



# Factors Influencing Indonesian Students' Interest in Mathematics Learning in the Age of Artificial Intelligence

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## ABSTRACT

Mathematics remains one of the subjects that many Indonesian students find it difficult, which often reduces their interest and motivation to learn. At the same time, the increasing use of Artificial Intelligence (AI) has introduced new opportunities for students to access mathematics learning through AI-based tools. Therefore, this study aims to explore the factors influencing Indonesian students' interest in learning mathematics in the age of Artificial Intelligence. This study employed a qualitative descriptive approach. Semi-structured interviews were conducted with five Indonesian students who had experience using AI tools in mathematics learning. The interview data were transcribed, analyzed, and categorized into themes. To ensure the trustworthiness of the findings, member checking was conducted with all participants. The findings revealed that students' interest in mathematics is influenced by both internal and external factors. Internal factors include motivation, confidence development, mindset, and perceptions of mathematics difficulty, while external factors include AI-based learning tools, teacher guidance, and learning environment. The findings also showed that AI contributes positively to mathematics learning by reducing fear of difficult topics, improving understanding through step by step explanations, and increasing learning motivation. However, over dependence on AI may reduce independent thinking and problem-solving skills. Therefore, AI should be used as a supportive learning tool with teacher guidance to encourage meaningful mathematics learning.

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## 1. INTRODUCTION

Mathematics is a subject that helps develop thinking skills and solving problems (Hidi & Renninger, 2006; Schiefele, 2009; Wigfield & Eccles, 2000). It also helps students think better and improve their critical thinking skills. But many students still think mathematics is difficult and are not very interested in it. Therefore, interest in learning mathematics has become an issue in modern education.

Previous studies show that learning interest is related to academic achievement. Mulyajaya, S and Anggraini, S (2022) and ( Purba et al., 2023 ) state that students' interest and motivation

strongly influence their learning outcomes. (Kurniawan et al., 2018) state that students with higher interest tend to show better analytical skills, while (Sukmaningthias et al., 2023) show that mathematics plays a role in improving problem-solving ability. In addition, factors such as environment and motivation are considered main influences on students' interest (Hidayati et al., 2024; Yulianto et al., 2024). Technological development has changed learning experiences, as artificial intelligence (AI) provides new opportunities to improve students' abilities (Senjaya et al., 2020).

However, most previous studies only focus on traditional classroom environments or general digital learning. There are still no studies that specifically examine how these factors influence students' interest in learning mathematics in the era of artificial intelligence. AI has the potential to influence how students find learning resources, engage with materials, and develop their learning interest. Therefore, this study aims to identify the factors that influence Indonesian students' interest in learning mathematics in the AI era. Based on this, there is one main research question: What factors influence Indonesian students' interest in learning mathematics in the AI era?

Mathematics is related to students' interest, motivation, and learning environment. Usually, students who have high interest are more active in class. Interest influences understanding the material and solving problems. In the digital era, learning is no longer limited to the classroom, because students can access many learning resources through technology and AI tools. Some studies say that learning interest is influenced by internal and external factors. Internal factors include motivation and personal attitude, while external factors include teaching methods, classroom environment, and the use of technology. Some researchers believe that artificial intelligence can support learning, where students can learn based on their own pace and needs. This makes learning more flexible and can increase students' engagement.

To increase the interest in learning mathematics for students is not easy, students must be interested in studying mathematics. In general, there are factors that affect the interests of the student in learning mathematics that are divided into two factors, namely, internal and external factors. Internal factors relating to the cause or impulses arising from the student himself, especially in his ability (Senjaya et al., 2020), Students do not understand the mathematical application in daily life (Kenedi et al., 2019), students do not understand the subject explained by the teacher (Cevikbas & Kaiser, 2020; Pimthong & Williams, 2020), and the student lacks enthusiasm to learn mathematics (Mailizar et al., 2020). While external factors are the explanation of the teacher, it is easily understood by the student (Mazana et al., 2019), the teacher is not fierce (Lukman et al., 2021; Makwa & Hidayati, 2020; Widiastuti et al., 2020), a comfortable learning atmosphere both at home and at school (Dagoc & Tan, 2018; Malik & Rizvi, 2018; Mazana et al., 2019), the family always supports the student to learn mathematics (Filgona et al., 2020; Peña et al., 2018), a friend who always supports in learning mathematics and student have a group to study together at home (Aldon et al., 2021; Jay et al., 2018).

However, some studies still focus only on motivation or only on teaching methods. This makes the understanding of students' interest less complete. In addition, research about the role of AI in mathematics learning, especially in Indonesia, is still limited. Therefore, it is important to study how different factors work together in influencing students' interest in learning mathematics in the AI era.

## 2. METHOD

This study uses a qualitative method with a descriptive approach to understand the factors that influence students' interest in learning mathematics in the AI era. This method is used because it can help the researcher understand students' experiences and opinions more clearly. Based on John, G (2017), qualitative research is usually conducted in a natural setting and focuses on real situations without changing the data. In this study, the researcher focuses on students' views and experiences when learning mathematics, especially when using AI.

The data in this study are collected through interviews with selected participants who are involved in mathematics learning and have experience using AI-based tools. The information collected from the interviews is then organized based on its relevance to the topic, especially related to learning interest, motivation, and the use of technology.

To collect the data, this study uses semi-structured interviews. This type of interview allows the researcher to ask prepared questions while still giving freedom to participants to share their thoughts. The questions were taken from previous research such as (Elfina et al., 2023), (Purba et al., 2023), and (Azis et al., 2019), but were adapted to this study. The interviews were done in a relaxed way, therefore, they were able to speak more openly.

Table 1. Participant's Background

NO.	Pseudonym	Age	Status
1.	OS1	19	Collage Student
2.	OS2	18	Collage Student
3.	OS3	18	Collage Student
4.	OS4	18	Collage Student
5.	OS5	18	Collage Student

In this study, data were collected through semi-structured interviews as the main method to gather information from the participants. This type of interview was selected because it allowed the researcher to explore participants' views, experiences, and personal opinions in more detail regarding their interest in learning mathematics in the age of artificial intelligence.

The interview questions were developed by referring to several previous studies related to learning interest, motivation, and technology integration, then adjusted to match the focus of this research. The interviews took place one at a time when each participant was ready. Each interview lasted

During the interviews researchers asked questions about the research topic. Researchers focused on what makes them interested in learning mathematics. Researchers also asked about their experiences learning math and what they think about using Artificial Intelligence in learning. We did the interviews, in Indonesian or their everyday language. This helped them feel more comfortable sharing their ideas.

For the analysis, the interview results are written into transcripts. Then, the researcher reads them several times to find important points. After that, the answers are grouped into themes to see patterns from different participants. Then, member checking is carried out by giving the data back to the participants to make sure there is no data falsification. The results are then explained in a simple way to show the main factors that influence students' interest in learning mathematics in the AI era.

### 3. RESULT AND DISCUSSION

This study found out that things inside and outside of school affect how much Indonesian students want to learn math that we have artificial intelligence. When we talked to students we saw that artificial intelligence is mostly a thing that helps students want to learn math feel motivated and understand it better especially when math seems really hard.. We also found out that artificial intelligence is not enough on its own because students still need to want to learn be disciplined and have help, from teachers. When we asked students what they thought they said they see intelligence as a tool that helps them learn, not something that replaces the way we learn in school. Indonesian students and artificial intelligence are still getting used to working and students think that artificial intelligence is a good way to get extra help with math.

Table 2. Factors influencing student's interest

Internal	External
1. Personal Motivation	1. AI- Based Learning Tools
2. Confidence Development	2. Clear Explanations And Fast Answers
3. Mindset And Discipline	3. Teacher Guidance And Learning Enviornment

Table 3. Effects of AI on Mathematics

Positive Effects	Negative Effects
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1. Reduces Fear of Difficult Mathematics	1. Risk of Overdependence on AI
2. Increases Understanding Through Step-by-Step Explanations	2. Reduces Independent Thinking
3. Improves Motivation and Learning Interest & Provides Flexible and Personalized Learning	3. May Weaken Long-Term Motivation If Misused

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### 3.1 Internal Factors

In this theme, the participants explained several internal factors that influence students' interest in learning mathematics in the AI era. When students think about mathematics they have their ideas about how hard it is. Most of the time students who think mathematics is really hard do not want to try to solve problems on their own. They think mathematics is confusing. Has a lot of formulas. This makes them feel like they are not good at mathematics. They do not want to do it. But at the time mathematics is hard, for many students so they want to use artificial intelligence tools. They think artificial intelligence can give them answers quickly explain things in a way and show them how to do problems step by step. This is why many students like to use intelligence when they are doing mathematics.

A common finding from almost all participants is that AI increases students' confidence by reducing fear, shame, and hesitation when learning mathematics. Students like asking computers questions over because the computer does not think badly of them. This makes students feel safe when they are learning for students who are really quiet in class. The computer helps students learn in a way that feels safe for them. That is really important, for students who do not like to talk in front of their class. Students can ask the computer the question many times and the computer will always give them the same helpful answer, which is something that students really like about using the computer to learn.

*"Yes, I think students who believe mathematics is difficult are usually more interested in using AI tools because AI can give faster answers and simpler explanations."* (OS1)

*"Because AI is always available, and students can ask the same question many times without feeling judged."* (OS1)

The data above show that low confidence and negative perceptions of mathematics can actually increase students' willingness to use AI tools. This happens because AI offers emotional comfort and easier access to explanations. In addition, motivation also appears as a major internal factor. Participants stated that AI can improve motivation when students begin to understand difficult material. Personalized support from AI can make students feel more capable, which increases their confidence and learning interest.

*"When students feel mathematics is difficult, their motivation is often low. But AI can increase motivation by giving personalized help based on their level."* (OS4)

*"If students understand more, they usually feel more confident."* (OS4)

However, participants also warned that motivation does not only depend on AI. Students' mindset, discipline, and personal effort remain important. Without these, AI may only become a shortcut for answers rather than a tool for real understanding.

*"AI can reduce fear and confusion, but if students are not motivated, they may still think mathematics is difficult."* (OS2)

### 3.2 External Factors

In this theme, the participants explained that external factors also play an important role in influencing students' interest in learning mathematics in the AI era. Based on the interviews, the most common external factor is the availability of AI tools as an accessible learning resource.

Many participants stated that AI gives students easier access to explanations anytime and anywhere, unlike traditional learning which often depends only on teachers, class schedules, or textbooks.

Most people agreed that AI is really helpful in class when the teachers explanations are too quick, hard to understand or not enough. AI lets students ask questions again, AI gives students explanations one step at a time, AI helps students study at their speed, students can learn in their way with AI. AI is helpful, for students. This flexibility makes AI an important support system outside the classroom.

*“I think AI platforms can help more because they provide direct explanations and sometimes more detailed steps than classroom teaching.” (OS3)*

*“Traditional learning depends a lot on the teacher’s explanation, but AI can be accessed anytime.” (OS3)*

These findings show that technology access and flexible learning environments are strong external factors that can improve students’ mathematics learning experiences. AI gives students additional support that traditional classrooms may not always provide. Another important external factor is teaching method. People said over and over that AI is good when it helps teachers not when it tries to replace them. AI can give information fast. Teachers are still needed because they help students, with their feelings and they encourage them. Teachers can also change how they teach to help each student.

*“AI is helpful when students need an extra help, but teachers are still very important because they can help students with their feelings and they can teach in different ways.” (OS3)*

*“Yes, I think AI is really helpful when students are learning something because sometimes students get bored when the lesson are too difficult.” (OS5)*

*“AI can make hard topics easier to understand, so students may stay interested longer.” (OS5)*

This indicates that subject difficulty, learning resources, and educational support systems are important external factors affecting students’ interest. Overall, the findings show that AI accessibility, flexible explanations, teacher support, and topic difficulty are major external factors that shape students’ mathematics learning interest. AI helps students learn better. It works best with good teachers and nice classrooms.

### 3.3 Positive Effects Of AI On Mathematics Learning

The participants explained several positive effects of AI on students’ interest in learning mathematics. A big thing researchers found out from talking to people is that AI usually helps reduce fear, confusion and negative feelings towards math. Many students think math is hard. AI helps by making concepts simple giving help and making tough topics feel easier to handle. Most people agreed that one of AI’s positive effects is giving step-, by-step explanations. This helps students understand formulas and calculations better, AI helps students understand math concepts clearly, and AI makes math feel less scary.

*“Yes, AI can help because it explains formulas step by step and makes mathematics look less confusing.” (OS2)*

*“Many students think math is only about difficult formulas, but AI can show easier ways to solve problems.” (OS2)*

*“If students understand more, they usually feel more confident.” (OS4)*

*“AI can increase motivation by giving personalized help based on their level.” (OS4)*

Using Artificial Intelligence makes students feel more at ease. This is especially true for students who’re too shy to ask questions in class. The people who took part in this study said that Artificial Intelligence helps students learn on their own. Students can study by themselves go over lessons again and learn without feeling embarrassed. The results show that Artificial Intelligence

has an effect on learning mathematics. It helps students understand better makes them more interested reduces their worries and supports learning that can be done at any time. These good things about Artificial Intelligence can really get students more interested in mathematics those students who had a hard time with mathematics before. Artificial Intelligence can make a difference, for these students.

*“Students can ask the same question many times without feeling judged.” (OS1)*

### 3.4 Negative Effects Of AI On Mathematics Learning

Although AI offers many benefits, participants also identified several negative effects that may influence students’ learning behavior. The most common concern is dependency. Many people think that students might start to rely much on Artificial Intelligence for answers. This means they will not learn how to think for themselves and solve problems on their own.

*“Artificial Intelligence can be helpful when you are just starting out. If students only use Artificial Intelligence to get answers and do not actually learn anything they will not be motivated to keep going in the long run.” (OS4)*

*“Not completely, because students still need personal effort and practice.” (OS2)*

*“AI helps, but it is not the only solution.” (OS2)*

These findings show that Artificial Intelligence or AI is not able to take the place of discipline, practice or personal responsibility. The people who took part in this study also said that AI cannot take the place of the support that humans give. Teachers are still very important for giving encouragement helping with interaction and providing deeper guidance when it comes to education and AI systems, like Artificial Intelligence are not able to do this. This indicates that overdependence on AI may weaken important teacher-student relationships.

*“AI is better as a support tool, not a full replacement.” (OS3)*

The study found that Indonesian students like learning mathematics in the AI era for reasons. Some reasons are inside the students themselves. These include how hard they think mathematics is, how confident they feel how motivated they are and their attitude. Other reasons are outside the students. These include how easily they can use AI, how teachers teach how flexible their learning is and how support they get from teachers. These findings match what other studies have said. Previous studies have found that students’ interest in mathematics depends on their motivation the environment they're in and how they use technology. Students’ interest in mathematics and AI are connected. The study, on students shows that both internal and external factors play a role. Motivation is a factor, It is both a factor and something that has been mentioned (Elfina et al., 2023; Gunawan et al., 2024; Mulyajaya & Angraini, 2022). In this study, AI appears to function as both a motivational support system and a technological learning tool that can reduce fear and confusion when students face difficult mathematical topics.

One big thing we found out is that students who think math is hard are usually more happy to use Artificial Intelligence tools. This is because Artificial Intelligence gives them answers helps them over and over and lets them learn without feeling bad about making mistakes. Students who think math is hard like using Artificial Intelligence because it makes learning math a lot for them. Artificial Intelligence tools are really helpful, for students who struggle with math. This finding supports (Delia et al., 2020), who explain that digital tools have strong potential to improve mathematics learning by creating more interactive and supportive learning experiences. People in this study also found that Artificial Intelligence helps make formulas easier to understand and it gives them step by step explanations. This can really help students, like mathematics more.

Artificial Intelligence can really change the way students learn for the better when it is used in the way. Artificial Intelligence is a tool for students to learn with when it is used properly.

This study also shows that students do better in mathematics when they get help from intelligence. They feel more able to understand mathematics. This is what (Yi et al., 2019), They said that the way we teach mathematics is changing. We are moving away from teaching bits and pieces. Now we are using systems that're more complete and can adjust to each student. Artificial intelligence learning tools are an example of this. They give students help that's just right for them. So artificial intelligence can make mathematics more interesting. It makes mathematics feel easier to understand and more flexible, for students. Artificial intelligence helps students understand mathematics better.

However even though Artificial Intelligence provides good things this study also found that relying too much on Artificial Intelligence may make students less likely to think for themselves and try to solve problems. Some people who took part in the study said that students might get too caught up in getting answers instead of really understanding things. This is a deal because learning mathematics should not just be about getting the right answers but also about developing the way we think and reason.

Artificial Intelligence should be used in a way that helps us not as a replacement for thinking deeply about things. We need to make sure that students are actively engaged with the ideas and concepts not just using Artificial Intelligence to get answers. Think that to really learn mathematics we need to be involved with the concepts not just producing answers, Suwarno and Rahardian (2021). So people need to use Artificial Intelligence as a tool that helps us not as a substitute, for really thinking about things. This finding strongly relates to Linda (2017), who states that teacher competency is the ability to acquire knowledge, scientific knowledge, skills, attitudes, and self-development that teachers must master and possess in carrying out their duties.

Furthermore this study also shows that where we learn is very important. (Wulandari et al, 2024) say that learning math can be more interesting if it is connected to real-life experiences. In this research AI seems to work when it helps students with hard topics in a way that they can understand. This means that just using technology is not enough learning must be fun and make sense to students. Overall this study confirms that AI can really help students like math more by making it easier to access more flexible and building their confidence. AI can also be a problem if students get too used, to it and do not try hard enough on their own. The study suggests that we need to balance AI with motivation, discipline and guidance from teachers.

#### 4. CONCLUSION

This research gives a clear picture of the factors influencing Indonesian students' interest in learning mathematics in the age of artificial intelligence from students' point of view. Based on the findings, it is clear that students' interest is influenced by both internal and external factors. Internal factors include motivation, confidence, mindset, and perceptions of mathematics difficulty, while external factors include AI accessibility, teaching methods, teacher support, and learning environment. The findings also show that AI can help students understand mathematics more easily, reduce fear, and increase motivation. However, AI may also create dependency if students rely on it too much without developing independent thinking skills. Therefore, AI should be used as a learning support tool rather than a full replacement for teachers. In addition, teachers still play an important role in guiding students and building meaningful learning experiences. Therefore, it is recommended that students, teachers, and educational institutions use AI wisely to support mathematics learning while still encouraging critical thinking, discipline, and active learning for better educational outcomes.

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