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Learning Media to Improve Mathematical Literacy

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Abstract Mathematical literacy is a mathematical ability that requires logical problem solving and critical reasoning abilities so that you can solve problems in everyday life. A person's mathematical literacy ability can be influenced by several factors, one of which is environmental factors, including the use of learning media in the teaching and learning process. This research uses the Systematic Literature Review (SLR) method to identify and analyze various studies that are relevant to answering research questions. Data collection was carried out by reviewing several national articles obtained from the Google Scholar, Semantic Scholar and Sinta databases. The results obtained show that interactive learning media is a media that is often used to improve students' mathematical literacy skills from 2020-2024. The use of interactive learning media can improve students' mathematical literacy skills by helping them be more involved in learning, increasing understanding of concepts, improving problem solving, and helping them visualize abstract or difficult-to-imagine objects so they can implement them in everyday life.

Keywords: mathematical literacy, systematic literature review, learning media

INTRODUCTION

Mathematics is a very important science used both in life and as a language and tool in the development of science and technology (Puspaningtyas & Marchamah Ulfa, 2020). Meanwhile, mathematics learning is a process where students can actively construct mathematical knowledge (Ulfa, 2019). There are five components to the standard mathematics learning process, including: problem solving ability, connection ability, communication ability, reasoning ability, and

representative ability. These abilities will be achieved if you apply mathematical literacy skills in learning (Rizqiyani et al., 2022).

Mathematical literacy is a mathematical ability that requires logical problem solving and critical reasoning abilities so that you can solve problems in everyday life (Amelia et al., 2023). Mathematical literacy according to the Oxford dictionary is (1) the ability to read and write; and (2) competence or knowledge in a particular field. Thus, mathematical literacy is the ability to read and write as well as knowledge in the field of mathematics. Meanwhile, the Program for International Student Assessment (PISA) states that mathematical literacy is the skill to formulate, apply and interpret mathematics in various contexts such as mathematical reasoning abilities, involving the ability to use concepts, procedures and facts to describe, explain or predict a phenomenon or incident.

Mathematical literacy is not just memorizing formulas, but also being able to use them logically and critically to solve problems. Mathematical literacy is very important because it can train and develop students' potential, especially cognitive potential, such as high-level thinking skills which include logical, critical, structured and creative thinking (Hasibuan et al., 2022). The concept of literacy supports students in developing a strong understanding of mathematical concepts so that it can help them in exploring abstract mathematics.

The focus of discussion in mathematical literacy is active involvement in mathematics, which includes mathematical reasoning using concepts, procedures, facts and mathematical tools in describing, explaining and predicting phenomena. Mathematical literacy emphasizes three main abilities, namely formulate, employ (use), interpretation (interpret). In more detail, Zahroh et al., (2020) explained that (1) the ability to formulate, apply and interpret mathematics in various contexts which is hereinafter referred to as mathematical processes, (2) the involvement of mathematical reasoning and the use of mathematical concepts, facts and tools to describe , explain and predict phenomena, and (3) the benefits of mathematical literacy skills, namely that they can help someone apply mathematics into everyday life as a form of constructive and reflective community involvement. The mathematical literacy process starts from identifying realistic problems and

formulating them. Mathematical problems are based on the concepts and relationships inherent in the problem, then after obtaining the appropriate mathematical form the next step is to apply mathematical procedures to produce mathematical results that can be interpreted back into the initial problem (Baroroh et al., 2019).

There are several factors that influence the low level of mathematical literacy, according to (Masjaya & Wardono, 2018) personal, environmental and educational factors have an influence on students' mathematical literacy abilities. Students' personal factors can influence their opinions about mathematics and their beliefs about their mathematical abilities. Meanwhile, environmental factors that can influence mathematical literacy skills are the use of learning media (Fajriati & Murtiyasa, 2023).

Learning media is really needed to help improve students' mathematical literacy skills. It is hoped that learning media can stimulate students to carry out the teaching and learning process concretely or in accordance with their daily lives. In some media, it is hoped that mathematical material can be clearly visualized or displayed in a real way so that students can imagine it so they can apply it in everyday life.

However, there are still few learning media available to help improve mathematical literacy skills. Therefore, researchers conducted a literature review related to mathematics learning media to increase mathematics literacy in Indonesia.

METHOD

The method used in this research is Systematic Literature Review (SLR). Triandini et al., (2019) revealed that by using the systematic literature review method a researcher will carry out a review by systematically identifying several journals according to the steps that have been determined. The steps in question are identifying, reviewing, evaluating and interpreting all available research.

The first step in using the systematic literature review method is to create a research question. The following are the research questions in this study:

RQ1. What learning media are often used to improve students' mathematical literacy from year to year 2020-2024?

RQ2. Why is this learning media suitable to be used to improve mathematical literacy skills student?

RQ3. How are students' mathematical literacy abilities after using this learning media?

The article search process was carried out by researchers using a search engine (Google) with the site address https://sinta.kemdikbud.go.id/, https://semanticscholar.org and, https://scholar.google.com/. Then articles will be selected if they have the following criteria:

1. The data used is related to learning media to improve mathematical literacy skills
2. The data used is in the 2020-2024 time period
3. Data obtained from the sites sinta.kemendikbud, google.scholar, and semantic.scholar.

Next, the data found will be evaluated based on the following quality assessment criteria questions:

QA1. Are journal papers published in 2020-2024?

QA2. Does the journal paper write down the reasons for choosing the learning media used for improve students' mathematical literacy skills?

QA3. Is there a change in students' mathematical literacy abilities after using the media learning?

From each article an answer value will be given below for each question above

1. Y (Yes): for the answer Yes
2. T (No): for the answer No

RESULT AND DISCUSSION

Table 1. Quality assessment results

No	Writer	Title	Year	QA1	QA2	QA3	Results

1.	Tommy Tanu Wijaya, Wahyu Hidayat, Ying Zhou	Development of Interactive Learning Video on Linear Program	2020	Y	Y	Y	√
2.	Galuh Supra Romadhani, Nailul Munna, Ellya Pabella Oktaviani, Adi Satrio Ardiansyah, Muhammad Asikin	Pengembangan Media Pembelajaran Berbasis Gamification dan Literasi Matematika pada Model Flipped Classroom untuk Siswa	2021	Y	Y	Y	√
3.	Tiara Habibi Suwandi, Syahlan, Isnaini Halimah Rambe	Pengembangan Media Pembelajaran Berbasis Creative Problem Solving Berbantuan Aplikasi Wordwall untuk Meningkatkan Kemampuan Literasi Matematika	2022	Y	Y	Y	√
4	Enggar Tri Aulia, Rully Charitas Indra Prahmana	Developing Interactive E-Module Based On Realistic Mathematics Education Approach And Mathematical Literacy Ability	2022	Y	Y	Y	√
5	Edi Susanto, Agus Susanta	Efektivitas E-Modul Interaktif Berbasis Pembelajaran Project Ditinjau dari Kemampuan Literasi Matematika dan Kepercayaan Diri	2022	Y	Y	Y	√

		Mahasiswa					
6.	Dhiya Fathiyyah Firdaus, Suripah, Lilis Marina Angraini	Development of Animated Video-based Mathematics Learning on the three dimensional Material of Class XII SMA to Improve Mathematical Literacy	2023	Y	Y	Y	√
7.	Sovi Endah Nurhayati, Supratman, Diar Veni Rahayu	Pengembangan Media Pembelajaran Interaktif Berbantuan Canva for Education dengan Pendekatan RME untuk Meningkatkan Kemampuan Literasi Matematika	2023	Y	Y	Y	√
8.	Poppy Yaniawati, Dahlia Fisher, Yudi Dwi Permadi, Siti Ainor Mohd Yatim	Development of Mobile-Based Digital Learning Materials in Blended Learning Oriented to Students' Mathematical Literacy	2023	Y	Y	Y	√
9.	Afnita Agil Syahdela, Junarti, Fifi Zuhriah	Literasi Matematika Siswa dalam Pembelajaran Melalui Media Quizizz	2023	Y	Y	Y	√
10.	Dewi Anggraeni, Supratman, Mega Nur Prabawati	Pengembangan Media Pembelajaran Interaktif Berbasis Android Menggunakan	2023	Y	Y	Y	√

		Articulate Storyline 3 untuk Mengeksplor Kemampuan Literasi Matematika				
11.	Neza Agusdianita, Yusnia, and Melisa	Pengaruh Pembelajaran Matematika Berbantuan Media Video Pembelajaran Berbasis STEAM Terhadap Kemampuan Literasi Numerasi Siswa Kelas V SD Negeri 01 Kapahiang	2024	Y	Y	Y	√

Symbol description:

√:for articles or data used in research. The data was chosen because it has a problem, approach, and sufficient information for data selection

×: For articles or data that are not used in research because the data contains insufficient information for data selection.

Table 2. Title and Research Methods

Article Title	**Level**	**Research methods**
Development of Interactive Learning Video on Linear Program	SENIOR HIGH SCHOOL (Linear Programming)	Research & Development
Pengembangan Media Pembelajaran Berbasis Gamification dan Literasi Matematika pada Model Flipped Classroom untuk Siswa	JUNIOR HIGH SCHOOL (build a side room flat)	Research & Development
Pengembangan Media Pembelajaran Berbasis Creative Problem Solving Berbantuan Aplikasi Wordwall untuk Meningkatkan Kemampuan	Vocational School (SPLDV)	Research & Development

Literasi Matematika		
Developing Interactive E-Module Based On Realistic Mathematics Education Approach And Mathematical Literacy Ability	SMP (number patterns)	Research & Development
Efektivitas E-Modul Interaktif Berbasis Pembelajaran Project Ditinjau dari Kemampuan Literasi Matematika dan Kepercayaan Diri Mahasiswa	Student mathematics education study program	Quasi experiment
Development of Animated Video-based Mathematics Learning on The Three-dimensional Material of Class XII SMA to Improve Mathematical Literacy	SMA (Dimenthree)	Research & Development
Pengembangan Media Pembelajaran Interaktif Berbantuan Canva for Education dengan Pendekatan RME untuk Meningkatkan Kemampuan Literasi Matematika	SMP (build a side room curved)	Research & Development
Development of Mobile-Based Digital Learning Materials in Blended Learning Oriented to Students' Mathematical Literacy	SMA (Number Sequences and Series)	Research & Development
Literasi Matematika Siswa dalam Pembelajaran Melalui Media Quizizz	JUNIOR HIGH SCHOOL (comparison)	Quasi experiment
Pengembangan Media Pembelajaran Interaktif Berbasis Android Menggunakan Articulate Storyline 3 untuk Mengeksplor Kemampuan Literasi Matematika	JUNIOR HIGH SCHOOL (cubes and blocks)	Research & Development
Pengaruh Pembelajaran Matematika Berbantuan Media Video Pembelajaran Berbasis STEAM Terhadap Kemampuan Literasi Numerasi Siswa Kelas V SD Negeri 01	Elementary School (Mathematics)	Quantitative research

Kapahiang

RQ1. What learning media are often used to improve students' mathematical literacy from 2017-2024?

From the 11 articles that have been selected, the results obtained show that in 2020-2024 the learning media that is often used to improve students' mathematical literacy skills is interactive learning media. Interactive learning media is a combination of two or more media (audio, text, graphics, images, animation and video) whose use is manipulated or treated to control a command and/or natural behavior of a lesson/presentation. This learning media has controls so that it can be operated directly by the user. In this research, the interactive learning media includes: video-assisted learning, Wordwall, Adobe After Effects, and Canva for Education-assisted media,

RQ2. Why is this learning media appropriate to use to improve students' mathematical literacy skills?

Of the 11 articles reviewed, the research used interactive learning media. In this research, this media helps students become more involved in learning, improve understanding of concepts or material, improve independent problem solving, and visualize abstract or difficult-to-imagine objects so they can implement them in everyday life. This is supported by the statement by Husna et al (2022) that interactive learning media can make it easier for students to understand the material explained by the teacher.

Table 3. Reasons for choosing media

Article Title	Level	Reasons for Media Selection
Development of Interactive Learning Video on Linear Program	High School (Linear Program)	Dynamic Mathematics is included in the learning video to help students visualize how to draw graphs of two linears and determine the area of solution to linear programming problems. Hawgent's Dynamic Mathematics

		Software combined with learning videos makes learning videos more interesting. Directs students to carry out problem solving patterns consisting of analysis, planning, implementation and evaluation. So that students get used to forming a problem-solving mindset both in daily activities and in working on mathematics problems at school, especially for linear programming material
Pengembangan Media Pembelajaran Berbasis Gamification dan Literasi Matematika pada Model Flipped Classroom untuk Siswa	SMP (build a flat side room)	This gamification-based media is expected to improve student performance in activities and strive to stimulate motivation to increase ranking in the game. Research also reveals that students are more engaged, motivated and have a positive impact on social skills when using these media.
Pengembangan Media Pembelajaran Berbasis Creative Problem Solving Berbantuan Aplikasi Wordwall untuk Meningkatkan Kemampuan Literasi Matematika	Vocational School (SPLDV)	The wordwall application was chosen because the use of the application is quite easy and can be accessed easily by teachers and students. Apart from that, in the wordwall application we can also make quizzes or evaluation materials more interesting
Developing Interactive E-Module Based On Realistic	SMP (number patterns)	Teaching materials are components that support students' mathematical

Mathematics Education Approach And Mathematical Literacy Ability		literacy. Teaching materials are an important source of material in carrying out the learning process for teachers. In the era of the industrial revolution 4.0, teaching materials are needed that follow the needs of the times. The development of science and technology is an electronic module (e-module) which can make students more enthusiastic in studying and understanding the material provided by the teacher. Apart from that, e-modules are teaching materials created by teachers to support the teaching and learning process, and students can learn independently in the era of the 4th industrial revolution.
Efektivitas E-Modul Interaktif Berbasis Pembelajaran Project Ditinjau dari Kemampuan Literasi Matematika dan Kepercayaan Diri Mahasiswa	Program students educational studies mathematics	The use of e-modules in learning makes it possible to modify teaching materials to be more interesting, such as by adding image, audio and video facilities so as to create a student learning experience, increase learning motivation and improve problem solving abilities
Development of Animated Video-based Mathematics Learning on The Three-dimensional Material of Class XII SMA to Improve	SENIOR HIGH SCHOOL (three dimensions)	Adobe After Effects is a software that creates animation works and visual effects that is used for multimedia presentations and various advertising animations, one of which is animation

Mathematical Literacy		tutoring. By using the effects available in Adobe After Effects, animated video-based learning media is expected to generate and increase students' imagination so that students' mathematical literacy can increase.
Pengembangan Media Pembelajaran Interaktif Berbantuan Canva for Education dengan Pendekatan RME untuk Meningkatkan Kemampuan Literasi Matematika	SMP (build a curved side room)	Canva for education was chosen because it has several benefits, including: 1) utilizing free editing tools; 2) providing educational templates for a variety of subjects, levels and resources; 3) offer interesting feedback in the form of text stickers or illustrations; 4) can be integrated with various online learning platforms. Meanwhile, the RME approach was chosen because this approach connects mathematical concepts with real world situations, showing that mathematics is closely related to human activities. Based on this, it is hoped that students will be able to overcome challenges mathematics they may encounter in everyday life
Development of Mobile-Based Digital Learning Materials in Blended Learning Oriented to Students' Mathematical Literacy	SMA (Number Sequences and Series)	Mobile learning is known as a learning channel for technology-ready people. This channel requires infrastructure and educators adequate with basic teaching skills. Mobile technology is a new

		technology in the world of education. Technology currently has an impact on all levels of society, whether rich or poor, educated or not, because its access power can be used for almost anything. Devices that enable learning Mobile includes cell phones and computers
Literasi Matematika Siswa dalam Pembelajaran Melalui Media Quizizz	JUNIOR HIGH SCHOOL (comparison)	Quizizz reflects the learning approach 4.0, where technology is used to support student-centered, interactive and skills-based learning, because this application is used to measure student participation, interest, motivation and learning outcomes in the learning process as well as its easy use and student assessment can processed quickly. Apart from that, the benefits of quiziz include: 1) contributing to improving learning outcomes in cognitive aspects or students' knowledge, especially in problem solving; 2) Quizizz can contribute to increasing student competence and educator creativity. ;3) using Quizizz as a game media can increase student interest and learning outcomes in mathematics subjects. This indicates that the interactive and game elements in Quizizz can make learning more interesting and interesting

		has a positive impact on student achievement
Pengembangan Media pembelajaran Interaktif Berbasis Android Menggunakan Articulate Storyline 3 untuk Mengeksplor Kemampuan Literasi Matematika	JUNIOR HIGH SCHOOL (cube and beam)	Articulate Storyline 3 is part of several software programs available to produce Android-based interactive learning media. Articulate storyline 3 can be published via LMS where LMS can be developed in materials, videos and evaluation questions so that students have experience learning is more fun and interactive
Pengaruh Pembelajaran Matematika Berbantuan Media Video Pembelajaran Berbasis STEAM Terhadap Kemampuan Literasi Numerasi Siswa Kelas V SD Negeri 01 Kapahiang	Elementary School (Mathematics)	According to Elihami, et al (2018) that video media is a medium that presents information in sound and visual form. The use of video involves the most senses compared to other teaching aids, through video students can see and hear. Learning media will be more meaningful if it is involved with one of the learning approaches. One suitable learning approach is the STEAM approach. STEAM-based learning videos can be an effective tool in improving students' understanding and skills in the field of STEAM science. Learning videos given in science learning need an approach that is based on students' daily realities, so it is important to have an approach such as STEAM in making

	learning videos.

RQ3. How are students' mathematical literacy abilities after using this learning media?

Students' mathematical literacy abilities after using interactive learning media experienced a significant increase. The following are the research results of each interactive media

Table 4. Results of students' mathematical literacy abilities

Article Title	Research result
Development of Interactive Learning Video on Linear Program	The validation results from media experts and material experts show that learning videos are suitable for application to students. In school implementation, learning videos are also made using constructive problem solving steps for students to form thinking patterns and understand basic concepts in linear programming. The results of this research also contribute to achieving better mathematics learning goals based on the use of video-based learning in improving high school students' mathematical abilities (Wijaya et al., 2020).
Pengembangan Media Pembelajaran Berbasis Gamification dan Literasi Matematika pada Model Flipped Classroom untuk Siswa	The student response test score is 100% with very good criteria, so this media development meets students' needs well (Romadhoni et al., 2021).

Pengembangan Media Pembelajaran Berbasis Creative Problem Solving Berbantuan Aplikasi Wordwall untuk Meningkatkan Kemampuan Literasi Matematika	The effectiveness of the learning media met 7 indicators, namely: The results of the mathematical literacy ability test in the first trial given to students reached the good category where there were 16 students who passed with a percentage of 53% and in the second trial it reached the very good category where there were 27 students who completed it with a percentage of 53%. completed with a percentage of 90%. The achievement of complete learning objectives in trial I and trial II which were formulated reached more than 70% of each learning objective. Students' mathematical literacy abilities in trial I increased by 0.43 with "Medium" category and in trial II there was an increase of 0.73 in the "High" category (Suwandi et al., 2022).
Developing Interactive E-Module Based On Realistic Mathematics Education Approach And Mathematical Literacy Ability	The RME-based e-module on number patterns for class VIII students is proven to be valid, practical, and has the potential to influence students' mathematical literacy skills. The research results show that the e-module developed is valid from the assessment of media and material experts as well as student comments at the expert review and one-to-one stages with very good criteria. Furthermore, the e-module developed is practical from assessing student responses at the small group stage and field test stage with good criteria. Finally, the potential effect of the e-module obtained at the field test stage shows a significant difference in

	students' mathematical literacy abilities after using the e-module based on the average pretest and posttest scores. Furthermore, students' mathematical literacy abilities increased by 32% with moderate criteria. Thus, RME-based e-modules on number pattern material have been proven to improve students' mathematical literacy skills. In addition, other researchers are advised to manage time well when implementing RME-based e-modules. This is because implementing this e-module takes time which is longer than other approaches (Aulia & Prahmana, 2022).
Efektivitas E-Modul Interaktif Berbasis Pembelajaran Project Ditinjau dari Kemampuan Literasi Matematika dan Kepercayaan Diri Mahasiswa	The calculation results of the average literacy ability after the experimental class and control class treatment were 81.25 and 62.91 respectively. Then the students' mathematical literacy skills are more than 70 (KKM). Apart from that, the increase in mathematical literacy skills is also marked by independent learning carried out by students outside of class learning time (Susanto & Susanta, 2022).
Development of Animated Video-based Mathematics Learning on The Three-dimensional Material of Class XII SMA to Improve Mathematical Literacy	Animated video-based learning media was declared very valid with a result of 73, very practical with a result of 56, and effective in increasing mathematical literacy. This states that animation-based video learning media is good and suitable for use as a mathematics learning media for improve mathematical literacy (Firdaus et al., 2023).

Pengembangan Media Pembelajaran Interaktif Berbantuan Canva for Education dengan Pendekatan RME untuk Meningkatkan Kemampuan Literasi Matematika	There was an increase in students' mathematical literacy skills after using this media as evidenced by the fulfillment of the attention function, affective function, cognitive function and compensatory function (Nurhayati et al., 2023).
Development of Mobile-Based Digital Learning Materials in Blended Learning Oriented to Students' Mathematical Literacy	Mobile-based digital learning materials applying the concept of sequence and number series have categories that are suitable for use. The application of mobile-based digital learning materials in blended learning of number sequences and series that are oriented towards students' mathematical literacy can be utilized and significantly increase the mathematical literacy of vocational school students. While using digital learning materials, students are accustomed to being more active in learning by discussing with their classmates. Practicing questions on digital learning materials is also based on indicators of mathematical literacy, so that students are accustomed to working on questions that are oriented towards their mathematical literacy. The mathematical literacy of vocational school students who use mobile-based digital learning materials in blended learning on sequences and number series is in the medium category. The highest overall percentage of mathematical literacy achievement is representation, meaning students can present problems well in the form of pictures or sketches. Meanwhile, the lowest

	percentage of mathematical literacy is designing problem solving strategies, meaning that students have not been able to determine the right strategy and solve problems well (Yaniawati et al., 2023).
Literasi Matematika Siswa dalam Pembelajaran Melalui Media Quizizz	Based on the results of the descriptive analysis of the percentage of students' mathematical literacy using the Quizizz learning media, (4%) students were able to reach level 4; (16.6 %) students are capable at level 3; (37.5%) students are capable at level 2; and (41.6)% of students are able to reach level 1. So it can be concluded that student literacy using Quizizz learning media is able to reach level 4 and this means that students can use effective skills in solving problems and then are able to explain the results of the answer by connecting it in the real world (Syahdela et al., 2023).
Pengembangan Media Pembelajaran Interaktif Berbasis Android Menggunakan Articulate Storyline 3 untuk Mengeksplor Kemampuan Literasi Matematika	After carrying out the pretest and posttest, it can be concluded that there has been an increase in students' mathematical literacy skills (Anggraeni et al., 2023).
Pengaruh Pembelajaran Matematika Berbantuan Media Video Pembelajaran Berbasis STEAM Terhadap Kemampuan Literasi Numerasi Siswa Kelas V SD Negeri 01 Kapahiang	Based on research results, the average value of the experimental learning class using STEAM-based learning video media was 72.50, higher than The average value of the learning control class using conventional methods and image media is 59. The results of the hypothesis test show

	that the t value using Equal Variences Assumed = 3.418 and the Sig. (2-tailed) has a value of 0.002 and the ttable distribution value is 1.686. So tcount> ttable (3.418 > 1.686) and Sig.(2-tailed) 0.002< 0.05. Based on the results of this research, it can be concluded that there is a significant influence of the use of STEAM-based video learning media on the numeracy literacy abilities of class V students at SD Negeri 01 Kepahiang (Agusdianita et al., 2024).

Based on the analysis of the articles that have been carried out, it emerged that the learning media that tends to be used to improve mathematical literacy skills in the last 5 years is interactive learning media, where the use of the media is manipulated or treated to control a command in learning. Meanwhile, the reason for choosing interactive learning media is to help students become more involved in learning, increase understanding of concepts or material, improve independent problem solving, and visualize abstract or difficult-to-imagine objects so they can implement them in everyday life. The use of interactive learning media has been proven to improve students' mathematical literacy skills based on the research results in these articles.

CONCLUSION

Based on the results of the research conducted, several conclusions can be drawn, including:

1. Instructional Media which is often used to increase students' mathematical literacy from 2020-2024 is interactive learning media
2. The reason for using interactive learning media to improve students' mathematical literacy skills is because this media helps them be more involved in learning, improve understanding of concepts or material, improve independent problem solving, and visualize abstract or difficult-to-imagine objects so they can implement them in their daily lives. -day.

3. There was an increase in students' mathematical literacy skills after using interactive learning media

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