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Publisher: Unib Press
Volume 2 number 2, 2023
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Media Development Using Macromedia Flash 8 on the Material of the Dynamics of Planet Earth

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Abstract

This research was conducted at SMA Negeri 1 Limboto. This research aims to develop learning media using macromedia flash 8 on the material of planetary dynamics. The method used in this research is the ADDIE method. Data collection techniques through observation, interviews, questionnaires and documentation. The instrument used in the form of assessment criteria to determine the feasibility of media from material experts, material experts, and geography teachers as well as student responses to learning media using a questionnaire. The data collected in the form of research results regarding the quality of the media get a value of 68.23% with the level of validity included in the qualification "valid", the results of validation by material experts get a value of 86.66% with the level of validity included in the qualification "very valid", and the results of validation by geography teachers get a value of 80.18% with the level of validity included in the qualification "very valid", while for student responses from the results of the trial get a value of 85%, this value is in the category "strongly agree".

Keywords**:** Media Development, Macromedia Flash 8, Dynamics of Planet Earth

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Introduction

Education is an important need for human life on this earth, because education can make humans achieve progress so that they are at a better level in the field of life. Education can also change the human mindset, morals and make humans themselves achieve the maturation process and independence to survive as individuals and educated social creatures. Education is an important part of the progress of a nation because the progress of a nation can be seen from the quality of education owned by the country (Ministry of Education, 2003). According to Law of the Republic of Indonesia Article 1 Number 20 of 2003 concerning the national education system (Sisdiknas), education is a conscious effort that is planned to be able to realize the learning process and learning atmosphere so that students are active in the potential that exists in themselves so that students are able to have religious spiritual strength, noble character, self-control, and skills that require themselves, society, nation and state (Ministry of Education, 2003).

Education is the change that is commonplace in students after the encounter of teaching, both the behavior of the individual and the life of the individual, society and the elements of the ordinary environment in which the individual lives. From one country to another, the goals or objectives of training are unique. As a reason for making unique goal decisions (Agency, 2006). Learning media is a means of delivering lessons that can channel messages, stimulate thoughts and feelings, and a person's willingness to learn. Learners will be interested (Sadiman, A. S., Rahardjo, R., & Haryono, 2014). Avoid boredom, and allow students to understand the material taught by the teacher (Pratama, 2022).

There are five important parts to the learning process: objectives, materials, techniques, media and assessment. This is a good example of the fifth aspect (Sulistianingsih & Mukminan, 2019).. The selection of certain teaching methods will have a good impact on learning media, without forgetting the other three important aspects, namely learning objectives, materials, and evaluation. In this case, the most important function of a learning media is as a learning tool that can be utilized to build inspiration, conditions, and environment (Naconha, 2021).

The use of learning media in the teaching and learning process will shift the teacher's position as the main source of information to become a facilitator for students both inside and outside the classroom. (Nina Sulvia Ayuna Sari et al., 2021). The use of learning media will also greatly

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assist the effectiveness of the learning process and the delivery of messages and lesson content at that time (Wiratmojo, 2017).

One of the most important components in the learning process, media cannot be separated from the discussion system in any case. Media utilization is a part that must receive attention in various learning activities. However, the part in question is often ignored for various reasons and is actually unnecessary, there are various kinds of media that can be selected, made, to be used according to the circumstances, time, cost, or expected learning objectives. Each type of media has various qualities that must be seen so that we can choose media that suits our needs and conditions. One of the appropriate learning media for learning is an assortment of media-based learning media, especially videos (Jeklin 2016).

Researchers made initial observations at SMA N 1 Limboto, in Gorontalo Regency and found three problems, namely; Teachers are not maximized in creating learning media that can describe the real world that is re-presented with animated displays. This can provide direct experience to students even though they do not see directly in the real world. By looking at the facts at SMAN 1 Limboto, I as a researcher am interested in further research on learning media on macromedia flash 8.

Research Method

The method used in this research is development research with the ADDIE model which consists of the stages of *Analysis, Design, Development, Implementation,* and *Evaluation.*(Branch, 2010). Each stage is carried out effectively and systematically with the aim of producing quality products and detailed explanations. (Pratama & Maryati, 2021).

The analysis stage is used to determine the media needs of the school that will be used as a media trial site. In the next stage the media is designed in accordance with the material and curriculum used at this time. In the development stage, the Macromedia Flash 8 application is used to create media (Siregar et al., 2020). In the manufacturing process, a validation stage is also carried out to improve the quality of the media. The application is limited to students to determine the extent of student response to the media. Evaluation at the final stage is carried out to correct deficiencies that have not been fulfilled in the learning media. This evaluation is based on student responses (Siregar et al., 2020).

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Research Instrument

The instruments used are questionnaires, observations, and documentation where the questionnaire instrument is used to determine student responses to learning media. Observation was carried out as an initial stage of knowing the use of media and the availability of media at the research location. Observations made are also supported by documentation so as to provide clarity on the direction of media development.

Data Analysis Technique

In this study using two types of data, namely: Qualitative and Quantitative Data.

The media utilization media validation sheet will be filled in by the validator, the assessment consists of 5 score assessments (Sukardi, 2009: 146), namely:

5 = Very good
4 = Good
3 = Good enough
2 = Not good
1 = None

To determine the percentage of the data results, the percentage formula can be used (Arikunto, 2003) which is as follows:

$$P = \frac{\sum x}{\sum x^1} \text{x } 100\%$$

Description:

P= Percentage
$\sum$ x= Total number of validator answer scores (real values)
$\sum x^1$ = Total number of highest answer scores (expected value)
100= Constant number

After obtaining the results of the percentage calculation, it can be determined the level of product feasibility of the development results. Providing the level of product feasibility will use qualifications that have criteria that can be seen in table 1:

Table 1. Qualification of Feasibility Level (Subali, et al, 2010)

Percentage	Qualification	Eligibility Criteria
84% < score ≤ 100%	Very valid	No revision
68% < score ≤ 84%	Valid	No revision
52% < score ≤ 68%	Valid enough	Needs revision
36% < score ≤ 52%	Less valid	Revised
20% < score ≤ 36%	Very less valid	Revised

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Result and Discussion

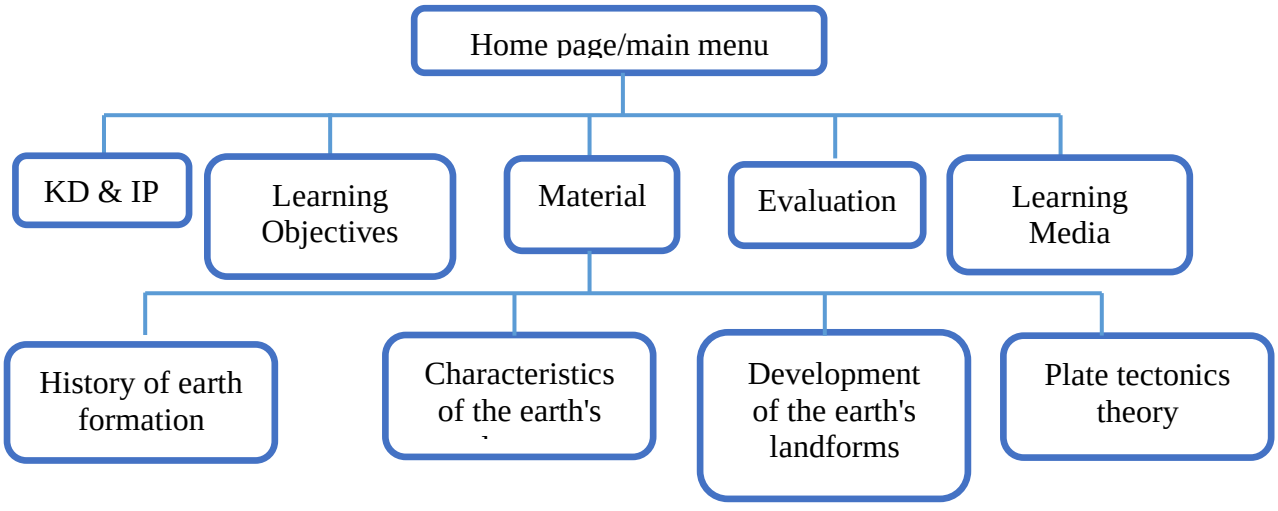
This research uses the ADDIE development model, which has the following development stages: a) analysis stage; b) design stage; c) development stage; d) implementation stage; e) evaluation stage. The following is an explanation of each stage carried out in this development research:

Analysis Stage

The results of the analysis will be a guideline in developing the current Macromedia Flash 8-based learning media. From the observation of class X students, it was found that the use of learning media is still minimal, the only programs used for learning are Microsoft Office Power Point and LKS. On the other hand, the curriculum used at SMA Negeri 1 Limboto is K13, which teaches teachers so that students can complete their assignments. Therefore, educators strive to develop new, interactive and interesting educational media. This is due to their desire to better understand their students' perspectives on the educational materials being taught.

Planning Stage

The Planning Stage is the next step in analyzing the educational media design process, which requires a specific design to assist in the creation of educational media. The above sketches are made in flowcharts and flowcharts.



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Development Stage

Learning media that has been created and designed based on existing stages, so that it can produce a product such as learning media using Macromedia Flash 8 on the material of the dynamics of planet Earth as a living space.

Figure 1. Initial view of the application macromedia flash 8

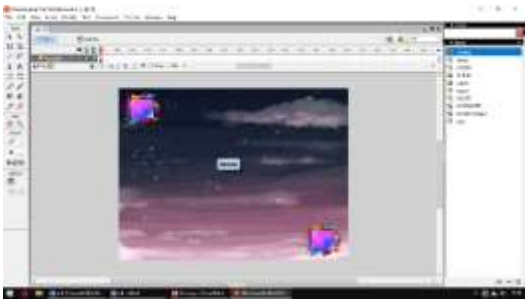


Figure 2. KD & IP

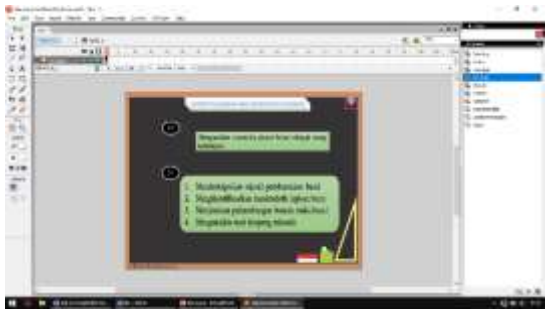
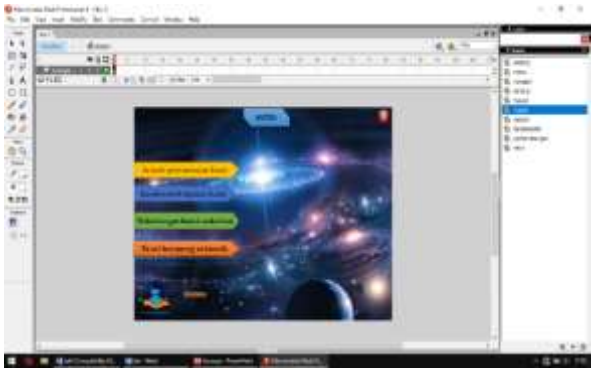


Figure 3. Learning objectives

Figure 4. Materials



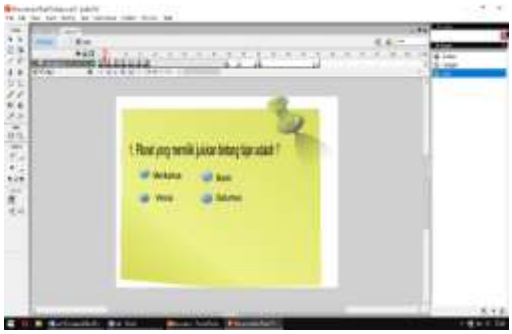


Figure 4: Planetary dynamics
Figure 5: evaluation in the form of multiple choice tests to measure students' ability to absorb the material provided through learning media.
Figure 6: animation of the circulation of the planets in the Solar System

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Implementation Stage

The implementation stage is carried out by validating learning media on material experts and media experts. Validation of learning media is done on geography teachers

Material Expert Validation

Table 2. Initial Validation Assessment by Material Experts

No.	Criteria	∑x	$\sum x^1$	P (%)	Level of validity	Description
1	The suitability of the concepts described in the material with the concepts put forward by the material expert	3	5	60	Valid enough	Needs revision
2	The material can be well organized	3	5	60	Valid enough	Needs revision
3	Suitability of material with core competency standards and basic competencies	3	5	60	Valid enough	Needs revision
4	The link between the material and everyday life	2	5	40	Less valid	Revised
5	Use of new information	3	5	60	Valid enough	Needs revision
6	Cultivate curiosity	3	5	60	Valid enough	Needs revision
7	Encourage to seek further information	3	5	60	Valid enough	Needs revision
8	Appropriateness of evaluation with learning objectives	3	5	60	Valid enough	Needs revision
9	Appropriateness of the evaluation form with the concepts presented	3	5	60	Valid enough	Needs revision
Total percentage (%)		26	45	57,77%	Valid enough	Needs revision

In stage I, the material expert validation obtained a presentation of 57, 77% which showed that the material contained in the media was not in accordance with the curriculum and material available at school so that improvements were made and revalidated in stage II and obtained a presentation value of 86, 66% very valid category.

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Table 3. Preliminary Validation Assessment by Material Experts After Revision

No.	Criteria	∑x	∑x[1]	P (%)	Level of validity	Description
1	The suitability of the concepts described in the material with the concepts put forward by the material expert	4	5	80	Very valid	No revision
2	The material can be well organized	4	5	80	Very valid	No revision
3	Suitability of material with core competency standards and basic competencies	5	5	100	Very valid	No revision
4	The link between the material and everyday life	4	5	80	Very valid	No revision
5	Use of new information	4	5	80	Very valid	No revision
6	Cultivate curiosity	5	5	100	Very valid	No revision
7	Encourage to seek further information	4	5	80	Very valid	No revision
8	Appropriateness of evaluation with learning objectives	5	5	100	Very valid	No revision
9	Appropriateness of the evaluation form with the concepts presented	4	5	80	Very valid	No revision
Total percentage (%)		39	45	86,66%	Very valid	No revision

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Media Expert Validation

The product given to the design expert that the design product consists of media learning materials based on Macromedia Flash 8. The design expert's assessment can cover several aspects shown through a questionnaire with instruments, thus producing some useful data to see whether the product developed can be continued to the next stage.

Table 4. Preliminary Validation Assessment by Media Expert

No.	Criteria	∑x	∑x[1]	P (%)	Level of validity	Description
1	Quality of material	3	5	60	Valid enough	Needs revision
2	Text font size	3	5	60	Valid enough	Needs revision
3	Text color and font	3	5	60	Valid enough	Needs revision
4	The materials and images convey complex concepts visually and dynamically, as well as the clarity of the images in the materials.	4	5	80	Very valid	No revision
5	Attractive material display	3	5	60	Valid enough	Needs revision
6	Creative in pouring ideas or notions	3	5	60	Valid enough	Needs revision
7	Use of language that is communicative and easy to understand	4	5	80	Very valid	No revision
8	Appropriateness of language use with students' developmental level	4	5	80	Very valid	No revision
9	Use of language that does not cause multiple interpretations	3	5	60	Valid enough	Needs revision
10	Voice volume	3	5	60	Valid enough	Needs revision
11	Music instrument accompaniment / backsound document	3	5	60	Valid enough	Needs revision
12	Clarity of voice-over vocals	3	5	60	Valid enough	Needs revision
13	Can be used classically	4	5	80	Very valid	No revision

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14	Flexibility of use	3	5	60	Valid enough	Needs revision
15	Presentation of material allows students to learn independently	4	5	80	Very valid	No revision
16	Ease of using the material	4	5	80	Very valid	No revision
17	Practicality in using the material	4	5	80	Very valid	No revision
Total percentage (%)		58	85	68,23%	Valid	No revision

Media expert validation gets a presentation of 68, 23% which is included in the valid category so that the media can be used immediately without revision in terms of the content of the learning media.

Teacher Expert Validation

Geography learning products submitted to students are learning media based on Macromedia Flash 8. Geography learning products can cover several aspects shown through questionnaire methods with instruments so that data can be obtained in the form of quantitative and qualitative information.

Table 5. Preliminary Assessment by Learning Experts

No.	Criteria	∑x	∑x[1]	P (%)	Level of validity	Description
1	Quality of material	4	5	80	Very valid	No revision
2	Text font size	4	5	80	Very valid	No revision
3	Text color and font	4	5	80	Very valid	No revision
4	The materials and images convey complex concepts visually and dynamically, as well as the clarity of the images in the materials.	5	5	100	Very valid	No revision
5	Attractive material display	4	5	80	Very valid	No revision
6	Creative in pouring ideas or notions	4	5	80	Very valid	No revision

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7	Use of language that is communicative and easy to understand	4	5	80	Very valid	No revision
8	Appropriateness of language use with students' developmental level	4	5	80	Very valid	No revision
9	Use of language that does not cause multiple interpretations	5	5	1000	Very valid	No revision
10	Voice volume	3	5	80	Very valid	No revision
11	Music instrument accompaniment / backsound document	4	5	80	Very valid	No revision
12	Clarity of voice-over vocals	4	5	80	Very valid	No revision
13	Can be used classically	4	5	80	Very valid	No revision
14	Flexibility of use	5	5	100	Very valid	No revision
15	Presentation of material allows students to learn independently	4	5	80	Very valid	No revision
16	Ease of using the material	4	5	80	Very valid	No revision
17	Practicality in using the material	4	5	80	Very valid	No revision
18	The suitability of the concepts described in the material with the concepts put forward by experts Material	4	5	80	Very valid	No revision
19	The material is well organized	4	5	80	Very valid	No revision
20	Suitability of material with core competency standards and basic competencies	4	5	80	Very valid	No revision

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21	The link between the material and everyday life	4	5	80	Very valid	No revision
22	Use of new information	4	5	80	Very valid	No revision
23	Cultivate curiosity	4	5	80	Very valid	No revision
24	Encourages to find out more information	4	5	80	Very valid	No revision
25	Appropriateness of evaluation with learning objectives	4	5	80	Very valid	No revision
26	Appropriateness of the evaluation form with the concepts presented	4	5	80	Very valid	No revision
Total percentage (%)		106	85	80,18%	Very valid	No revision

The results of validation from teachers show a presentation score of 80, 18% very valid category. Most of the categories used for assessment indicate a very valid category.

Learner Response Results

Based on the information obtained from the students' questionnaire responses, it can be seen that the average value of the attractiveness of Macromedia Flash 8-based media is 85% and is on very valid criteria. This student response table has been included in the appendix. From the questionnaire questionnaire statement of student response to learning media based on macromedia flash 8 in class X-2 students obtained the following data:

a. The display of Macromedia Flash 8 is interesting. From this statement, an assessment with a percentage of 85% was obtained.
b. I can read the text easily because the font size chosen is appropriate. From this statement, an assessment with a percentage of 92% was obtained.
c. Macromedia flash 8 makes me more excited in learning geography. From this statement, an assessment with a percentage of 85% was obtained.
d. With Macromedia Flash 8, it can make learning geography not boring. From this statement, an assessment with a percentage of 90% was obtained.

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e. Macromedia flash 8 supports me to master geography lessons, especially the material on the dynamics of planet Earth as a living space. From this statement, an assessment with a percentage of 89% was obtained.
f. The music in this learning media attracts my attention so that it can provide stimulation to learn. From this statement, an assessment with a percentage of 89% was obtained.
g. Macromedia flash 8 makes it easier for me to learn independently. From this statement, an assessment was obtained with a percentage of 86%
h. The delivery of material in Macromedia Flash 8 is related to everyday life. From this statement, an assessment with a percentage of 84% was obtained.
i. I understand because the material on the dynamics of planet Earth as a living space is presented sequentially. From this statement, an assessment with a percentage of 85% was obtained.
j. The presentation of material in Macromedia Flash 8 media encourages me to discuss with other friends. From this statement, an assessment with a percentage of 93% was obtained.
k. I can understand the material on the dynamics of planet Earth as a living space with the help of good quality pictures. From this statement, an assessment was obtained with a percentage of 87%
l. The illustrations in the form of pictures and videos make it easier for me to understand the material on planetary dynamics as a living space. From this statement, an assessment with a percentage of 89% was obtained.
m. With Macromedia Flash 8, I can gain more in-depth knowledge about the material on the dynamics of planet Earth as a living space. From this statement, an assessment with a percentage of 86% was obtained.
n. This macromedia flash 8 media makes evaluation activities that can test how far my understanding of the material on the dynamics of planet Earth as a living space. From this statement, an assessment with a percentage of 89% was obtained.
o. The sentences and paragraphs used in this learning media are clear. From this statement, an assessment with a percentage of 90% was obtained.
p. The language used in this learning media is simple and easy to understand. From this statement, an assessment with a percentage of 90% was obtained.

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The research on the development of interactive learning media using Macromedia Flash 8 on the topic of planetary dynamics was conducted at SMA Negeri 1 Limboto. This study adopted several relevant theories in the field of instructional design and educational technology. One of the pertinent theories applied in this research is the ADDIE model. The ADDIE model (Analysis, Design, Development, Implementation, and Evaluation) is a systematic instructional design framework widely used in educational settings (Sugiyono, 2015). The research began with the Analysis phase, where the researchers identified the need for interactive learning media on the topic of planetary dynamics. Next, in the Design phase, the media was created using Macromedia Flash 8. Then, during the Development phase, the media was refined based on feedback from experts and student responses. In the Implementation phase, the interactive learning media was introduced in the classroom, and finally, in the Evaluation phase, data was collected and analyzed to assess the effectiveness and validity of the learning media.

Furthermore, the Cognitive Load Theory is also relevant to this research. This theory suggests that learning materials should be designed to manage cognitive load in students' working memory (Afidah, 2020). In this study, the use of interactive elements and multimedia components in Macromedia Flash 8 aims to reduce cognitive load and enhance the learning experience. The interactive features of the media facilitate active learning and enable students to engage more deeply with the content.

Moreover, the Media Richness Theory is also applicable to this research. This theory states that the choice of media should match the complexity and richness of the information being conveyed (Nurbaiti et al., 2017). In the topic of planetary dynamics, which involves complex concepts and visual representations, Macromedia Flash 8 as an interactive multimedia tool provides a suitable platform for effective content delivery. The addition of videos, animations, and interactive elements can enhance students' understanding and retention of the subject matter.

Additionally, the Social Learning Theory is also relevant to this research. This theory emphasizes the importance of social interaction in the learning process (Nurbaiti et al., 2017). In this study, questionnaires and interviews provided an opportunity for students to express their responses and opinions about the learning media. Integrating student feedback allows for improvements and adjustments to the media to better meet the needs and preferences of the learners.

Overall, the research on the development of interactive learning media using Macromedia Flash 8 on the topic of planetary dynamics demonstrates a focused approach by adopting relevant instructional design theories. The application of the ADDIE model, consideration of cognitive load, media richness, and social learning aspects reflects a comprehensive effort in creating an effective and engaging learning experience for students at SMA Negeri 1 Limboto.

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Conclusion

The results of validation by geography teachers obtained a score of 80.16% this value is included in the qualification "very valid," the results of validation by material experts obtained a score of 86.66% this value is included in the qualification "very valid", the results of validation by geography teachers obtained a score of 80.16% this value is included in the qualification "very valid" then for student responses from the trial results get an average percentage value of 85% this value is included in the category "strongly agree". The media is said to be good if the feasibility score reaches> 60%. Based on this theory, this media has met the requirements as a good learning media.

References

Afidah, V. N. (2020). Prinsip- Prinsip Teori Beban Kognitif Dalam Merancang Media Pembelajaran Matematika. *JP2M (Jurnal Pendidikan Dan Pembelajaran Matematika)*, *1*(2). https://doi.org/10.29100/jp2m.v1i2.195

Agency, L. (2006). *Undang-undang RI nomor 20 tahun 2003 tentang sistem pendidikan nasional [Indonesian law number 20 year 2003 on national education system]*. Legal Agency.

Branch, R. M. (2010). *Instructional design: the addie approach. in instructional design: the addie approach*. https://doi.org/10.1007/978-0-387-09506-6

Ministry of Education. (2003). *Undang-undang RI No. 20 Tahun 2003 Sistem Pendidikan Nasional [Law of the republic of indonesia no. 20 year 2003 national education system]*. Zitteliana, 19(8).

Jeklin. (2016). Pengaruh earning management terhadap nilai perusahaan dengan karakteristik komite audit sebagai variabel moderasi pada perusahaan manufaktur yang terdaftar di

bursa efek indonesia periode 2007-2011 [The effect of earning management on firm value with audit committee characteristics as a moderating variable in manufacturing companies listed on the indonesian stock exchange for the period 2007-2011. *Journal of Modern African Studies*, 35(17).

Naconha, A. E. (2021). Consenso colombiano de atención, diagnóstico y manejo de la infección por SARS- CoV-2/COVID-19 en establecimientos de atención de la salud 12 de marzo de 2021 [Colombian consensus on care, diagnosis and management of SARS-CoV-2/COVID-19 infection in health care establishments March 12, 2021]. *Instituto de Evaluacion Tecnologia En Salud*, 4(1).

Nina Sulvia Ayuna Sari, Hamengkubuwono, & Pratama, M. I. L. (2021). Pengaruh penggunaan media interaktif lectora inspire terhadap hasil belajar siswa pada mata pelajaran pendidikan agama Islam [The effect of using lectora inspire interactive media on student learning outcomes in Islamic religious education subjects]. *Scientific Journal of Education Profession*, 6(4).

Nurbaiti, U. C., Pascasarjana, P., & Muhammadiyah, U. (2017). *PENGEMBANGAN MEDIA PEMBELAJARAN PENDIDIKAN AGAMA ISLAM Pengembangan multimedia menggunakan software Lectore Inspire diharapkan mampu membantu permasalahan-permasalahan dalam pembelajaran . Penyusunan multimedia dengan Lectore Inspire dimaksudkan mempermu*. *12*(1), 21–29. https://doi.org/10.29408/edc.v12i1.1317

Pratama, M. I. L. (2022). Pengembangan media pembelajaran interaktif sebagai sarana edukasi kesiap-siagaan bencana tsunami pada anak [Development of interactive learning media as a means of tsunami disaster preparedness education for children]. *Scientific Journal of Education Profession*, 7(3b). https://doi.org/10.29303/jipp.v7i3b.782

Pratama, M. I. L., & Maryati, S. (2021). Pengembangan suplemen bahan ajar geografi pariwisata pada materi potensi ekowisata di kawasan teluk tomini [Development of tourism geography teaching material supplements on ecotourism potential material in the tomini bay area]. *Darussalam Journal; Journal of Education, Communication and Islamic Legal Thought*, 13(1), 31-48. https://doi.org/10.30739/darussalam.v13i1.1286

Sadiman, A. S., Rahardjo, R., & Haryono, A. (2014). *Media Pendidikan: Pengertian, Pengembangan, dan Pemanfaatannya [Educational media: definition, development, and utilization]*. In Arief S. Sadiman.

Siregar, A. C., Adisaputera, A., & Yus, A. (2020). The development of interactive media assisted by macromedia flash to improve the ability of understanding the fiction story information in elementary school students. *Budapest International Research and Critics in Linguistics and Education (BirLE) Journal*, 3(2). https://doi.org/10.33258/birle.v3i2.1053

Sulistianingsih, E., & Mukminan, M. (2019). The development of web-based learning multimedia for high school students' lithosphere material. *Geosfera Indonesia*, 4(1). https://doi.org/10.19184/geosi.v4i1.9882

Wiratmojo. (2017). Konsep penelitian r&d dalam bidang pendidikan [The concept of r&d research in education]. *Journal of Islamic Studies*, 4(2).