more in-depth exploration, research, and reflection. Therefore, this model may be difficult to implement if learning time is limited.
- b. Requires problem solving abilities: guided inquiry models require students to have good problems solving abilities. Some students may face difficulties in solving problems or understanding complex concepts. Therefore, more intensive guidance and support is needed for students facing such difficulties.
- c. Requires more mature consideration in classroom management: guided inquiry models may require more mature and effective classroom management. Teachers need to make sure learning is going well, students are actively involved, and no student is left behind. This can be a challenge especially in inclusion classes with diverse special educational needs.
- d. May not be suitable for all learning topics: while guided inquiry models are effective for increasing student engagement and understanding, not all learning topics are suitable for these models. Some concepts may be better taught through demonstrations or hands-on learning. Therefore, teachers need to use learning models that match the learning objectives and characteristics of students in inclusion classes.

### **The effectiveness of the inquiry learning model is guided in improving the mathematical communication abilities of students in the inclusion classes**

The above journal answers questions from research questions, namely the guided inquiry learning model is very effective in improving the mathematical communication abilities of students in inclusion classes. This model involves students actively in the learning process and encourages them to communicate and discuss mathematical concepts. In this model, the teacher acts as a facilitator who provides direction and guidance to students. They provide open-ended questions that stimulate students' critical thinking and bring up discussions between them. Students are invited to investigate problems, collect data, analyze results, and reach conclusions together.

In inclusion classes, where students with different levels of learning ability come together in one class, the guided inquiry model is particularly relevant. This model can engage and challenge students with a wide range of abilities, thus enabling them to learn in an inclusive environment. Through discussion and interaction in the guided inquiry model, students have the opportunity to share their knowledge and understanding with each other. They can come up with arguments, exchange ideas and solve problems together. This process not only improves students' mathematical communication abilities, but also develops social, collaborative, and problem-solving abilities.

In addition, the guided inquiry model allows students to understand and relate mathematical concepts to real situations. By involving students in investigating and discovering their own understanding, this model has the potential to increase students' interest and motivation towards mathematics. However, to achieve full effectiveness, the guided inquiry model in inclusion classes needs to be adapted to the needs and abilities of students. Teachers need to pay attention to individual student differences as well as provide additional support to students with learning difficulties. In addition, inclusive evaluations need to be conducted to monitor students' progress and adapt learning approaches to their needs.

Overall, the guided inquiry learning model can be a very effective option in improving students' mathematical communication abilities in inclusion classes. By encouraging students to actively participate, discuss and solve problems together, the model focuses not only on developing students' mathematical abilities, but also on social and collaborative abilities that are important in everyday life.

### **Recommendations for further development and research related to guided inquiry learning models in improving students' mathematical communication abilities in inclusion classes**

For further development and research related to the guided inquiry learning model in improving the mathematical communication abilities of students in inclusion classes, there are several recommendations that can be considered:

- a. Research on the influence of variation of guided inquiry approach: conducted a study comparing the effectiveness of guided inquiry model with other approaches in improving the mathematical communication abilities of students in the inclusion class. For example, comparing with traditional learning, free exploration approaches, or thematic learning models.
- b. Research with a more careful experimental design: conducting experimental research with a clearer control group in an inclusive environment. This can help identify more specifically the impact of guided inquiry models on students' mathematical communication abilities in inclusion classes.
- c. Development of inclusive learning strategies: developing strategies and teaching models that are more appropriate for students with different levels of ability in inclusive classrooms. For example, providing more diverse resources, ability-based groupings, or differentiation approaches to meet individual student needs.
- d. Development and validation of assessment instruments: develop and validate appropriate assessment instruments to measure students' mathematical communication abilities in inclusion classes. The instrument can include aspects such as speaking, writing, reading and presenting mathematical understanding.
- e. Identify the factors that affect the effectiveness of the guided inquiry model: conduct an in-depth study to identify the factors that affect the success of the guided inquiry model in improving the mathematical communication abilities of students in inclusion classes. These factors can include teacher competence, understanding of previous student concepts, support from the school environment, and parent involvement.

- f. Research on the transfer of understanding: examines whether the understanding of mathematical concepts acquired through guided inquiry models can be applied or transferred to other mathematical situations outside the learning context.
- g. Research on the relationship between mathematical communication abilities with student engagement and achievement: conduct research that examines the relationship between students' mathematical communication abilities with their level of involvement in learning and their academic achievement in general.

In conducting further research and development related to the guided inquiry learning model, it is important to consider the unique context of the inclusion classroom, as well as the diverse needs and characteristics of students. With more in-depth research, it can be expected that the development of learning models that are more effective and meet the needs of students in improving their mathematical communication abilities in inclusion classes.

## **5. Conclusion**

Conclusion or outline of the discussion in the systematic literature review about the inquiry learning model guided by the mathematical communication abilities of students in the inclusion class, several conclusions can be drawn:

- a. The guided inquiry learning model is effective in improving students' mathematical communication abilities in inclusion classes. This model involves students actively in the learning process and encourages them to communicate and discuss mathematical concepts.
- b. Through discussion and interaction in the guided inquiry model, students have the opportunity to share their knowledge and understanding with each other. This not only improves students' mathematical communication abilities, but also develops social, collaborative, and problem-solving abilities.
- c. Guided inquiry models can motivate students and increase their interest in mathematics. By involving students in investigating and finding their own understanding, this model allows students to relate mathematical concepts to real situations.
- d. In inclusion classes, where students with different levels of learning ability come together, the guided inquiry model is very relevant. This model can engage and challenge students with a wide range of abilities, thus enabling them to learn in an inclusive environment.

Although the guided inquiry learning model demonstrates its effectiveness in improving students' mathematical communication abilities in inclusion classes, it is important to continue to conduct further research and development. This will help identify factors that influence the effectiveness of these models, develop more inclusive learning strategies, and validate appropriate assessment instruments. Thus, the practice of learning in inclusive classrooms can be continuously improved to provide maximum benefits for all students.

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