

Learning Media Recommendations and Criteria for the Validity of Junior High School Mathematics Learning Media Books

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ABSTRACT

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The low quality of education and the achievement of school accreditation, where one of the assessed aspects is the learning process that should be technology-based, demand teachers to develop instructional media. This research aims to develop reference books and establish criteria for mathematical learning media for junior high school. The research method used is Design Research, which involves the following steps: problem identification and analysis, prototype drafting, prototype testing, and improvement. The research is conducted by reviewing theories and research findings, followed by the development of a learning media reference book that will serve as a teacher's guide for creating mathematics learning media for junior high school. The developed book is then validated by three experts in the field of mathematical learning media, including lecturers and mathematics teachers for junior high school. The conclusion of this study is that interactive learning is an effective medium for mathematics education. Some interactive media that have an impact on math learning outcomes include interactive PowerPoints, instructional videos, and Geogebra. To further enhance the development of learning media, a mathematics learning media reference book has been created specifically for junior high school. This reference book meets valid criteria in terms of material aspects, language usage, presentation of content, and infographics.



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A. INTRODUCTION

According to Section 3 of Law No. 20 of 2003 regarding the National Education System, national education is aimed at developing abilities and shaping the character and civilization of a dignified nation. Its purpose is to educate the nation's life by developing the potential of students to become individuals who are faithful, obedient, noble, healthy, knowledgeable, capable, creative, independent, and responsible democratic citizens. This section implies that education should foster the creativity and knowledge skills of students.

Various efforts made by the government in implementing education to fulfill the mandate of the law include improving public access to schools, enhancing the quality of teachers, improving educational facilities and infrastructure, and developing the curriculum. However, the overall quality of education in Indonesia remains low, including in West Nusa Tenggara. Based on the Regional Education Balance Sheet in 2019, the average national examination results in West Nusa Tenggara were 45.62, compared to the national average of 52.82.

According to the results of the teacher competence test in 2019, the average competence of teachers in West Nusa Tenggara was 52.38. School accreditation results at the junior high school level indicate that 20.5% have received accreditation A, 47.9% have received accreditation B, 25.6% have received accreditation C, and 6.1% have not been accredited. The pedagogical competence of teachers in West Nusa Tenggara is 49.42, below the minimum standard of 55. Clearly, this competence is far below the established minimum standard. Pedagogical competence refers to a teacher's ability to teach or relate to the learning process in the classroom. This competence greatly determines the success of the teaching and learning process in the classroom.

The low achievement of school accreditation in West Nusa Tenggara is also heavily influenced by the quality of teachers as facilitators in the learning process. This can be seen in the Minister of Education and Culture's decision No. 1005/P/2020 regarding IASP 2020 (Instrument for Accreditation of Educational Units). In IASP 2020, there are four assessment components: Graduate Quality, Learning Process, Teacher Quality, and School Management.

The component of teacher quality consists of the following: Teachers develop active, creative, and innovative lesson plans by optimizing the environment and utilizing Information and Communication Technology (ICT) or other suitable methods according to the context. Teachers engage in continuous professional development to enhance their knowledge, skills, and insights. Teachers develop creative and innovative strategies, models, methods, techniques, and learning media. Based on the aforementioned points, Information and Communication Technology (ICT), professional development, and instructional media development become crucial aspects for teachers.

The development of ICT-based instructional media is crucial and should be implemented by teachers. This is because it significantly influences students' attitudes, interests, and motivation, ultimately determining their learning outcomes. In the context of mathematics learning and teaching, the integration of technology is highly necessary for constructing students' new knowledge (Nwigbo & Madhu, 2016). Students can build new knowledge with the help of technology in the form of mathematics instructional media. Interactive mathematics instructional media is essential, as it allows students to actively engage with the media. In mathematics education, interactive media such as PowerPoint-based materials that are attractive and innovative are needed. Interactive multimedia is highly suitable for both face-to-face and remote learning settings (Sakiah & Effendi, 2021). Interactive instructional media can also enhance students' mathematical abilities and change their attitudes towards mathematics, preventing boredom in the learning process (Prambudi & Yuniarta, 2020).

Teachers require reference books as guidance for developing instructional media. However, the availability of reference books specifically for mathematics instructional media is very limited, which hinders teachers from independently developing instructional media for mathematics teaching. According to a survey conducted on the use of teaching aids by middle and high school teachers in five districts and cities, 92.8% of teachers stated that mathematics lessons require instructional media. However, 21.4% of teachers never use media in mathematics teaching, and 67.8% of teachers use media 1-3 times per semester. Further surveys were conducted to gather information on the reasons why teachers do not use instructional media, with the aim of finding solutions. The survey results showed that 82.2% of

teachers have never attended training on instructional media, 85.7% of teachers do not have reference books on mathematics instructional media, and 50% of teachers face difficulties in preparing instructional media that can support their teaching.

The response from teachers regarding the statement of whether they need reference books that provide examples of mathematics instructional media for middle school material resulted in 89.3% stating that they highly need it. Therefore, based on the identified problem and the factors causing the problem, a reference book on Mathematics Instructional Media for middle school material will be developed.

Some students still struggle to understand mathematical symbols Mutammam et al. (2023), therefore, to improve their understanding, the use of instructional media is necessary. Instructional media can be integrated with specific models to effectively enhance students' competencies (Saryadi & Sulisworo, 2023). Additionally, TPACK-based learning should be implemented promptly (Juhaevah & Kaliky, 2023). Apart from technology-based media, instructional media can also involve the cultural elements surrounding the students (Irawan et al., 2022). Consequently, teachers should be able to create the necessary media for effective teaching.

Many studies have revealed the influence of instructional media on learning outcomes, particularly in mathematics education. One study stated that instructional media has an impact on learning outcomes (Supardi et al., 2015). Other research has identified various media that have an influence on learning outcomes. Some influential media include web-based interactive instructional media, Macromedia Flash-based instructional media, instructional videos, Cabri 3D, and Geogebra (Priyambodo et al., 2012); Ulfa & Saputra, 2019; Novita et al., 2019; Akhirni & Mahmudi, 2016). The findings of these studies indicate that instructional media plays an important role in improving mathematics learning outcomes. Teachers who teach mathematics are encouraged to incorporate technology into their teaching practices. The integration of technology in teaching can be achieved by utilizing technology-based instructional media in the learning process.

Technology-based instructional media needed for teaching and learning are not readily available in schools. Teachers need to develop the necessary instructional media to support their teaching activities. Teachers must be creative in developing instructional media that align with their specific needs. Attending workshops is essential for teachers to enhance their skills in developing instructional media. There are various teacher training activities that focus on developing Geogebra-based instructional media (Amrullah et al., 2021). Teachers can also participate in workshops that specifically cover the development of video-based instructional media (Azmi et al., 2021).

Training activities, workshops, and teacher forums are sometimes limited in terms of time and the level of support provided. However, teachers often require more intensive mentoring to develop appropriate instructional media that align with their needs. Therefore, it is important to develop reference books as a guide for teachers to determine and develop suitable instructional media. These reference books will provide comprehensive and structured resources that assist teachers in overcoming challenges in creating effective and contextually relevant learning materials.

Media is a tool used to convey messages in the context of learning activities, and the intended message is the subject matter (Sundayana, 2014). The term "instructional media" is often used interchangeably with terms such as instructional material, audio-visual communication, visual education, teaching aids, and explanatory media (Kustandi & Sutjipto, 2011). Media can be classified into two categories: media as a means of conveying information and media as a tool for imparting mathematical concepts (Suherman, 2003). Instructional media serves as both a teaching aid and a learning resource that students can use independently (Lestari, 2020). Instructional media serves several functions: (1) attracting students' attention; (2) facilitating faster comprehension in the learning process; (3) clarifying the presentation of messages; (4) overcoming spatial limitations; (5) promoting more communicative and productive learning; (6) allowing for flexible learning time; (7) preventing students from getting bored in their studies; (8) increasing students' motivation to learn; (9) accommodating various learning styles, and (10) enhancing student engagement in learning activities (Fathurrohman & Sutikno, 2007). Instructional media offers several benefits: (1) generating interest among learners; (2) reaching a larger target audience; (3) helping to overcome language barriers; (4) facilitating better information reception by learners; and (5) providing better perception (Sumiharsono & Hasanah, 2017). Furthermore, instructional media offers additional benefits, such as (1) fostering a learning spirit; (2) making learning more engaging; (3) enhancing interactivity in learning; and (4) improving students' positive attitudes toward the subject matter (Riana, 2009).

The criteria for selecting instructional media are as follows: (1) captivating students' interest in learning; (2) the material is useful for students. (3) The learning resource is relevant to the applicable curriculum; (4) the presented material is authentic and up-to-date; (5) the accuracy of facts and concepts is ensured; (6) the format of presenting the material is organized; (7) it does not contain any propaganda elements; (8) the narration, images, effects, colors, etc., meet the required standards; (9) the use of language, symbols, illustrations aligns with students' thinking level; and (10) Its validity has been proven (Fathurrohman & Sutikno, 2007).

The use of instructional media enhances students' motivation to learn (Aurora & Effendi, 2019). The utilization of mathematics instructional videos improves students' understanding of mathematical concepts (Gusmania & Wulandari, 2018). Visual media influences students' comprehension of concepts (Rosidah, 2016). Student motivation is crucial to consider in mathematics education as it determines students' understanding of mathematical concepts (Virgana et al., 2019). One influential media in enhancing understanding is Geogebra (Neneng, 2015). Geogebra instructional media has an impact on students' motivation (Widya, 2021).

Reference books are commonly used by students as reference materials for their courses. In the context of learning, reference books are primarily used as a source for exploring new understanding, comparing concepts, and as a reference for developing textbooks (Arifin & Kusrianto, 2009). Reference books are also defined as books that contain materials that can be used to find answers to problems related to a particular knowledge domain (Piranti & Muliwati, 2016). The differences between textbooks and reference books can be seen in Table 1 (Arifin & Kusrianto, 2009), as shown in Table 1.

Table 1. The Differences between Textbooks and Reference Books

Teaching Materials	Reference Book
Generating reader's interest.	Assuming the reader's interest
Written and designed for student use	Primarily written for use by lecturers
Designed for self-paced learning	Primarily written for use by lecturers
Based on competencies	Not based on competency
Developed based on students' needs and the final competencies to be achieved	Its structure is based on the logical progression of the subject matter (content)
Focused on providing opportunities for students to practice	Not necessarily providing exercises
Accommodating the learning difficulties of students	Not anticipating students' learning difficulties
Always providing summaries	May not necessarily provide summaries
Communicative writing style	Narrative writing style
Density based on student needs	Very dense
Packaged and used in the learning process	Packaged for research and learning purposes
Have a mechanism for collecting feedback from students (Worksheets)	Does not have a mechanism for collecting feedback from users.
Explaining how to study a textbook	Does not provide suggestions on how to study the book.

The components of the book's content feasibility include considering: (1) coverage of the material, which reflects the breadth of the material and concepts in line with the expected competencies; (2) accuracy of the material, ensuring the correctness of concepts, theories, and principles; (3) currency, with updated examples and in accordance with the development of knowledge; (4) fostering a sense of productivity; (5) fostering curiosity; (6) developing personal, social, academic, and vocational skills; (7) developing an attitude of appreciation; (8) presentation techniques. (9) supporting material presentation, ensuring the relevance and accuracy of illustrations to the content; (10) interactive and participatory material presentation that motivates students and focuses on student-centered learning; (11) attention to the language used; and (12) book layout and design (Arifin & Kusrianto, 2009).

B. METHODS

The type of research used is Design Research (Plomp & Nieveen, 2007). The research steps employed are adapted from the design (Reeves, 2006), as shown in Figure 1.

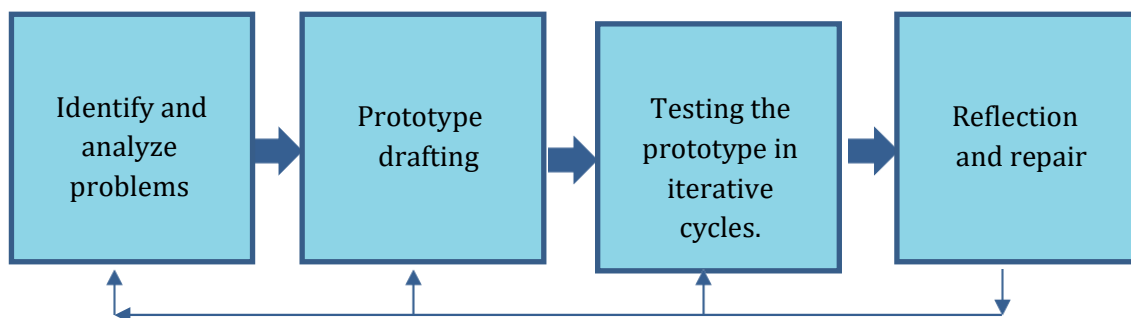


Figure 1. Design Research

Figure 1 shows the presence of iterative cycles as a characteristic of Design Research. The initial prototype, called Prototype I, is developed based on the findings from problem identification and analysis, addressing the current conditions and needs related to the existence of instructional media reference books. Prototype I is then tested in Phase I to evaluate whether the designed product meets the expected criteria. The results of the testing phase will be used to provide feedback and insights for necessary improvements. This process continues until the data becomes saturated and ready for testing on a wider subject population.

In Design Research, there are two types of evaluation: Formative Evaluation and Summative Evaluation. During the product development stage, Formative Evaluation is conducted to test the content validity, construct validity, practicality, and effectiveness of the product. On the other hand, Summative Evaluation involves testing the product on a larger subject population to evaluate its transferability. However, due to time constraints, this research only conducted testing until the content validity stage in the Formative Evaluation phase (Plomp & Nieveen, 2007). Data collection and data analysis in this study are tailored to the needs according to the stages in Design Research as in Table 2.

Table 2. Research Data Collection and Analysis Methods

No	Stages	Required Data	Methods of Data Collection	Methods of Data Analysis
1	Identification Problem and Needs Analysis	Needs of Teachers and Prospective Teachers in Junior High School Reference Books	Questionnaire aimed at mathematics teachers and prospective teachers at the junior high school and senior high school levels (or equivalent) in the city of Mataram.	Combined Method (Quantitative Descriptive and Qualitative Descriptive)
		The availability of widely circulated instructional media reference books.		
2	Prototype Development and Formative Evaluation	Content Validity	Literature review to compare the needs (ideal condition) of instructional media reference books with the current situation (real condition)	Descriptive Qualitative
			Expert Review (lecturers and mathematics teacher Junior High School)	Descriptive Quantitative

Data analysis of expert review results for each item using Aiken's V formula. (Azwar, 2012):

$$V = \frac{\sum s}{[n(c-1)]} \quad (1)$$

Information: $s = r - l_o$; l_o = lowest validity assessment numbers c = highest validity assessment figure r = numbers given by a validator.

C. RESULT AND DISCUSSION

The development of a mathematics instructional media reference book for junior high school (SMP) starts with a survey of the problems faced by mathematics teachers in teaching mathematics at junior high school. Based on the survey results regarding the use of teaching aids by junior high school (SMP) and senior high school (SMA) teachers in 5 districts and cities, it was found that 92.8% of teachers stated that the mathematics materials they taught required instructional media. 21.4% of teachers never used media in mathematics teaching, while 67.8% of teachers used media 1-3 times in a semester. Further surveys were conducted to gather information about the reasons why teachers did not use media, in order to find solutions. The survey results showed that 82.2% of teachers never attended training on media, 85.7% of teachers did not have reference books on Mathematics Instructional Media, and 50% of teachers faced difficulties in preparing instructional media that could support teaching. Based on these findings, what teachers need is mathematics instructional media, both for junior high school and senior high school levels.

Based on the stated problem, an analysis of the distribution of mathematics topics in junior high school was conducted. Junior high school was chosen because students' attitudes towards mathematics are influenced by their experiences in junior high school. The analysis resulted in the distribution of mathematics topics in junior high school. The analysis of the topics includes the mathematics curriculum for grades VII, VIII, and IX in both the first and second semesters. The topics covered are Numbers, Algebra, Geometry and Measurement, Statistics, and Probability.

The analysis of the mathematics topics that require instructional media indicates several topics that require instructional media, such as integer and fraction operations, linear equations, sets and Venn diagrams, geometry, function values, sketching function graphs, slope of a line, Pythagorean theorem, circles, tangent lines, inscribed and circumscribed circles of triangles, properties of three-dimensional shapes, congruence, similarity, cylinders, cones, and spheres.

Based on the mathematics topics that require instructional media, an analysis of instructional media applicable to mathematics teaching was conducted. The analysis resulted in the identification of technology-based instructional media, in accordance with Minister of Education and Culture Decree No. 1005/P/2020 regarding teacher quality and instructional quality, as well as Regulation of the Minister of Education and Culture No. 22 of 2016 Chapter III, which emphasizes the need to integrate information and communication technology effectively in teaching, based on the situation and conditions. The technology-based instructional media that can be applied to mathematics teaching include Concept Maps, Informative PowerPoint presentations, Interactive PowerPoint presentations, Student Worksheets, Instructional Videos, Manipulatives, and Geogebra. Based on the framework provided, a prototype of a mathematics instructional media reference book for middle school teachers is developed with the following outline:

Table of Contents	CHAPTER	II:	MATHEMATICS
CHAPTER I: INSTRUCTIONAL MEDIA	INSTRUCTIONAL MEDIA		
A. Introduction	A. Concept Maps		
B. Definition	B. Informative PowerPoint Presentations		
C. Objectives	C. Interactive PowerPoint Presentations		
D. Functions	D. Student Worksheets		
E. Benefits	E. Instructional Videos		
F. Types	F. Manipulatives		
G. Principles of selecting instructional media	CHAPTER III: DEVELOPING INSTRUCTIONAL MEDIA WITH GEOGEBRA		
	A. Introduction to Geogebra		
	B. Developing Media with Geogebra		
	REFERENCES		

Based on the framework of the mathematics instructional media reference book needed for middle school teachers in Mataram, the content of the book is developed by referring to relevant sources. The developed content is then subjected to analysis and evaluation to further understand the criteria that need to be fulfilled by an appropriate book and ensure compliance with existing rules and regulations. The analysis and evaluation reveal that there are four criteria or aspects required for the mathematics instructional media reference book needed by middle school teachers: content aspect, language aspect, presentation of content, and graphical design. Based on these four aspects, they are used as a basis for determining the validity of the mathematics instructional media reference book needed by middle school teachers.

The validity of the book is assessed from the content aspect, which is related to the accuracy of the content, currency of data and concepts, and its alignment with the achievement of national educational goals. The book should encourage independence and innovation, motivate self-development, and utilize reliable theoretical and empirical sources of information. Below are the results of expert validation regarding the content aspect. To obtain the appropriate criteria for reference books, validation is conducted on the criteria that have been compiled. In validating the instrument, the validator is asked to provide responses ranging from very good (5), good (4), quite good (3), less good (2), not good (1) for each aspect being assessed. The following is the result of expert validation regarding the content aspect, as shown in Table 3.

Table 3. Validation of Expertise in Content Aspect

No	Assessed aspects	Validator Score			Validity
		V1	V2	V3	
1	Accuracy of content, up-to-dateness of data and concepts, and the ability to support the achievement of national educational goals.	5	5	5	V=1 (valid)
2	Promoting the emergence of independence and innovation	5	5	4	V=0,92 (valid)
3	Able to motivate oneself for self-development.	4	5	4	V=0,83 (valid)
4	Using correct theoretical and empirical sources of material.	4	5	5	V=0,92 (valid)
Total		18	20	18	

Based on Table 3, It is known that the responses of the three validators regarding the content aspect of the book are different, but all assessed aspects received good and very good responses. The aspects of Accuracy of content, up-to-dateness of data and concepts, and the ability to support the achievement of national educational goals, received very good responses from all three validators, while other aspects still had validators who gave good responses. Overall, out of the three validators, only one validator gave a very good response to all aspects, while the other validators stated 50% very good and 50% good. Each assessed aspect of the content falls into the valid category. In terms of the Language aspect, the expert validation results are as shown in Table 4.

Table 4. The results of the expert validation regarding the language aspect

No	Evaluated aspects.	Validator Score			Validity
		V1	V2	V3	
1	The use of language (spelling, words, sentences, and paragraphs) is accurate, clear, and concise.	4	4	5	V=0,83 (valid)
2	Language usage appropriate for the age level.	5	5	5	V=1 (valid)
3	The language used is communicative and informative, enabling readers to understand the positive message conveyed.	5	5	5	V=1 (valid)
4	The language used exhibits educational, polite, ethical, and aesthetic characteristics suitable for the age level.	5	5	5	V=1 (valid)
5	The book title and titles of content sections are harmonious, appealing, capable of attracting interest in reading, and non-provocative.	4	5	4	V=0,83 (valid)
Total		23	24	24	

Based on Table 4, the distribution of validator responses is not significantly different. All three validators provided good and very good responses to each aspect being validated. Four aspects received very good responses from all three validators, while two aspects received very good responses from one validator and good responses from the other two validators. Overall, it can be concluded that all aspects validated in terms of Language are valid. In terms of the aspect of material presentation, the following are the expert validation results, as shown in Table 5.

Table 5. Results of expert validation regarding the aspect of material presentation.

No	Assessed aspects	Validator Score			Validity
		V1	V2	V3	
1	The book material is presented in an engaging manner (sequential, coherent, concise, easy to understand, and interactive), ensuring the integrity of the intended meaning is well-maintained.	5	5	5	V=1 (valid)
2	The illustrations, both in text and images, are attractive and suitable for the age level of the readers. They effectively clarify the material/content and maintain a polite tone.	4	4	4	V=0,75 (valid)

3	The use of illustrations to clarify the material does not contain elements of pornography, extremist ideologies, radicalism, violence, racial, religious, or gender bias, and does not contain any other forms of deviation	5	5	5	V=1 (valid)
4	The presentation of the material stimulates critical, creative, and innovative thinking.	5	5	4	V=0,92 (valid)
5	The presentation of the material is engaging, making it enjoyable for readers and fostering a deep sense of curiosity.	5	5	5	V=1 (valid)
Total		24	24	23	

Based on Table 5, all aspects received very good and good responses from all three validators. Out of the 5 aspects validated, 3 aspects received very good responses from all three validators, while the other 2 aspects still had validators who gave good responses. It is worth noting that in the illustrations, both in text and images, are attractive and suitable for the age level of the readers. They effectively clarify the material/content and maintain a polite tone. All validators stated that it is good, although there might be some areas that still need improvement in this aspect. Overall, all validated aspects fall into the valid category. In terms of the Graphic, the following are the expert validation results, as shown in Table 6.

Table 6. Graphic Aspect Validation Result

No	Assessed aspects	Validator Score			Validity
		V1	V2	V3	
1	The size of the book is appropriate for the age level and content of the book.	5	5	5	V=1 (valid)
2	The use of color in a harmonious layout to clarify functions.	4	4	4	V=0,75 (valid)
3	The use of fonts and font sizes should be adjusted according to the level of development of the age.	5	5	5	V=1 (valid)
4	The illustration used is able to clarify the message to be conveyed.	5	5	5	V=1 (valid)
Total		19	19	19	

Based on Table 6, out of the 4 aspects validated, only one aspect received a good response from all three validators, while the rest received very good responses. The aspect that received a good response is the Use of color in a harmonious layout to clarify function. Therefore, there are still areas that need improvement in this aspect. Overall, all aspects fall into the valid category.

The framework of the mathematics material based on the analysis conducted serves as the basis in determining the criteria for reference books of mathematics learning media needed by SMP teachers. The criteria in this case covers the necessary media which are Concept Map, Informative Power Point, Interactive Power Point, Student Worksheet, Learning Video, Teaching Aids, and Geogebra and other aspects of the book which includes 4 aspects which are material aspect, language, presentation of material, and graphics. The concept mapping material contains definitions of concept mapping, characteristics of concept mapping, types of concept mapping, examples of concept mapping, and steps in constructing concept mapping.

Concept mapping will help students in representing a set of concepts (Setiawan & Syaifuddin, 2020).

The informative PowerPoint material contains principles for organizing an informative PowerPoint, steps for creating an informative PowerPoint, things to avoid when creating an informative PowerPoint, benefits of using an informative PowerPoint, and examples of informative PowerPoint. Informative PowerPoint is a computer program that can be used to present information with the aim of enabling the listeners or audience to capture and understand the information presented well. Benefits of using an informative PowerPoint include providing a brief overview of the sequence of content organization for learners.

Interactive power point materials contain the benefits and stages of creating interactive power points and examples of interactive power points. Interactive Power Point is a presentation that allows two-way interaction between learners and teachers as well as between learners and computers. This interaction arises because in interactive presentations, information is not presented monotonously where the material is entirely given in the presentation sheet but given pauses and opportunities for exploration so that learners can build their understanding.

Student worksheet material contains the benefits of worksheets, worksheet elements, points that must be considered in compiling worksheets, and examples of student worksheets. Student worksheets (LKPD) are collections of sheets containing student activities that allow students to carry out real activities with the objects and problems studied. Learning using LKPD can improve student motivation and learning outcomes (Muthoharoh et al., 2017). Learning Video is a learning media that uses text, images, sound, and animation to convey the content of teaching material from learning resources to learners (individuals or groups), which can stimulate the thoughts, feelings, attention, interests of learners, can capture, process, and rearrange visual or verbal information in such a way that the learning process (inside/outside the classroom) becomes more effective (Purwanti, 2015). Teaching aids are a set of concrete objects designed, made, assembled, or arranged intentionally that are used to help instill or develop concepts or principles in mathematics. With props abstract things can be presented in the form of models, where the model is in the form of concrete objects that can be seen, held, twisted so that they are easy to understand and contain or carry the characteristics of the concepts studied.

Geogebra material contains material related to knowing geogebra which consists of appearances, parts, and tools owned, as well as examples of media development using geogebra. GeoGebra is a free software developed by Markus Hohenwarter since (2001). Geogebra serves as a learning medium that provides visual experiences to students in interacting with concepts. With a varied and attractive appearance, as well as the ease of manipulating various objects, it is expected to increase student interest while increasing the effectiveness of mathematics learning. The results of expert validation in terms of material aspects show that the accuracy of the material, the up-to-date of data and concepts, and can support the achievement of national education goals. Encouraging independence and innovation, Able to motivate to develop himself, Using theoretically and empirically correct material sources, it is obtained that all items have a "valid" validity category with a validity coefficient above 0.8.

The results of expert validation are related to language aspects, namely the use of language (spelling, words, sentences, and paragraphs) precise, straightforward, clear, and, The use of language according to the level of age development, Illustration of material, both text and images according to the level of age development of the reader and able to clarify the material/content, The language used is communicative and informative so that the reader is able to understand the positive message conveyed, The language used has educative, polite, ethical, and aesthetic characteristics according to the level of age development, book titles and titles of parts of the material/book content are harmonious/harmonious, interesting, able to attract interest in reading, and not provocative obtained that all items have a validity category of "valid" with a coefficient above 0.8.

The results of expert validation are related to aspects of material presentation, namely that the book is presented attractively (coherent, coherent, straightforward, easy to understand, and interactive), so that the integrity of the meaning to be conveyed can be maintained properly, Material illustrations, both text and images are interesting according to the level of age development of the reader and are able to clarify the material/content and politeness, The use of illustrations to clarify the material does not contain pornographic elements, extremism, radicalism, violence, race, gender bias, and do not contain other deviant values, The presentation of material can stimulate critical, creative, and innovative thinking. The presentation of interesting material so that it is pleasant for readers and can foster a deep curiosity obtained that all items have a "valid" validity category.

The results of expert validation are related to graphic aspects related to the size of the book according to the level of age development and the material/content of the book, Giving color to the elements of a harmonious layout and can clarify the function, The use of letters and font sizes is adjusted to the level of age development, The illustrations used are able to clarify the message to be conveyed obtained that all items have a validity category of "valid". Based on the validation of the 4 aspects, namely Material, Language, Material Presentation, and Graphic Design, the junior high school mathematics learning media book is declared valid or suitable for use. There were no items that received less good or not good responses in each aspect assessed by the validators. All items received good and very good responses..

D. CONCLUSION AND SUGGESTIONS

Interactive learning media is the right learning media in mathematics learning. Some interactive media that affect mathematics learning outcomes are interactive power-points, learning videos, and geogebra-based media. In order to develop learning media, a reference book for junior high school mathematics learning media was developed with valid criteria on aspects of material, language, material presentation, and graphics.

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