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# IMPLEMENTATION OF INTERACTIVE DIGITAL LEARNING MEDIA ON MATHEMATICS LEARNING INTEREST OF GRADE X STUDENTS

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**ABSTRACT**

Mathematics learning still shows that some students pay less attention to explanations and are not actively involved during learning. This study aims to describe the implementation of interactive digital learning media and students' interest in learning mathematics after its use. The study used a mixed methods approach with an explanatory sequential design , involving 17 10th grade students on the Sequences and Series material. The media used was an interactive Canva-based presentation combined with YouTube, Educaplay, and Wordwall. Data were collected through a learning interest questionnaire, observations during two meetings, and interviews with three students and one education practitioner. The data were analyzed descriptively and thematically, then integrated. The results showed that students' interest in learning mathematics reached 87.94%, categorized as very high. Responses to the media obtained the highest percentage of 95%, while involvement or activeness obtained the lowest percentage of 77%, categorized as high. The results of observations and interviews also showed a positive response from students to the media used. Thus, the implementation of interactive digital learning media received a positive response, and students' interest in learning mathematics after its use was in the very high category.

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## INTRODUCTION

The development of digital technology provides opportunities for educators to deliver more engaging, interactive, and varied learning. In mathematics learning, digital media can present material through a combination of text, images, animation, audio, and video, providing a more diverse learning experience. (Çeken & Taşkın, 2022) explain that the application of multimedia learning principles requires attention to how information is presented within the learning environment. Therefore, digital media not only serves as a means of delivering material but can also support student engagement during learning.

One important aspect in mathematics learning is students' interest in learning, which is related to feelings of pleasure, interest, attention, and involvement in learning activities. (Hidi & Renninger, 2006) through the Four-Phase Model of Interest Development explains that interest can develop from situational interest that arises due to certain conditions or activities to a more maintained individual interest. (Friantini & Winata, 2019) also examined interest in learning mathematics through a descriptive approach using a questionnaire. Based on this foundation and adjustments to the research context, interest in learning in this study was operationalized through six indicators, namely feelings of pleasure, interest, attention, involvement or activeness, learning motivation, and response to media.

Various studies have examined the use of digital media in learning. (Asria et al., 2021) discussed student enthusiasm in learning evaluation using Quizizz, while (Syaifuddin & Rahmasari, 2023) examined responses, learning interest, and conceptual understanding through the same application. (Emalfida, 2024) discussed the synergy of Canva and Wordwall in digital learning, while (Nurliah et al., 2025) examined the use of both platforms in mathematics learning. (Nur et al., 2026) also developed Canva-based interactive media for the topic of Sequences and Series. In the international literature, (Valero Larico et al., 2026) through a systematic review of 49 studies showed various applications of digital applications in secondary mathematics learning. These various studies demonstrate the use of digital technology in material presentation, exercises, and evaluation. However, studies regarding the integration of several platforms with different functions in a single learning series and the response of student learning interests in the context of its implementation still need attention.

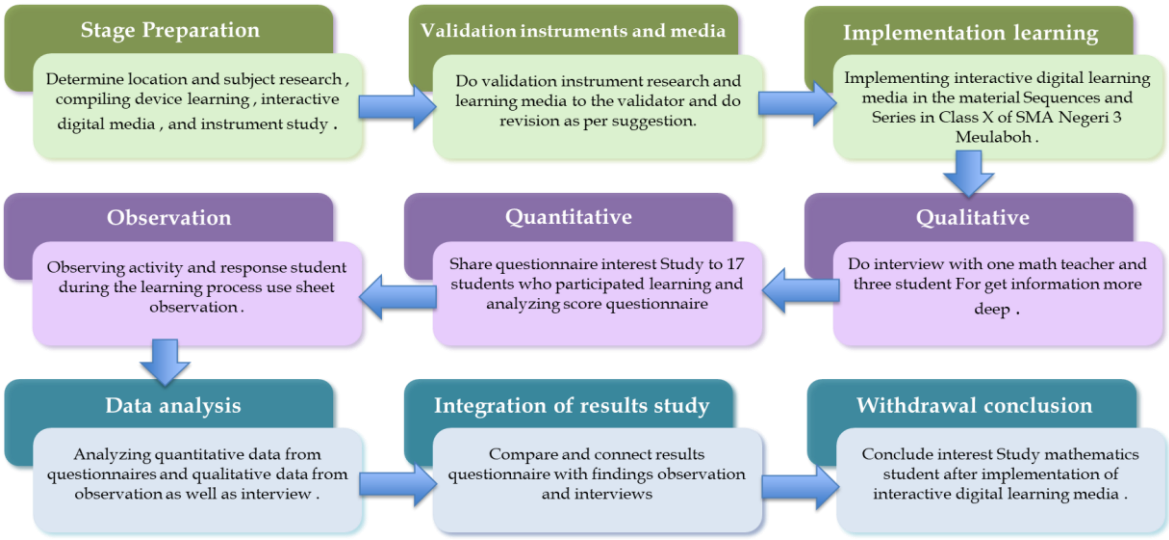
This research is based on initial observations in grade X of SMA Negeri 3 Meulaboh. During mathematics lessons, researchers noted that some students paid little attention to the teacher's explanations, rarely asked questions, and were not actively involved. Furthermore, daily grade recaps indicated that some students' achievement did not meet the Minimum Completion Criteria (KKM) of 75. The observation notes describe student behavior during learning, while the grade recap provides information on learning outcomes; neither is a direct measure of learning interest. These conditions became a consideration for presenting more varied learning through the integration of several digital platforms. Canva was used to present the material, YouTube as a supporting medium, Educaplay for interactive exercises, and Wordwall for game-based evaluations on the Sequences and Series material.

Different from studies that focus on a single platform, the integration of two media, or product development, this study examines the implementation of four digital platforms with complementary functions in a series of mathematics learning. In addition to describing the implementation, this study describes students' learning interests after implementation through a questionnaire supported by observation and interview results. Thus, this study aims to describe the implementation of interactive digital learning media and the mathematics learning interests of grade X students at SMA Negeri 3 Meulaboh after implementation. The results of the study are expected to provide an empirical overview and become a consideration for teachers in selecting and integrating digital media according to the needs of mathematics learning.

## RESEARCH METHODS

### Types and Design of Research

This study employed a mixed methods approach with an Explanatory Sequential Design , which involved collecting and analyzing quantitative data, followed by qualitative data, to provide a more in-depth explanation of the quantitative results (Toyon, 2021) . The quantitative stage involved a learning interest questionnaire administered after learning with interactive digital media. The questionnaire results then guided further research through interviews with educational practitioners and three students, in line with the integration principle of this design (Jackson-Gordon & Plano Clark, 2024) . Observations during learning were used as supporting data to describe student activities and responses. The association of quantitative findings with qualitative data was carried out as part of the data integration process (Jackson-Gordon & Plano Clark, 2024) .




Source: Processed by researchers (2026).

**Figure 1. Research implementation flow.**

**Place and Subject of Research**

The research was conducted at SMA Negeri 3 Meulaboh, West Aceh Regency, in February 2026 in learning the material of Sequences and Series. The subjects of the research were 30 students of grade X. A total of 17 students were present and filled out the questionnaire, so that all questionnaires were used as quantitative data. Qualitative data were obtained through interviews with one mathematics teacher and three students who were selected purposively based on their activeness and responses during the learning process .

**Research Instruments**

The research instruments included a learning interest questionnaire, observation sheets, interview guides, and documentation. The questionnaire consisted of 24 statements based on six indicators of learning interest with a five-choice Likert scale. The observation sheet consisted of 11 items covering student activities and responses during two meetings. The interview guides were used to elicit teacher and student responses regarding media use. The learning instruments and media were validated by two validators, a Mathematics Education lecturer and a mathematics teacher, and were declared suitable for use with minor revisions.

**Data Collection Procedures**

Data collection began with a lesson on Sequences and Series using an interactive Canva-based presentation combined with YouTube, Educaplay, and Wordwall. Observations were conducted during the lesson to record student activities and responses. After the lesson, a questionnaire was administered to the students in attendance. The questionnaire results were then used as the basis for further in-depth interviews with one mathematics teacher and three students. Documentation was used as supplementary data.

**Data Analysis and Integration Techniques**

The questionnaire data was analyzed descriptively through scoring and percentage calculations. Positive statements were scored 5–1, while negative statements were reverse-scored 1–5. The percentage of learning interest was calculated using the formula:

$$P = \frac{S}{S_{maks}} \times 100\%$$

Information:

- $P$ = Percentage of learning interest score
- $S$ = Total score obtained
- $S_{max}$ = Maximum score

Calculations are made on the overall score and each indicator. Percentages are interpreted into five categories: 0–20% (very low), 21–40% (low), 41–60% (sufficient), 61–80% (high), and 81–100% (very high).

Interview data was analyzed thematically by grouping responses based on six indicators of learning interest and other emerging themes (Xu & Zammit, 2020) . Observational data was analyzed descriptively based on the scores for each item and their percentages. Furthermore, the results of the questionnaire, interviews, and observations were compared in a joint display to identify any congruences or discrepancies in the findings.

**Research Ethics**

The research was conducted with the permission of the school. Students gave their consent to participate, while the identities of the informants were kept confidential, using the codes S1–S3 for students and P for teachers.

## RESULTS AND DISCUSSION

### RESULTS

**Overview of the Implementation of Interactive Digital Learning Media**

Interactive digital learning media was implemented in mathematics lessons on Sequences and Series in grade 10 of SMA Negeri 3 Meulaboh. The media used was an interactive presentation based on Canva as the primary medium for delivering the material. This media was designed by combining text, images, color, animation, video, and links to interactive activities. It contains several menus, namely instructions for use, motivation, apperception, icebreakers , materials, and interactive quizzes.

The learning process began with introductory activities and apperception through illustrations of saving activities, namely Rp1,000, Rp2,000, and Rp3,000. These illustrations were used to connect students' everyday experiences with the concept of number patterns that form the basis for learning Sequences and Series. Next, the material was delivered through a Canva presentation with navigation buttons that made it easy to move between menus. YouTube videos were also used as supporting *icebreaker* activities to provide variety in the learning process.

In addition to the presentation of the material, the media included interactive quiz activities using Wordwall and Educaplay . Students were divided into groups of three to participate in the learning activities. One activity involved a representative selecting a

mystery box containing a question on the Wordwall . This activity gave students the opportunity to discuss the questions and share their answers with their group members.

Based on observations during the learning process, the use of interactive digital media provided a variety of activities through visual presentations, videos, and quizzes. Students followed learning stages involving media use and group activities. Observations of the learning process also provided insights into student attention, responses, and engagement during the activities. These observational findings provided supporting data for understanding the implementation of interactive digital learning media, which were further supplemented by the results of the learning interest questionnaire and interviews.

**Results of the Mathematics Learning Interest Questionnaire**

Data on mathematics learning interest were obtained through a questionnaire completed by 17 10th-grade students after the implementation of interactive digital learning media. The questionnaire consisted of 24 statements covering six indicators: enjoyment, interest, attention, involvement or activeness, learning motivation, and response to the media. Scoring used a Likert scale with five answer options. Negative statements were scored in reverse order to ensure all scores had the same direction.

The analysis results show that the overall score obtained was 1,794 out of a maximum score of 2,040, with a percentage of 87.94%. The percentage of learning interest based on each indicator is presented in Table 1.

**Table 1. Percentage of Students' Interest in Learning Mathematics Based on Indicators**

| No | Learning Interest Indicator | Percentage | Category |
|---|---|---|---|
| 1 | Feeling happy | 91% | Very high |
| 2 | Interest | 89% | Very high |
| 3 | Attention | 85% | Very high |
| 4 | Involvement/activeness | 77% | Tall |
| 5 | Motivation to learn | 90% | Very high |
| 6 | Response to media | 95% | Very high |
| | **Overall percentage** | **87.94%** | **Very high** |

*Note: The percentage of each indicator is rounded to the nearest whole number, while the overall percentage is presented to two decimal places.*

Based on Table 1, the response indicator to media achieved the highest percentage at 95%, followed by feelings of enjoyment at 91% and learning motivation at 90%. Furthermore, interest achieved 89% and attention at 85%. Meanwhile, involvement or activeness achieved the lowest percentage at 77%, although it is still in the high category. Thus, five indicators are in the very high category and one indicator is in the high category.

Overall, the questionnaire results showed that students' interest in learning mathematics after the implementation of interactive digital learning media was in the very high category, with a percentage of 87.94%. The high percentage of responses to the media indicates positive student acceptance of its use in learning. The relatively lower percentage of involvement or activeness indicates that active student participation is still an aspect that needs attention. These findings provide an overview of students' interest in learning mathematics after participating in learning using interactive digital media.

**Interview and Observation Results**

Qualitative data were obtained through interviews with three students (undergraduate, master's, and doctoral), one educational practitioner (P), and observations during two meetings. The student interviews used ten questions, while the educational practitioner interviews used six questions. Thematic analysis yielded six themes based on learning interest indicators and two additional themes: understanding of the material and implementation constraints. These findings were then integrated with the questionnaire results, as presented in Table 2.

**Student interviews.** All three students reported that learning using interactive digital media was more engaging and less boring than learning using only textbooks. S1 liked the colorful displays, animations, and interactive quizzes, which increased her enthusiasm for working on the problems. S3 stated that the media helped her focus better, be more active in completing assignments, and be more confident in answering and asking questions. Meanwhile, S2 felt that the example of saving activities helped her understand the material. All three students also hoped that the media would be used again in mathematics lessons.

**Interviews with educational practitioners.** Educational practitioners (P) assessed that the use of media provided a positive response to the atmosphere and student engagement in learning. Students appeared more enthusiastic, focused, and active in answering questions, discussing, taking quizzes, and expressing opinions. According to P, visual displays and animations helped attract students' attention and concretely explain abstract mathematical concepts. P also assessed that the media was suitable for continued use. However, its implementation still faces obstacles in the form of sometimes unstable internet connections and power outages that make the infocus and smartboard unusable.

**Observation.** The results of observations during two meetings showed a score of 51 out of a maximum score of 55 or 92.73% based on 11 observation items with a scale of 1–5. A score of 5 was obtained for seven aspects, namely positive student expression, interest in

media displays, attention to media, focus on teacher explanations, activeness in answering questions, positive responses to media, and media assistance in understanding the material. Meanwhile, four other aspects obtained a score of 4, including feelings of happiness, not doing other activities, activeness in asking questions, and involvement in completing assignments. In addition, students appeared enthusiastic when they learned that a quiz would be held and were eager to answer the questions given.

**Integration of Quantitative and Qualitative Findings**

Data integration is presented in the form of a joint display (Jackson-Gordon & Plano Clark, 2024) in Table 2. Student informants are coded S1–S3, and educational practitioners are coded P.

**Table 2. Joint Display of Questionnaire, Interview, and Observation Data Integration**

| Indicator | Questionnaire | Interview | Observation | Integration |
|---|---|---|---|---|
| **Feeling happy** | 91% | S1–S3 are happier because learning is not boring; P: the atmosphere is more lively | 90% | Convergent |
| **Interest** | 89% | S1 likes colors, animations, and quizzes; P: learning is more interesting | 100% | Convergent |
| **Attention** | 85% | S3 is more focused; S2 is helped by examples of saving; P: visuals increase attention | 93.33% | Convergent |
| **Involvement/activeness** | 77% | S3 is more daring in asking and answering questions; P: students actively answer and discuss | 86.67% | Partially divergent |
| **Motivation to learn** | 90% | S1 is more enthusiastic because of the quiz; S1–S3 wants the media to continue | – | Convergent |
| **Response to media** | 95% | S1–S3 want the media to continue; P: the media is suitable for continued use | 100% | Convergent |

Source: Processed by researchers (2026).

Based on Table 2, data integration indicates consistent findings across five indicators: enjoyment, interest, attention, learning motivation, and media response.

Meanwhile, the engagement or activeness indicator shows some divergence. The questionnaire obtained a percentage of 77%, while interview and observation results illustrated relatively positive student engagement, each supported by observation results of 86.67%.

These differences can be understood based on the characteristics of the data sources. The three students interviewed were selected based on their active learning experience, so they may not necessarily represent the experiences of all questionnaire respondents. Furthermore, observations describe student behavior during learning activities, while questionnaires record individual student responses. Therefore, these differences indicate variations between individual experiences and observed behavior during learning.

Furthermore, education practitioners reported challenges such as unstable internet connections and power outages. Students' and practitioners' statements about learning being more engaging than before are perceptions based on their experiences, not evidence of a quantitative increase in learning interest.

## DISCUSSION

### Students' Interest in Learning Mathematics after the Implementation of Interactive Digital Media

The questionnaire results showed that students' interest in learning mathematics after the implementation of interactive digital learning media reached an overall percentage of 87.94%, categorized as very high. These results illustrate students' positive response to learning that combines material presentation, visual elements, videos, and interactive quizzes. The use of these various features provides variety in learning activities, allowing students not only to receive explanations of the material but also to participate in interactive activities.

These findings can be explained through the interest development model (Hidi & Renninger, 2006) , which states that interest can begin with situational interest due to stimulation from the learning environment. In this study, visual displays, animations, and interactive quizzes have the potential to attract students' attention during learning. However, these results only describe learning interest after media implementation and do not yet demonstrate long-term interest development.

The results of this study are similar to those of Mirnawati et al., 2024 , who found the influence of interactive learning media on students' interest in learning mathematics. The similarity lies in the study of the use of interactive media in mathematics learning and

its relationship to learning interest. However, the study (Mirnawati et al., 2024) used an ex post facto quantitative approach in eighth grade students, while this study focuses on the implementation of interactive digital media in tenth grade students using a mixed methods approach. These differences indicate that this study provides additional insights through a combination of questionnaires, observations, and interviews.

This finding is also relevant to research by Fauziah et al., 2024 , which implemented interactive media using Canva and Wordwall in mathematics learning through the Problem-Based Learning (PBL) model. The study reported positive results on student interest and learning outcomes. Although both utilized interactive digital media in 10th-grade mathematics learning, this study did not apply PBL as the primary model, but instead described the implementation of media that combined Canva, YouTube, Educaplay, and Wordwall in the Sequence and Series material.

Furthermore, Halawa et al. (2025) reported that the use of Wordwall-based media was related to interest in learning mathematics, while Zulfa & Perwita (2025) discussed positive responses to student interest and engagement after the digitalization of learning media. Aditya & Imami (2024) provided a basis for measuring interest in learning mathematics through several indicators, such as feelings of enjoyment, interest, attention, and involvement. These various studies reinforce the relevance of utilizing digital media in mathematics learning, despite differences in research design, respondent characteristics, materials, and instruments used.

Thus, the 87.94% percentage in this study indicates that students' interest in learning mathematics was in the very high category after the implementation of interactive digital learning media. These results provide insight into students' responses in the learning context under study, but cannot be interpreted as evidence of increased interest compared to before the media was used.

**Analysis of Learning Interest Based on Six Indicators**

Interest in learning mathematics in this study was analyzed based on six indicators that describe students' responses during learning using interactive digital media.

**1. Feeling of Happiness**

The feeling of enjoyment indicator achieved a percentage of 91%. These results indicate that students responded positively to the learning environment. Interviews with S1 also indicated that the use of color, animation, and quizzes made learning more engaging

and less boring. This aligns with Hidi & Renninger (2006) , who explained that stimulation from the learning environment can foster students' situational interest.

**2. Interest**

The interest indicator achieved a percentage of 89%. Student interest was evident in their responses to the presentation of the material and the interactive activities used during the lesson. The use of visual displays and quizzes through Wordwall and Educaplay provided a variety of activities that could capture students' attention. This finding is relevant to research (Halawa et al., 2025) , which showed that Wordwall media can support interest in learning mathematics through interactive activities.

**3. Attention**

The attention indicator achieved a percentage of 85%. Observations showed that students paid attention to the presentation of the material and responded to the activities displayed. The use of text, images, animations, and videos provided variety in the delivery of the material, ensuring that learning did not occur solely through verbal explanations. This aligns with (Çeken & Taşkın, 2022) , who emphasized the importance of paying attention to how information is presented in a multimedia learning environment. Therefore, the combination of visual and video elements in the media used can support the presentation of the material while also helping to capture students' attention during learning.

**4. Involvement or Activeness**

The engagement or activeness indicator achieved a percentage of 77%, the lowest compared to the other five indicators, although still in the high category. Based on observations, students were involved in group activities and interactive quizzes, including answering questions through mystery boxes. Interview results also showed that the interviewed students gave positive responses, such as being more confident in asking and answering questions. However, the questionnaire results indicated that active involvement was not felt equally by all respondents. This difference indicates that positive responses during learning activities do not fully reflect the involvement of each student. Therefore, opportunities for participation need to be provided more evenly through the management of group discussions and interactive activities.

**5. Motivation to Learn**

The learning motivation indicator achieved a percentage of 90%. These results illustrate students' positive response to learning activities using interactive digital media. The varied presentation of materials and quizzes provided diverse learning experiences

and opportunities for students to actively participate. Research (Wahyuni et al., 2025) also discussed the relationship between Wordwall use and student interest and motivation in mathematics learning. However, motivation and interest remain two distinct concepts despite their interconnectedness in the learning process.

**6. Response to Media**

The media response indicator achieved the highest percentage, at 95%. These results indicate that students responded positively to the media used. Interviews with undergraduate students indicated an interest in color, animation, and interactive quizzes, while undergraduate students also responded positively to digital media-assisted learning. These findings demonstrate that visual elements and interactive features are the elements that garner positive student acceptance.

Based on these six indicators, media response achieved the highest percentage, while engagement or activeness achieved the lowest percentage. These results indicate that positive media reception does not necessarily translate into uniform active engagement. Therefore, the use of interactive digital media requires learning management that encourages participation from all students.

**The Contribution of Interactive Digital Learning Media to the Mathematics Learning Experience**

The interactive digital learning media used in this study presented a variety of learning experiences through a combination of materials, visual displays, animations, videos, and interactive quizzes. The use of Canva as the primary medium, connected to YouTube, Wordwall , and Educaplay, enabled the Sequence and Series material to be presented through explanations and activities that involved student responses. This combination of multimedia elements aligns with a study by (Çeken & Taşkın, 2022) , which describes the application of various multimedia learning principles in a learning environment to support information presentation and the learning process.

The contribution of media is seen through the variety of learning activities. Apperception using examples of saving patterns connects the material to everyday life, while ice-breaking videos provide a variety of activities. Quizzes using Wordwall and Educaplay also provide opportunities for students to answer questions and participate in group activities. These findings align with research (Fauziah et al., 2024) , which implemented interactive media such as Canva and Wordwall in 10th-grade mathematics learning and reported positive results on student interest and learning outcomes. However, that study combined media with the Problem-Based Learning model for exponents, while

this study focuses on the implementation of interactive digital media for Sequences and Series. The similarities in media use and the context of mathematics learning indicate that interactive media can be utilized to provide more varied and engaging learning activities.

The positive student response to media use was reflected in the questionnaire results, with the media response indicator achieving the highest percentage at 95%. Interview results indicated that color, animation, and quizzes were student-preferred features. These findings align with observations that demonstrated student attention and participation during learning. Thus, the results of the questionnaire, interviews, and observations provide a complementary picture of student acceptance of the use of interactive digital media.

However, interactive digital media is a supporting tool and not the sole factor determining learning interest. Teachers still play a role in directing activities, explaining material, and encouraging student engagement. Therefore, media utilization requires effective learning management to ensure optimal use of available features.

**Implications and Limitations of the Research**

The results of this study have implications for mathematics instruction, particularly the use of interactive digital media to support student learning. Teachers can utilize Canva combined with videos and interactive quizzes to present material in a more varied way. Visual elements, animations, and interactive activities can be alternatives for delivering engaging learning experiences. However, teachers must still ensure the involvement of all students to ensure that learning activities are not dominated by just a few.

This study has several limitations. First, the study was conducted in a single class at SMA Negeri 3 Meulaboh, involving 17 students who participated in the learning process and completed the questionnaire. Therefore, the results cannot be broadly generalized to students with different characteristics and school environments. Second, the measurement of learning interest was conducted after the media implementation without a pretest and a comparison group. Therefore, the results only describe students' learning interest after the media use and cannot confirm any improvement or causal relationship. Third, qualitative data were obtained through observations and interviews with one mathematics teacher and three students. These data provide supporting information regarding the learning process and student responses, but do not fully describe the experiences of all students.

Based on these limitations, further research is recommended involving more respondents, multiple classes or schools, and using pre- and post-implementation measurements. The use of a comparison group may also be considered to obtain stronger

evidence regarding changes in student learning interests. Furthermore, studies of different materials, educational levels, and student characteristics could broaden our understanding of the use of interactive digital learning media in mathematics learning.

## CONCLUSIONS AND SUGGESTIONS

### Conclusion

Based on the research results, the implementation of interactive digital learning media on the Sequences and Series material in class X of SMA Negeri 3 Meulaboh received a positive response from students. The questionnaire results showed that students' interest in learning mathematics after the media implementation reached an overall percentage of 87.94%. The response indicator to the media obtained the highest percentage of 95%, while involvement or activeness obtained the lowest percentage of 77%. The results of interviews and observations also supported these findings, especially in showing positive student responses to visual displays, animations, interactive quizzes, and variations in learning activities. Overall, interactive digital learning media can be an alternative to support more varied and interesting mathematics learning. However, the results of this study describe students' interest in learning after the media implementation and have not shown any improvement compared to conditions before the use of the media.

### Suggestion

Based on the research findings, mathematics teachers are advised to utilize interactive digital learning media as an alternative in presenting material and developing varied learning activities. Teachers also need to provide equal opportunities for participation to all students, especially in group discussions and interactive quizzes. For future researchers, this study can be expanded by involving a more diverse number of respondents and schools, and using measurements of learning interest before and after media implementation as well as a comparison group. Thus, further research can provide a broader picture and stronger evidence regarding changes in mathematics learning interest through the use of interactive digital media.

## REFERENCES

Aditya, MS, & Imami, AI (2024). Measuring the learning interests of eleventh-grade high school students in the mathematics learning process. *JP2M (Journal of Mathematics Education and Learning)* , *10* (1), 209–215. https://doi.org/10.29100/jp2m.v10i1.5398

Asria, L., Sari, DR, Ngaini, SA, Muyasaroh, U., & Rahmawati, F. (2021). Analysis of student enthusiasm in learning evaluation using the Quizizz platform. *Alifmatika: Journal of Mathematics Education and Learning* , *3* (1), 1–17. https://doi.org/10.35316/alifmatika.2021.v3i1.1-17

Çeken, B., & Taşkın, N. (2022). Multimedia learning principles in different learning environments: A systematic review. *Smart Learning Environments* , *9* . https://doi.org/10.1186/s40561-022-00200-2

Emalfida. (2024). Synergy of Canva and Wordwall in digital learning for generation Z at SMA Negeri 11 Banda Aceh. *Fitrah: Journal of Educational Studies* , *14* (2), 229–240. https://doi.org/10.47625/fitrah.v14i2.801

Fauziah, L., Warsodirejo, PP, & Tanty, H. (2024). Implementation of the PBL (Problem Based Learning) Model Assisted by Interactive Media to Improve Interest and Learning Outcomes in Class X of SMA Negeri 2 Medan. *Journal on Education* , *7* (1), 8026–8036. https://doi.org/10.31004/joe.v7i1.7615

Friantini, RN, & Winata, R. (2019). Analysis of learning interest in mathematics learning. *JPMI (Jurnal Pendidikan Matematika Indonesia)* , *4* (1), 6–11. https://doi.org/10.26737/jpmi.v4i1.870

Halawa, PMA, Telaumbanua, YN, Mendrofa, RN, & Lase, S. (2025). Development of mathematics learning media using Wordwall to improve students' interest and learning outcomes. *Kognitif: Journal of HOTS Research in Mathematics Education* , *5* (4), 1655–1668. https://doi.org/10.51574/kognitif.v5i4.3816

Hidi, S., & Renninger, K. A. (2006). The four-phase model of interest development. *Educational Psychologist* , *41* (2), 111–127. https://doi.org/10.1207/S15326985EP4102_4

Jackson-Gordon, R., & Plano Clark, V. L. (2024). Using a joint display for building integration in a sequential study: Informing data collection for a participatory second phase. *Journal of Mixed Methods Research* , *18* (2), 137–146. https://doi.org/10.1177/15586898231179848

Mirnawati, Takdir, & Irmayanti. (2024). The Influence of Interactive Learning Media on Mathematics Learning Interest in Students of UPTD SMPN 7 Sinjai. *Journal of Mathematics (JTMT)* , *5* (2), 160–165. https://doi.org/10.47435/jtmt.v5i2.3234

Nur, IRD, Mohamed, M., & Kossahdasabitah, A. (2026). Development of interactive learning media using Canva for teaching sequences and series in senior high school. *Mosharafa: Journal of Mathematics Education* , *15* (1). https://doi.org/10.31980/mosharafa.v15i1.3494

Nurliah, A., Rosmayanti, N., & Afriansyah, EA (2025). *Enhancing elementary students' understanding of whole numbers through canva and wordwall in ICT-integrated realistic mathematics education* . *04* (02), 817–826.

Syaifuddin, M., & Rahmasari, E. (2023). Students' response, learning interest, and conceptual understanding ability of two-dimensional figures in junior high school: A study on the use of the Quizizz app. *Mosharafa: Journal of Mathematics Education* , *12* (3), 571–586. https://doi.org/10.31980/mosharafa.v12i3.828

Toyon, MAS (2021). Explanatory sequential design of mixed methods research: Phases and challenges. *International Journal of Research in Business and Social Science* , *10* (5), 253–260. https://doi.org/10.20525/ijrbs.v10i5.1262

Valero Larico, D., Benavente Gutierrez, M. A., Talavera-Mendoza, F., & Rucano Paucar, F. H. (2026). Digital applications in mathematics learning for secondary school students: A systematic literature review. *Eurasian Journal of Mathematics, Science and Technology Education* , *22* (1). https://doi.org/10.29333/ejmste/17760

Wahyuni, RT, Azizah, N., Nugroho, GE, Tsaniyah, SM, Camarasari, P., & Subekti, H. (2025). Wordwall on the effectiveness, motivation, and interest in learning fractions: Voice from student version. *Kalamatika: Journal of Mathematics Education* , *10* (2), 1–16. https://doi.org/10.22236/KALAMATIKA.vol10no2.2025pp1-16

Xu, W., & Zammit, K. (2020). Applying thematic analysis to education: A hybrid approach to interpreting data in practitioner research. *International Journal of Qualitative Methods* , *19* . https://doi.org/10.1177/1609406920918810

Zulfa, Z., & Perwita, D. (2025). Digitalization of learning media: A comparative study on metacognitive ability, learning interest, and activeness in Islamic High School 2 Banyumas Excellent Class. *Journal of Educational Technology Innovation* , *12* (2), 156–165. https://doi.org/10.21831/jitp.v12i2.77455