



# Identification of Junior High School Students' Experiences in Using Question Card Media for Algebra Learning

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## Abstract

This study aims to explore junior high school students' experiences in using Question Card media in algebra learning. Using a qualitative approach, this study involved 26 students of grade VII B at SMP Darul Ulum 5 Rebalas as the main participants. Data were collected through classroom observations, interviews, and student response questionnaires to understand perceptions, engagement, and challenges faced during the learning process using Question Cards. The results showed that Question Card media was able to increase students' interest, attention, and engagement in algebra learning. Most students stated that using Question Cards made learning more interactive, enjoyable, and helped them understand abstract algebraic concepts. Data analysis showed that the level of student learning interest was in the high category (74.7%), with indicators of engagement and attention also showing high percentages. However, there were some students who still felt more comfortable with conventional methods, so further adaptation was needed. These findings confirm that Question Card media can be an innovative alternative in mathematics learning, especially algebra, to enhance students' learning experiences actively and meaningfully. This study recommends the development of similar media and training for teachers to optimize the use of interactive media in mathematics learning at the junior high school level.

**Keywords:** Student Experience, Question Card Media, Algebra, Interactive Learning, Qualitative Research

of superior and highly competitive human resources. However, significant challenges remain in improving the quality of mathematics learning (Nailurrohmah, 2022), particularly in abstract subjects like algebra. Many students in various countries, including Indonesia, consider algebra difficult to understand, resulting in low interest, motivation, and engagement in the learning process (Irfan, 2020).

The main problems that frequently arise in algebra learning at the junior high school level are low student interest, difficulty understanding abstract concepts, and the dominance of conventional learning methods that lack active student engagement (Rohimah, 2024). Students tend to be passive, simply accepting teacher explanations without much opportunity to interact or explore concepts independently. Furthermore, the limited use of innovative learning media makes the learning process monotonous and unengaging (Lee, 2024; Salsabila, 2021; Sumarwati, 2020). Another challenge is the lack of media that can connect algebra concepts to students' concrete experiences, making it difficult for them to develop meaningful understanding.

Various previous studies have attempted to address these issues through the development of interactive learning media. Afifah and Putri (2021) developed contextual-based e-comics (e-comics) for flat geometry, which were proven to improve students' understanding of mathematical concepts. Afifah and Dewi (2021) also developed e-comics to improve mathematical conceptual understanding, with positive results on student engagement. Furthermore, Qisma and Afifah (2022) developed the board game "Magic Shop" for social arithmetic, emphasizing the importance of game-based learning in increasing student interest and motivation. These studies demonstrate that interactive and game-based media can be an effective solution for improving the quality of mathematics learning.

## INTRODUCTION

Mathematics education plays a central role in developing students' logical thinking, problem-solving, and numeracy skills, which are essential foundations for mastering science and technology in today's global era (Desnita, 2022; Evendi, 2022; Pahrudin, 2021). Internationally, mathematics is recognized as a core subject supporting the development

However, research specifically exploring the use of Question Cards in algebra learning is still very limited. Question Cards offer a new approach that combines interactive, collaborative, and competitive elements through a relay game format (Sinenko, 2020), thereby increasing student active participation, strengthening conceptual understanding, and developing critical thinking and problem-solving skills (Anna, 2022; Cornwall, 2025; Sedory, 2020). The novelty of this research lies in the application of Question Cards specifically designed for algebra at the junior high school level (Moore, 2023), with expert validation demonstrating the effectiveness and suitability of this medium in the context of mathematics learning.

The identified research gap is the lack of in-depth qualitative studies of students' experiences using Question Cards in algebra learning. Previous research has focused primarily on media development and validation, as well as quantitative measurements of interest or learning outcomes, without exploring in detail the dynamics, perceptions, and challenges faced by students during the learning process (Birgin, 2020; Brave, 2025; Sedory, 2020). Furthermore, there is limited research on how Question Cards can be adapted to various learning contexts and student characteristics.

This research is based on a constructivist theoretical framework, which emphasizes the importance of students' active involvement in constructing knowledge through direct experience and social interaction. Question Card media is designed to facilitate more interactive, collaborative, and meaningful learning (Borsetti, 2022), in accordance with constructivist learning principles (Mascia, 2020; Pellas, 2020; Sánchez-Ruiz, 2023). Furthermore, cognitive load theory serves as a reference in designing media that can simplify abstract

algebraic concepts into more concrete and understandable concepts. The main concept used in this research is the use of interactive learning media to increase student interest, attention, and engagement in algebra learning (Sumarwati, 2020), as well as develop critical thinking and problem-solving skills through collaborative and competitive activities (Desnita, 2022; Dolapcioglu, 2022; Saripah, 2023).

Therefore, this research is expected to provide new contributions to the development of innovative mathematics learning media and enrich understanding of students' qualitative learning experiences in the context of using Question Card media in algebra learning at the junior high school level. The findings of this study are also expected to serve as a reference for teachers and learning media developers in designing more effective, enjoyable, and adaptive learning strategies to meet the needs of today's students.

## RESEARCH METHOD

### 2.1 Research Design

This research uses a qualitative approach with a case study design. This approach was chosen because it provides an in-depth understanding of students' subjective experiences in the context of using Question Cards in algebra learning. Case studies are well-suited to exploring complex and contextual phenomena, such as the dynamics of student interactions with innovative learning media in mathematics classes. can deliver more effective, supportive efforts to increase understanding and acceptance to digital-based learning innovation (Behnamnia, 2020; Kim, 2020; Malla, 2023).

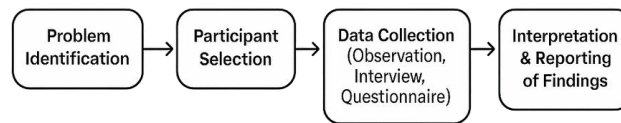


Figure 1. Qualitative Research Design

### 2.2 Subjects and Sampling Technique

The research subjects consisted of 26 seventh-grade B students at SMP Darul Ulum 5 Rebalas. Participants were selected purposively, taking into account gender representation, variations in mathematics achievement, and willingness to participate in learning using Question Cards. Purposive sampling is a common technique used in qualitative research to obtain rich and relevant data.

### 2.3 Data Collection Techniques

Data collection was conducted using three main methods: classroom observation, interviews, and student response questionnaires. This combination of methods aimed to obtain comprehensive and

complementary data (data triangulation). Classroom observations included direct observation of student interactions with the Question Card media during algebra lessons, recording classroom dynamics, participation, and student engagement (Cornwall, 2025). Through interviews, students' experiences, perceptions, and challenges related to the use of the Question Card media were explored personally. These interviews were conducted in a semi-structured manner, allowing students to express their opinions freely but in a focused manner. The student response questionnaire was used to measure student interest, attention, and engagement using validated indicators, while also providing space for students to provide open-ended feedback.

This mind map illustrates the three main data collection techniques used to obtain in-depth, triangulated data (Moreno-Guerrero, 2020).

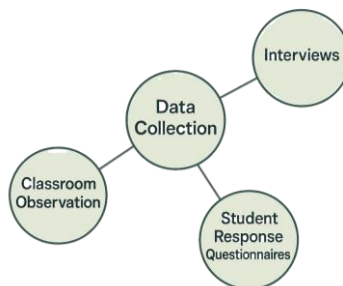


Figure 2. Mindmap Data Collection Techniques

### 2.4 Data Analysis Techniques

Data analysis was conducted thematically, following the following stages (Irfan, 2020; Mulenga, 2020): (1) data transcription, (2) open coding, (3) categorization, (4) theme identification, and (5)

interpretation. This process enabled researchers to identify patterns in student experiences, perceptions of the Question Card media, and challenges faced during learning (Davis, 2021). Thematic analysis is highly recommended in educational research to explore student experiences and perceptions in depth.

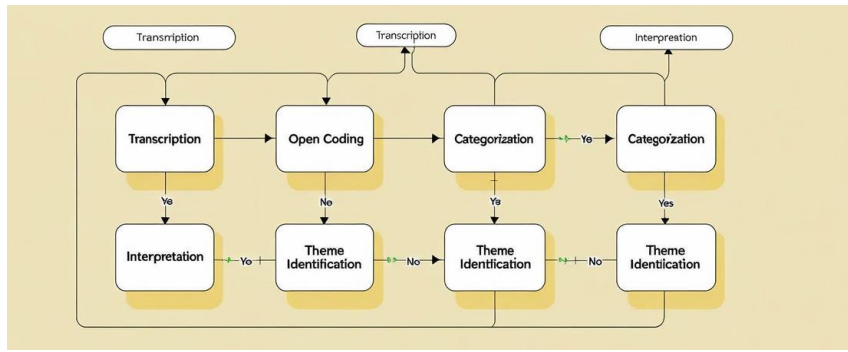


Figure 3. Thematic Data Analysis Flowchart

2.5 Data Validity and Reliability

Data validity was maintained through method triangulation (observation, interviews, questionnaires), member checking (confirming results with participants), and peer debriefing (discussions with fellow researchers) (Kaiser, 2022; andika setyo budi Lestari et al., 2022; Wankerl, 2023). Reliability was strengthened by an audit trail, which involves detailed and consistent recording of the analysis process (Gülü, 2023; Manda, 2021; Ok, 2020). This strategy aligns with current best practices in qualitative educational research.

2.6 Research Procedures

The research was conducted in several stages (Bockenbauer, Julliard, Lo, & ..., 2002; Demri, 2023): (1) preparation and permitting, (2) participant selection, (3) data collection, (4) data analysis, and (5) reporting results. Each stage was carried out systematically to ensure the achievement of the research objectives. The following table illustrates the sequence and timing of each research stage, ensuring a well-structured and scheduled process.

Table 1. Timeline of Research Procedures

Stage	Week 1	Week 2	Week 3	Week 4
Preparation and Permits	✓			
Participant Selection	✓	✓		
Data Collection		✓	✓	
Data Analysis			✓	✓
Results Reporting				✓

RESULTS

3.1 Summary of Findings

This study found that the use of Question Cards in algebra learning at SMP Darul Ulum 5 Rebalas significantly increased student interest,

attention, and engagement. Student interest was high (74.7%), with engagement and attention indicators also showing high percentages. Most students felt the learning was more interactive, enjoyable, and helped them understand abstract algebraic concepts. However, a small number of students still preferred conventional methods, necessitating further adaptations.

Table 2. Summary of Key Findings

Indicator	Percentage (%)	Category Main	Description
Learning Interest	74,7	High	Students are enthusiastic and interested in the Question Cards
Engagement	73,7	High	Students actively ask questions and express their opinions
Attention	76,6	High	Students are focused and motivated during learning
Conventional Comfort	49,0	Low	Some students are still comfortable with the old method

3.2 Data Analysis

The data analysis process was conducted thematically, including transcription, open coding, categorization, theme identification, and interpretation. Qualitative data from observations, interviews, and questionnaires were processed to identify patterns in student experiences. The following bar chart shows the percentage of each

student interest indicator, with enjoyment being the highest. Further analysis showed that enjoyment (81.7%) and attention (76.6%) were the highest, indicating that students enjoyed and focused on using the Question Cards. The interest indicator (66.8%) was the lowest, but still in the high category. This may indicate that some students still need to adapt.

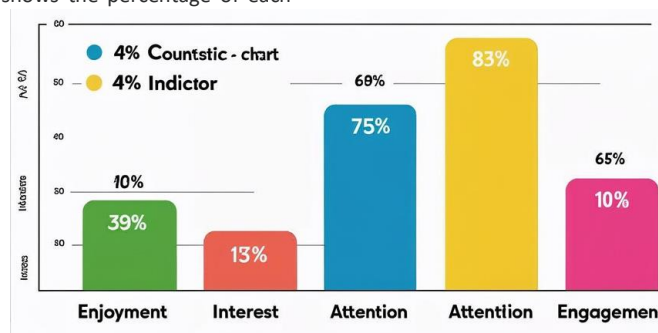


Figure 4. Percentage of student Interest Indicator for Question Cards

## DISCUSSION

The results of this study reinforce previous findings that interactive learning media, such as Question Cards, can increase student interest and engagement in mathematics learning. The strength of Question Cards lies in their ability to transform abstract algebra learning into something more concrete and enjoyable through collaborative and competitive activities (relay games) (Birgin, 2020; Crespo, 2020; Rohimah, 2024). This aligns with trends in the development of

mathematics education media that emphasize interactivity, gamification, and student-centered learning.

Compared to other interactive media such as math e-comics and the Magic Shop board game, Question Cards offer a unique feature in the form of structured questions that facilitate discussion, questioning, and the expression of opinions. However, challenges remain, especially for students who are more comfortable with conventional methods, necessitating adaptation strategies and further training for teachers.

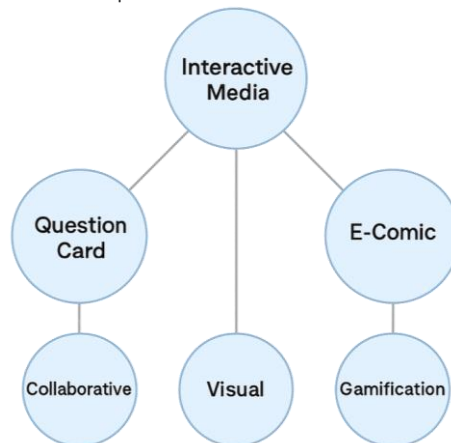


Figure 5. Comparison of Interactive Media

The image above compares the advantages of Question Cards with other interactive media such as e-comics and board games.

The use of Question Cards has proven effective in increasing junior high school students' interest, attention, and engagement in algebra learning. Students perceived learning to be more interactive, enjoyable, and facilitated their understanding of abstract concepts. This finding supports the initial hypothesis that interactive media can be an innovative solution in mathematics learning, particularly algebra, at the junior high school level.

### 4.1 Increasing Student Interest and Engagement through Question Cards

The results of this study consistently show that the use of Question Cards in algebra learning significantly increases student interest, attention, and engagement. This finding is reflected in the percentage of students' learning interest, which is in the high category (74.7%), with indicators of enjoyment reaching 81.7%, attention 76.6%, and engagement 73.7%. This improvement is not only quantitative but also qualitative, with students reporting that learning has become more enjoyable, interactive, and facilitates the understanding of algebraic concepts previously considered abstract and difficult (Afni, 2020; Sözen, 2024; Wu, 2020). This phenomenon aligns with the research findings of Afifah & Putri (2021), which showed that interactive media such as math e-comics can improve students' understanding and interest in mathematics. Similarly, Qisma & Afifah (2024) emphasized that game-based board games can create a more lively and collaborative learning environment, enabling students to be more actively involved in the learning process.

### 4.2 Critical Analysis of the Effectiveness of Question Cards

The effectiveness of Question Cards in increasing student interest and engagement can be analyzed from two main perspectives: interactive media design and a collaborative learning approach. The visually appealing Question Card design, which adopts a relay game format, has been shown to facilitate discussion, encourage questioning, and encourage students to express their opinions. This supports constructivist theory, which emphasizes the importance of direct experience and social interaction in building knowledge. Furthermore, validation by media and materials experts yielded high scores (88-89%), indicating that this media meets the standards of suitability and

effectiveness for use in the classroom. However, it's worth noting that the interest indicator remains at its lowest level (66.8%), indicating that some students require more time to adapt to the new method. This finding aligns with research by Maghfiroh et al. (2025), which highlights the importance of addressing student motivation and anxiety in innovative media-based mathematics learning.

### 4.3 Reflection on Implementation Challenges and Student Preferences

Although the majority of students responded positively to the use of Question Cards, some students still felt more comfortable with conventional methods (Goldberg, Fishkin, Gujar, Mynatt, & ..., 2007; Nemudryi, Valetdinova, Medvedev, & Zakian, 2014; Yang, 2021). This indicates challenges in the adaptation process, both from the students and teachers. Preference for conventional methods can be caused by established learning habits, a lack of media literacy, or anxiety about change. This reflection is important to consider in the future development of learning media, so that they can accommodate the diverse needs and characteristics of students. Research by Lestari & Afifah (2023) also confirms that the success of learning media is greatly influenced by the readiness of students and teachers to accept innovation, as well as the support of a conducive learning environment.

### 4.4 Comparison with Previous Research and Practical Implications

Compared to previous research, Question Cards offer a unique feature in the form of structured questions that encourage collaboration and healthy competition among students. Unlike e-comics, which emphasize visual and narrative aspects, or board games that emphasize gameplay, Question Cards integrate cognitive, affective, and social aspects in a balanced manner. The practical implications of these findings include the need for teacher training to optimize the use of Question Cards, as well as the development of similar media that can be adapted for a variety of other mathematics materials. Furthermore, integrating Question Cards with digital technology could be a strategic step to increase the appeal and accessibility of mathematics learning in the digital age.

### 4.5 Impact and Contribution of Research to the Development of Mathematics Learning Media

The primary impact of this research is the proof that Question Card media is an innovative alternative capable of addressing the challenges

of algebra learning at the junior high school level (Afni, 2020; Mailizar, 2020; Mulenga, 2020). This media not only increases student interest and engagement but also helps them develop a more concrete and meaningful understanding of concepts. This research contribution enriches the literature on the development of interactive mathematics learning media and provides empirical references for teachers, media developers, and education policymakers in designing more effective and adaptive learning strategies. This research also opens up opportunities for further exploration of the integration of Question Card media with technology-based learning approaches and instructional differentiation based on student needs. Thus, this discussion confirms that Question Card media has significant potential to revolutionize mathematics learning at the junior high school level, particularly in algebra, while still considering implementation challenges and adaptation needs for all education stakeholders.

## CONCLUSION

Based on the results of research conducted on the use of Question Cards in algebra learning in junior high schools, it can be concluded that this media is effective in increasing student interest, attention, and engagement. Data analysis shows that students' learning interest is high (74.7%), with indicators of engagement and attention also showing high percentages. Most students stated that learning became more interactive, enjoyable, and helped them understand abstract algebraic concepts. Question Cards were also considered practical, easy to use, and able to concretely understand difficult mathematical concepts, thus facilitating understanding and increasing student engagement in the learning process.

However, this study also found that some students still felt more comfortable with conventional learning methods. This indicates that although Question Cards have many advantages, further adaptation and mentoring are still needed so that all students can experience the optimal benefits of using this interactive media. Furthermore, limitations in teacher technology use are also challenges that need to be addressed to support the more widespread and effective implementation of Question Cards.

Overall, this study confirms that Question Card media can be an innovative alternative in mathematics learning, particularly algebra, to enhance students' active and meaningful learning experiences. These findings also strengthen the literature on the importance of using interactive media in mathematics education to overcome the challenges of conventional learning and improve student learning outcomes.

## RECOMMENDATIONS

Based on the research findings, several recommendations can be made, including the development of similar media, teacher training, adaptation and differentiation approaches, further research, and ongoing evaluation and feedback. It is recommended to develop and expand the variety of interactive learning media such as Question Cards for various mathematics topics to overcome student boredom and increase learning motivation. Teachers need regular training and mentoring to optimally utilize interactive media, so that media and technology literacy among teachers can support the successful implementation of Question Cards in the classroom. Adaptive approaches and instructional differentiation are needed to accommodate students who are comfortable with conventional methods, combining Question Cards with other methods to actively engage all students. It is recommended that further research involve more participants from various schools and grade levels, and integrate quantitative data to strengthen the findings, including exploring the integration of Question Cards with digital technology. Regular evaluation and feedback from students and teachers are important to identify the strengths and weaknesses of the media so that development and implementation can be refined as needed. By

considering these recommendations, it is hoped that the use of Question Cards and other interactive media can be further optimized in mathematics learning at the junior high school level, creating a more active, enjoyable, and meaningful learning experience for all students.

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