

INTERACTIVE MULTIMEDIA ORIENTED TO THE MATHEMATICAL NUMERACY SKILLS OF JUNIOR HIGH SCHOOL STUDENTS

Nilza Humaira Salsabila^{1*}, Baidowi¹, Syahrul Azmi¹, Ulfa Lu'luilmaknun¹

¹Pendidikan Matematika, FKIP, Universitas Mataram

*Email : nilza_hs@unram.ac.id

Abstrak

Penelitian ini bertujuan untuk mendeskripsikan kevalidan multimedia yang dikembangkan pada pembelajaran matematika SMP. Multimedia yang dikembangkan berupa multimedia interaktif berkonteks lokal Pulau Lombok. Pengembangan multimedia berorientasi pada kemampuan numerasi matematika pada materi peluang. Penelitian ini merupakan penelitian pengembangan dengan menggunakan model penelitian desain (*design research*) oleh Plomp yang terdiri dari 3 tahapan yaitu *Preliminary Research* (Pendahuluan), *Development or Prototyping Phase* (Pengembangan), dan *Assessment Phase* (Penilaian). Adapun salah satu kriteria multimedia dikatakan layak adalah memenuhi kriteria valid. Penelitian ini menggunakan lembar validasi multimedia oleh ahli media dan ahli materi untuk menilai kevalidan produk. Hasil penelitian menunjukkan bahwa skor rata-rata penilaian ahli media sebesar 109 dengan klasifikasi sangat baik dan skor rata-rata penilaian ahli materi sebesar 80 dengan klasifikasi sangat baik. Maka dapat disimpulkan bahwa multimedia yang dikembangkan memenuhi kriteria valid.

Kata kunci: Interaktif, Multimedia, Numerasi

Abstract

This study aims to describe the validity of multimedia developed in junior high school mathematics learning. The multimedia developed is in the form of interactive multimedia with the local context of Lombok Island. Multimedia development is oriented towards mathematical numeracy skills in the material of probability. This research is development research using a design research model by Plomp which consists of 3 stages, namely Preliminary Research, Development or Prototyping Phase, and Assessment Phase. One of the criteria for multimedia to be said to be feasible is to meet the valid criteria. This study uses a multimedia validation sheet by media experts and material experts to assess the validity of the product. The results showed that the media expert's average score was 109 with a very good classification and the material expert's average score was 80 with a very good classification. So it can be concluded that the developed multimedia meets the valid criteria.

Keywords: Interactive, Multimedia, Numeracy

INTRODUCTION

Learning media is one of the important components that help teachers in learning. Likewise in learning mathematics. Learning media are everything that can be used to channel messages or information from teachers to students in order to achieve learning objectives

effectively (Sukiman, 2012). Arsyad (2002) revealed that the emphasis of educational media is on visual and audio media. Therefore, it is important to facilitate students with mathematics learning media that includes audio-visual elements.

Media with a combination of more than one media element such as text (alphabetical or numeric), symbols, images, images, audio, video, and animation with the help of technology for the purpose of improving understanding or memorization is called multimedia (Guan, Song, & Li, 2018). Multimedia can help learn mathematics (Nusir, Alsmadi, Al-Kabi, & Sharadgah, 2013). This is because mathematics material presented through multimedia is more organized and comprehended (Gebreyohannes, Bhatti, & Hasan, 2016). Moreover, media with the use of audio-visual can positively influence students' mathematics learning outcomes (Prasetia, 2016). The audio-visual media can attract students' attention (Jusmiana, Herianto, & Awalia, 2020). Media is also more interesting and entertaining with audio-visual elements (Anjarsari, Farisdianto, & Asadullah, 2020).

In addition, interactive multimedia can help to learn effectively (Siagian, 2012). Wibawanto (2017) stated that interactive learning multimedia is one of the media that can be used to deliver learning materials to students very effectively and efficiently. Interactive learning media makes the learning process more interesting with pictures, story illustrations, audio, and text so that students more easily understand the material (Arindiono & Ramadhani, 2013). It can be said that interactive multimedia can help learning activities become better which causes students' ability to learn to increase.

One of the important skills in learning mathematics is numeracy skills. Numeracy skills is one of the skills tested in the Minimum Competency Assessment. The Ministry of Education and Culture (2017) revealed that numeracy is an individual's ability to be able to apply mathematical concepts and skills in solving everyday life problems. Pangesti (2018) also stated that numeracy skills are closely related to solving mathematical problems in everyday life. Therefore, it is important to pay attention to the use of learning media to improve students' numeracy skills.

Several previous studies have shown that learning using multimedia can develop students' mathematical numeracy skills (Remando & Remando, 2019; Rohendi, Sumarna, & Sutarno, 2017). The local context displayed in the media can also be an important element for improving numeracy. Interactive multimedia with local contexts, such as educational

games with local wisdom contexts, can be used effectively in learning mathematics (Safitri, Pujiastuti, & Sudiana, 2020). In addition, the learning approach by giving local problems and then students looking for solutions shows a positive impact on numeracy learning outcomes (Maulidyawati & Irham, 2020).

Considering that the use of multimedia is an important aspect of learning mathematics and numeracy skills are important skills to be developed by students, the research aims to develop interactive multimedia using local contexts oriented to the mathematical numeracy skills of junior high school students. This interactive multimedia needs to be developed to help improve students' mathematical numeracy skills.

RESEARCH METHOD

This research is development research that aims to produce a product in the form of interactive multimedia using a local context oriented to the mathematical numeracy skills of junior high school students. The local context referred to in this research is the context related to phenomena and situations that occur on Lombok Island which are then linked to mathematics material at school. Several local contexts presented in multimedia such as traditional musical instruments, traditional games, and traditional food on the Lombok Island. The multimedia includes material probability for junior high school students. The sub material presented in the multimedia includes Empirical Probability and Theoretical Probability.

This study uses a design research model by Plomp (2013) which consists of 3 stages, namely Preliminary Research, Development or Prototyping Phase, and Assessment Phase. At the Preliminary Research stage the researcher conducts a literature review, developing a conceptual or theoretical framework for research. In addition, curriculum analysis, student characteristics analysis, numeracy ability indicators analysis, local context analysis, and required resource analysis were also carried out. At the Development or Prototyping Phase, researchers create interactive multimedia. The multimedia that has been made and the instruments that have been compiled are validated by experts. In addition, the implementation of interactive multimedia was carried out to obtain practicality and effectiveness data. In the final stage, the Assessment Phase, an assessment phase is carried out to analyze the effectiveness and practicality of the developed multimedia. The effectiveness and practicality results were obtained from the data during the trial.

Furthermore, validity criteria is one of the criteria that must be met by the developed multimedia (Nieveen, 1999). The multimedia validity assessment was carried out by validators, namely media experts and material experts. The assessment was carried out using the Multimedia Validation Sheet instrument by the Media Expert and the Multimedia Validation Sheet by the Material Expert. The comments and suggestions given by the validator are used as material to improve the quality of the developed multimedia.

Multimedia Validation Sheet by Media Experts consists of 24 statement items with 5 indicators including content quality (2 points), design (12 points), interactivity (6 points), usability (3 points), and standard conformity (1 point). Furthermore, the Multimedia Validation Sheet by Material Expert consists of 18 statements with 3 indicators, including content eligibility (8 points), presentement (5 points), and language (5 points). The validation sheet uses a Likert scale of 5, namely very good (score 5), good (score 4), neutral (score 3), poor (score 2), and very poor (score 1). Table 1 below is a classification table of validity seen from the scores of media experts and material experts. Multimedia is said to be valid if the score is at a minimum good classification. The formula for determining classification intervals is based on Widoyoko (2016).

Table 1 Multimedia Validity Classification Table

Media Expert Score	Material Expert Score	Classification
$X > 100,8$	$X > 75,6$	Very Good
$81,6 < X \leq 100,8$	$61,2 < X \leq 75,6$	Good
$62,4 < X \leq 81,6$	$46,8 < X \leq 61,2$	Moderate
$43,2 < X \leq 62,4$	$32,4 < X \leq 46,8$	Poor
$X \leq 43,2$	$X \leq 32,4$	Very Poor

RESULT AND DISCUSSION

The product developed in this study is interactive multimedia using a local context oriented to mathematical numeracy skills. The material presented in multimedia is probability material for the junior high school level. The sub material offered in the multimedia includes Empirical Probability and Theoretical Probability. The following is a display of the developed multimedia.



Figure 1 Interactive Multimedia Display

The interactive multimedia that has been developed is assessed for quality to meet the validity criteria. The validity of the multimedia is determined based on the assessment of the validators, namely media experts and material experts. Multimedia that has been declared valid and feasible can be used in research in the field. Table 2 below is the result of the multimedia validation assessment from the validators.

Table 2 Multimedia Validation Results by Media Experts and Material Experts

No	Information	Media Expert	Material Expert
1	Number of Items	18	24
2	Maximum Score	90	120
3	Minimum Score	18	24
4	Validator Score 1	77	107
5	Validator Score 2	83	111
	Average Score	80	109
	Classification	Very Good	Very Good

The table above shows that the developed multimedia is classified as very good based on the assessment of media experts and material experts. So it can be said that multimedia meets the valid criteria and is suitable for use as a media for learning mathematics. The results of the more detailed assessment by media experts can be seen in Table 3 below.

Table 3 Details of Multimedia Validation Results by Media Experts

No	Indicator	Validator 1 Score Average	Validator 2 Score Average	Overall Average
1	Content Quality	4.50	5.00	4.75
2	Design	4.42	4.58	4.50
3	Interactivity	4.50	4.50	4.50
4	Usability	4.67	4.67	4.67
5	Standard Conformance	4.00	5.00	4.50

The details of the results of the multimedia assessment by material experts, it is shown in Table 4 below.

Table 4 Details of Multimedia Validation Results by Material Experts

No	Indicator	Validator 1 Score Average	Validator 2 Score Average	Overall Average
1	Content Eligibility	4.38	4.50	4.44
2	Presentment Eligibility	4.20	4.60	4.40
3	Language Eligibility	4.20	4.80	4.50

The interactive multimedia developed was improved based on comments and suggestions from the validators. As for some of the improvements made based on comments and suggestions from the validators, including clarified sentences in the audio, improved sentences on the material presented, and improvements to practice questions. Improvements are made so that the quality of multimedia is getting better and suitable for use as a media for learning mathematics for students.

Several previous studies have also shown that multimedia and mathematics learning applications with an attractive appearance can help improve students' numeracy skills (Nasiba, 2022; Utari et al., 2021). Media that displays information in the form of numbers, data, and symbols related to mathematics and requires students to be able to analyze this information to draw conclusions, can effectively improve students' numeracy skills (Kustantina, Nuryadi, & Marhaeni, 2022). So it can be said that the content and design as well as the presentation of material in multimedia are important indicators to pay attention to.

The use of audio in media can also help in learning numeracy (Patriana, Sutama, & Wulandari, 2021). Learning materials that present audio visuals can provide interesting and interactive learning (Dantes & Handayani, 2021). In addition, interactive learning media have also been tested to strengthen numeracy learning for junior high school students (Fajar, Sunismi, & Wulandari, 2022; Ismanto, 2022). The nature of interactivity in the media can create a fun learning for students by being directly involved with the material (Benny, 2017).

Then the content of the local context in multimedia learning also plays an important role in the eligibility of the media. Students' numeracy skills can be improved through learning that uses the context of traditional games (Kamsurya & Masnia, 2021). Practice questions that use local contexts or contexts that are close to their daily lives can also develop students' numeracy skills (Kurniawan, Budiarto, & Ekawati, 2022). Learning mathematics

will certainly be meaningful if they can use their numeracy skills to solve everyday problems (Jamil & Khusna, 2021).

CONCLUSION

The product developed in the form of interactive mathematics learning multimedia meets the valid criteria after being assessed by material experts and media experts. Several media assessment indicators such as content quality, design, interactivity, usability, and standard conformance were declared valid with a very good classification. In addition, several material assessment indicators such as the eligibility of content, presentment, and multimedia language were declared valid with a very good classification. Therefore, the developed multimedia is feasible to be used as a learning media. Through this multimedia, it can help improve students' mathematical numeracy skills, especially on probability material.

ACKNOWLEDGEMENT

This research was supported by the 2022 PNPB funding from the Institute for Research and Community Service at the Universitas Mataram.

REFERENCE

- Anjarsari, E., Farisdianto, D. D., & Asadullah, A. W. (2020). Pengembangan Media Audiovisual Powtoon pada Pembelajaran Matematika untuk Siswa Sekolah Dasar. *Jurnal Matematika Dan Pendidikan Matematika*, 5(2), 40–50.
- Arindiono, R. J., & Ramadhani, N. (2013). Perancangan Media Pembelajaran Interaktif Matematika untuk Siswa Kelas 5 SD. *Jurnal Sains Dan Seni ITS*, 2(1), F28–F32.
- Arsyad, A. (2002). *Media Pembelajaran*. Jakarta: PT Raja Grafindo Persada.
- Benny, A. (2017). *Media & Teknologi dalam Pembelajaran*. Jakarta: Kencana.
- Dantes, N., & Handayani, N. N. L. (2021). Peningkatan literasi sekolah dan literasi numerasi melalui model blended learning pada siswa kelas V SD kota singaraja. *Widyalyaya: Jurnal Ilmu Pendidikan*, 1(3), 269–283.
- Fajar, A. N., Sunismi, S., & Wulandari, T. C. (2022). Pengembangan Video Pembelajaran Interaktif Berbasis Easy Sketch Pro Terintegrasi Numerasi Untuk Menunjang Asesmen Kompetensi Minimum Pada Siswa Kelas XI. *Jurnal Penelitian, Pendidikan, Dan Pembelajaran*, 17(20).

- GebreYohannes, H. M., Bhatti, A. H., & Hasan, R. (2016). Impact of multimedia in teaching mathematics. *International Journal of Mathematics Trends and Technology (IJMTT)*, 39(1), 80–83.
- Guan, N., Song, J., & Li, D. (2018). On the advantages of computer multimedia-aided English teaching. *Procedia Computer Science*, 131, 727–732. <https://doi.org/https://doi.org/10.1016/j.procs.2018.04.317>
- Ismanto, I. (2022). Pengembangan Modul Digital Interaktif Berbasis Pengalaman Siswa Untuk Memperkuat Pembelajaran Numerasi SMP Dalam Mendukung Merdeka Belajar. *Postulat: Jurnal Inovasi Pendidikan Matematika*, 3(1), 61–76.
- Jamil, A. F., & Khusna, A. H. (2021). Pengembangan Asesmen Berorientasi Kontekstual Untuk Meningkatkan Kemampuan Literasi Matematis Dan Numerasi Mahasiswa. *Jurnal Ilmiah Mandala Education*, 7(4), 78–86.
- Jusmiana, A., Herianto, H., & Awalia, R. (2020). Pengaruh Penggunaan Media Audio Visual Terhadap Hasil Belajar Matematika Siswa Smp Di Era Pandemi Covid-19. *Pedagogy: Jurnal Pendidikan Matematika*, 5(2), 1–11.
- Kamsurya, R., & Masnia, M. (2021). Desain Pembelajaran Dengan Pendekatan Matematika Realistik Menggunakan Konteks Permainan Tradisional Dengklaq Untuk Meningkatkan Keterampilan Numerasi Siswa Sekolah Dasar. *Jurnal Ilmiah Mandala Education*, 7(4).
- Kementerian Pendidikan dan Kebudayaan. (2017). *Gerakan Literasi Nasional Materi Pendukung Literasi Numerasi*. Jakarta: Tim Gerakan Literasi Nasional.
- Kurniawan, A. P., Budiarto, M. T., & Ekawati, R. (2022). Pengembangan Soal Numerasi Berbasis Konteks Nilai Budaya Primbon Jawa. *Jurnal Review Pembelajaran Matematika*, 7(1), 20–34.
- Kustantina, V. A., Nuryadi, N., & Marhaeni, N. H. (2022). Meningkatkan Kemampuan Literasi Numerasi Siswa Menggunakan Komik Matematika Interaktif Pada Materi Teorema Phytagoras. *Jurnal Ilmu Pendidikan Muhammadiyah Kramat Jati*, 3(1), 10–16.
- Maulidyawati, D., & Irham, M. (2020). Penerapan Problem Driven Iterative Adaptation (PDIA) untuk Mengatasi Kesulitan Belajar Matematika Siswa SDN 2 Pungkit. *Media Pendidikan Matematika*, 8(2), 80–87.
- Nasiba, U. (2022). Brankas Rahasia: Media Pembelajaran Numerasi Berbasis Berpikir Komputasi untuk Meningkatkan Kemampuan Pemecahan Masalah. *Jurnal Didaktika Pendidikan Dasar*, 6(2), 521–538.
- Nieveen, N. (1999). Prototyping to reach product quality. *Design Approaches and Tools in Education and Training*, Springer, 125–135.
- Nusir, S., Alsmadi, I., Al-Kabi, M., & Sharadgah, F. (2013). Studying the impact of using multimedia interactive programs on children’s ability to learn basic math skills. *E-*

- Pangesti, F. T. P. (2018). Menumbuhkembangkan Literasi Numerasi pada Pembelajaran Matematika dengan Soal HOTS. *Indonesian Digital Journal of Mathematics and Education*, 5(9), 566–575.
- Patriana, W. D., Sutama, S., & Wulandari, M. D. (2021). Pembudayaan Literasi Numerasi untuk Asesmen Kompetensi Minimum dalam Kegiatan Kurikuler pada Sekolah Dasar Muhammadiyah. *Jurnal Basicedu*, 5(5), 3413–3430.
- Plomp, T. (2013). *Educational design resesarch: an introduction*. Dalam J. Van den Akker et al. *Educatioan Design Research*. Enschede, Netherland: National Institute for Curriculum Development.
- Prasetia, F. (2016). Pengaruh Media Audio Visual Terhadap Hasil Belajar Matematika. *Jurnal Kajian Pendidikan Matematika*, 1(2), 257–266.
- Remando, I. A., & Remando, J. C. G. R. (2019). effects of multimedia teaching on kindergarten pupils in the development of their numeracy skills. *Ascendens Asia Journal of Multidisciplinary Research Abstracts*, 3(2L).
- Rohendi, D., Sumarna, N., & Sutarno, H. (2017). Game Multimedia in Numeracy Learning for Elementary School Students. *IOP Conference Series: Materials Science and Engineering*, 180, 012068. <https://doi.org/10.1088/1757-899X/180/1/012068>
- Safitri, A. W., Pujiastuti, H., & Sudiana, R. (2020). Pengembangan Game Edukasi dengan Konteks Kearifan Lokal Banten pada Materi Matriks. *Journal of Medives: Journal of Mathematics Education IKIP Veteran Semarang*, 4(2), 319–328. <https://doi.org/https://doi.org/10.31331/medivesveteran.v4i2.1171>
- Siagian, R. E. F. (2012). Pengaruh Minat dan Kebiasaan Belajar Siswa terhadap Prestasi Belajar Matematika. *Jurnal Formatif*, 2(2), 122–131. <https://doi.org/http://dx.doi.org/10.30998/formatif.v2i2.93>
- Sukiman. (2012). *Pengembangan Media Pembelajaran*. Yogyakarta: Pedajogja.
- Utari, W., Tambunan, E. R., Arrasyid, I. C., Fauziyah, M., Nisrina, R. H., Damanik, Y., ... Sari, N. T. A. (2021). Pelatihan Pemanfaatan Aplikasi Quizizz Bagi Guru SDN 9 Nagrikaler untuk Meningkatkan Kemampuan Literasi Numerasi Matematis Siswa. *Indonesian Journal of Community Services in Engineering & Education (IJOCSEE)*, 1(2), 142–152.
- Wibawanto, W. (2017). *Desain dan Pemrograman Multimedia Pembelajaran Interaktif*. Jember: Penerbit Cerdas Ulet Kreatif.
- Widoyoko, E. P. (2016). *Evaluasi Program Pembelajaran*. Yogyakarta: Pustaka Pelajar.