Development of Interactive Web Based Multimedia for Online Learning in Elementary School

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ABSTRACT
This research aim to produce interactive multimedia web-based teaching materials as a support for online learning for elementary school students that are valid according to media experts and material experts. This study uses a development research method that adapts the theory of Borg and Gall. The steps taken to produce this interactive web-based multimedia product are: Preliminary Study; Planning; Product Initial Draft Development; Initial Product Draft Trial; Major Product Revisions; Main Product Trial; Final Revision; Implementation. Web based interactive multimedia was developed using the nearpod application embedded in the website. Based on material expert validation, 90.5% was obtained with a very valid category. Media expert validation, obtained a percentage of 92.25% with a very valid category.

Keywords: interactive web based multimedia, online learning, elementary school.

1. INTRODUCTION

In a very short period of time, the education system in Indonesia was forced to undergo major changes. Learning that was originally outside the network (offline) turned into a network (online). The sudden change due to this pandemic disaster has certainly overwhelmed many teachers. Various designs and learning methods as well as offline teaching materials that had been prepared long in advance were forced to not be used. Not to mention the limited knowledge and ability to use online networks as a learning tool that needs to be done.

According to the results of research in the form of interviews and also questionnaires to 50 elementary school teachers spread across various regions in East Java, it was obtained data that most of the teachers experienced problems in making and delivering online teaching materials. They find it difficult to get the right teaching materials so that online learning can still be understood by students as easily as when they do offline learning. According to the teachers, there are many limitations in the provision of teaching materials and learning methods when the online system is implemented. Teaching materials that can be used by teachers are limited to power points, written explanations using whatsapp, and lecture explanations using video conferencing applications, even teachers sometimes still need parental help to re-explain teaching materials to

students. This is in line with research conducted by Herlina and Suherman (2020) which states that learning can be done using a distance learning model and initiating a collaborative approach with students' parents through observation sheets of student learning activities. The use of limited teaching materials certainly has an impact on the level of learning achievement that is lacking, either because of a lack of student interest or lack of communicative and interactive teaching materials. So sometimes teachers still feel the need to visit students' homes one by one to re-explain learning materials that are difficult to understand using online and monitor the progress of their students.

Creating effective and fun online learning is certainly a challenge for teachers. Learning that is only done by giving assignments will have a boring impact and tend to be monotonous for children the age of students at the elementary school level. Teachers need to create an interesting learning process for students and of course not cause students to be compelled to carry out learning that is only done at home or online learning (Salsabila, et al, 2020). Various researches related to online teaching materials for elementary schools have also emerged, such as the research conducted by Mahadiraja and Syamsuarnis (2020) who developed online-based modules. As well as research conducted by Salsabila, et al (2020) regarding the use of audiovisual media in online learning in elementary schools. However, some of these

studies have not fully adjusted the quality of offline learning, because there is no interactive element in learning.

Based on previous research as well as the results of interviews and questionnaires that have been carried out, to overcome these problems it is necessary to have a facility that provides various teaching materials that are varied, interesting, communicative, and interactive. So that online learning is not an obstacle for teachers to deliver teaching materials as well as possible and students can be motivated so that they can understand the lessons delivered as well as possible.

Web-based Interactive Multimedia is interactive media that is made web-based that requires a web server and browser to run it (Putra, A. P, 2019). By creating a web-based system, there are several important things that must be considered before building the system, including:

1. Does not require hardware with strong specifications to run the application.

2. The server needed is enough to install supporting tools so that clients can easily run the application

3. The network infrastructure required is also quite large because the applications made can be accessed from an external network (internet).

4. Web-based applications can be accessed from various devices with the condition that only using a web browser can access them.

5. If you want to update a ready-made app, it's very easy to do so as it doesn't require opening the entire app.

Another important component in multimedia is animation which is a creative medium to convey material concepts. This animation, can be used as an attention-grabbing force for users (students), besides that there are also games (games) which of course will make users (students) learn with fun while playing (Ambarwati et al., 2020; Andajani et al., 2020; Putra et al., 2020; Wahyuningtyas et al., 2020). Based on this discussion, it is necessary to develop interactive multimedia based on a website so that it is easy to use in online learning. The purpose of this research is to produce interactive multimedia web-based teaching materials as a support for online learning for elementary school students that are valid according to media experts and material experts.

2. METHOD

This study uses a development research method that adapts the theory of Borg and Gall (2003). The steps of the Borg & Gall model (2003), namely Preliminary Study; Planning; Product Initial Draft Development; Initial Product Draft Trial; Major Product Revisions; Main Product Trial; Final Revision; Implementation. Referring to the steps of the Borg & Gall model, in the

development process of this research, the researche rmodified the research and development approach of Borg & Gall. This interactive multimedia web-based development step can be seen more clearly in this chart.
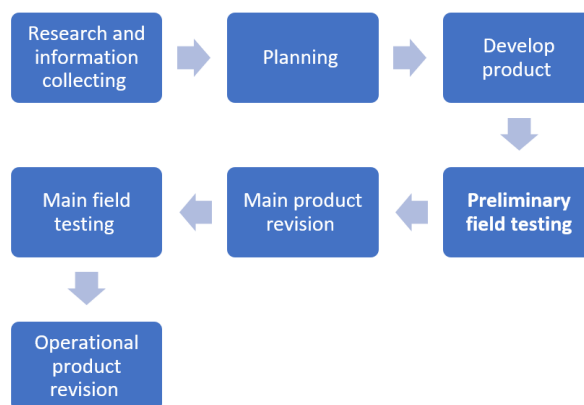

Figure 1. Research flowchart

The experimental subjects in this study consisted of. Material/content experts with the criteria of lecturers who are experts in material in Elementary Schools; Expert in teaching materials, with criteria for lecturers in teaching materials.

This study uses a mixed method analysis method, which combines quantitative data with qualitative data. Quantitative analysis is used to process data from questionnaires and test sheets while descriptive qualitative analysis is used to process data in the form of responses (suggestions, responses, criticisms). The descriptive quantitative and qualitative descriptive data were obtained from four types of data, namely validity data. Validity data were obtained from two experts, namely material experts and teaching materials experts. The data will be added and divided by two to obtain the final product validity data. The data obtained from the validation questionnaire given to the experts were analyzed by quantitative descriptive analysis with the formula .

$$x = \frac{\sum skor\ perolehan}{\sum pernyataan}$$

Description : x = value aspect validity

Table 1. Criteria of Validity

Score	Criteria
x = 5	Very valid
4 x < 5	Valid
3 x < 4	Quite valid
2 x < 3	Invalid
1 x < 2	Totally invalid

3. RESULT

Designing interactive web-based multimedia products begins with formulating indicators and learning

objectives, looking for material according to topics, and looking for references to develop interactive web-based multimedia media . Media creation begins with creating content using nearpod. This application can make learning more interactive. The following content creation using nearpod can be seen in Figure 2.
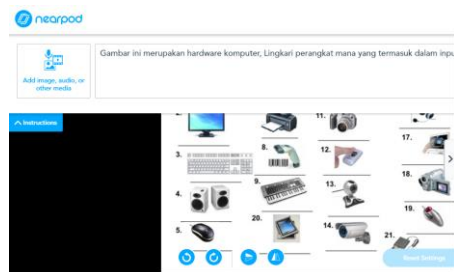

Figure 2. Content creation using nearpod

The next step is to embed the embed code from nearpod into the website. This embed code is used to embed the nearpod view into the website directly. To copy the embed code can be seen in Figure 3.
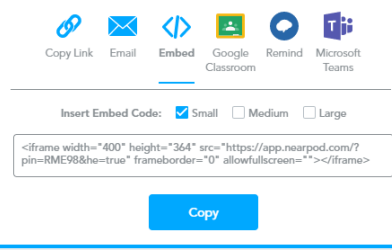

Figure 3. Copying the neapod embed code

The embed code that has been copied is then pasted into the website in HTML code format as shown in Figure 4. The results of the embed code embed will embed the nearpod application on the website. The results of embedding the embed code into the website can be seen in Figure 5.

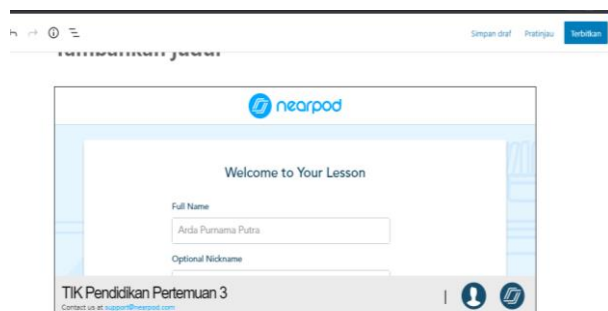**Figure 4.** Paste the embed code into the website

Figure 5. Embed code embed results

Data validation results of interactive learning media materials are shown in table 2

Table 2. Validation from Material Expert

No	Assessment Aspect	Total score
1	Conformity of Material Content	4
	Percentage	93%
	Category	Very Valid
2	Material Language	3
	Percentage	89%
	Category	Valid
3	Material breadth	4
	Percentage	88%
	Category	Very Valid
4	Material Presentation	4
	Percentage	92%
	Category	Very Valid
	Validation Value	90.5%
	Criteria	Very Valid

Based on table 2, then analyzed using formula (1). The results of the calculation of android-based interactive learning media obtained an average validation of 90.5% so it can be concluded that the media is very valid and can be used without revision. The above results are supported by qualitative data from comments and suggestions from the validator, namely the goals and hierarchy need to be improved. The data on the validation results of interactive learning media are presented in table 3.

Table 3. Validation from Media Expert

No	Assessment Aspect	Total score
1	Product Feature	3
	Percentage	93%
	Category	Valid
2	Product Practicality	4
	Percentage	92%
	Category	Very Valid
3	Product Suitability	4
	Percentage	93%
	Category	Very Valid
4	Material Presentation Techniques	4
	Percentage	91%
	Category	Very Valid
	Validation Value	92.25%
	Criteria	Very Valid

Based on table 3, then analyzed using formula (1). The results of the calculation of android-based

interactive learning media obtained an average validation of 92.25% so it can be concluded that the media is very valid and can be used without revision. The above results are supported by qualitative data from comments and suggestions from the validator, namely adding animation to the media.

4. DISCUSSION

Web based interactive multimedia development has been validated by material experts. Validation is used to answer research and development objectives with four aspects, namely content suitability, language, breadth, and presentation. Validation get a result of 90.5% . The results are interpreted using table 1 regarding the validation results criteria, so that the predicate is very valid and can be used without revision. However, to improve the interactive web-based multimedia, it needs a little improvement in accordance with the advice given by the material expert. The advice from material experts is that the goals and hierarchy need to be improved. The results of the percentage of material expert validation are similar to previous research from Ariefin (2020) which obtained a percentage of 91.66% with very valid criteria and can be used without revision.

Web-based interactive multimedia development has been evaluated by media experts with four aspects of assessment, namely the assessment of aspects of product attractiveness, product practicality, product suitability, and material presentation techniques. The assessment carried out by the validator was analyzed and resulted in a level of validity of 92.25%. So it can be said that web-based interactive multimedia is very feasible and can be used. The interactive multimedia web-based needs a little improvement in accordance with the advice given by media experts. These suggestions are from the appearance, writing, and color fonts to get more attention. The results of the percentage of media expert validation are similar to previous research from Ariefin (2020) which got a percentage of 87.5% with very valid criteria and can be used without revision.

The content aspect of the material is validated by a material expert. This aspect assesses the suitability of the material and the scope of the material. Aspects of material content based on material expert validation obtained 93% which was included in the very valid category so that it could be used without revision. That is, the material contained in web-based interactive multimedia is in accordance with the learning objectives, and the correctness of the concept. The scope of the material is also in accordance with the ability level of students and is easy to understand. videos and pictures are in accordance with the material discussed, and in accordance with the learning objectives, content of the material, and the abilities of students.

The presentation aspect is validated by a material expert. This aspect assesses the presentation technique and completeness. The presentation aspect based on material expert validation reaches 92% which is included in the very valid category so that it can be used without revision. That is, the material on web-based interactive multimedia is presented systematically, the videos and illustrated images are presented to make it easier for students to understand the material, and there is a link between each submenu of the material. Web-based interactive multimedia is complete, starting from learning objectives and instructions.

Aspects of language rules are validated by material experts. This aspect assesses the accuracy of writing, sentence accuracy, and communicativeness. The results of material expert validation are 89% with a very valid category so that it can be used without revision. This means that the writing on interactive web-based multimedia is not misspelled (no typo), the writing of standard words is correct, and the writing uses the right punctuation. The sentences used are effective, in accordance with PUEBI, and do not cause double meanings. The sentences chosen are simple, short, clear, and easy to understand, and in accordance with the level of development of students.

Based on the validation of media experts, the suggestions and inputs given were not to use compound sentences and to use simple sentences. So, some sentences were revised to make them easier to understand. This is in line with Arsanti's (2018) statement that the material is presented using effective, communicative sentences, and in accordance with good and correct language rules (EBI). This means that the sentences used are effective, simple and not long-winded, and easy to understand.

The graphic aspect is validated by media experts. This aspect assesses appearance, legibility, and illustration. The graphic aspect based on media expert validation obtained 93% which was included in the very valid category so that it could be used without revision. That is, the display on web-based interactive multimedia is made as attractive as possible with elements of a harmonious layout, attractive background design and in accordance with the development of student characteristics, as well as the presence of buttons that are easy for students to operate. The type of font used is attractive, the font size is easy to read, and the size of the spacing between lines is appropriate. The illustrations and videos are clear and proportional, the color selection is not flashy, varied, and interesting, and the presentation is able to attract the attention of students. This is in line with the statement by Levie & Lents (in Shalikhah, et al., 2017) that one of the functions of learning media is the attention function which can attract and focus students' attention in learning. In addition, Tresnawati, et al. (2016) suggest that attractive designs and varied colors

make interactive web-based multimedia more attractive to use for children.

Aspects of use are validated by media experts. This aspect assesses practicality. Aspects of use based on media expert validation obtained 92% which is included in the very valid category so that it can be used without revision. That is, interactive web-based multimedia is easy to use, can be accessed anywhere and anytime, and can lead to interactivity. This is in line with the statement of Lubis & Ikhsan (2015) that one of the characteristics of interactive web-based multimedia learning media is practical. Practical means that it can be used easily anywhere and anytime.

5. CONCLUSION

The research and development of web based interactive multimedia has been validated by material experts and media experts. From the validation results get the results that the web based interactive multimedia are very valid and can be used in learning. Based on material expert validation, 90.5% was obtained with a very valid category. Media expert validation, obtained a percentage of 92.25% with a very valid category. This research and development produces interactive web-based multimedia products that are very valid according to material experts, very valid according to media experts. Based on this research, it can be concluded that the nearpod application can be used to create a valid interactive multimedia web base. This is because the nearpod application provides an embed code facility that can be embedded on the website.

REFERENCES

[1] Ariefin, Mokhammad. 2020. Pengembangan Media Pembelajaran Berbasis Powtoon Qr-Code Materi Karangan Narasi Dengan Penguatan Karakter Rasa Ingin Tahu Kelas V SDN Srengat 01.

[2] Arsanti, M. 2018. Pengembangan Bahan Ajar Mata Kuliah Penulisan Kreatif Bermuatan Nilai-Nilai Pendidikan Karakter Religius bagi Mahasiswa Prodi PBSI, FKIP, UNISSULA. KREDO: Jurnal Ilmiah, Bahasa, dan Sastra. 1(2). (Online). (https://jurnal.umk.ac.id/index.php/kredo/article/view/2107/1220), diakses pada tanggal 24 Juni 2021.

[3] Ambarwati, R. D., Bintartik, L., & Putra, A. P. (2020). The Development of An Interactive E-Module with The Self-Reinforcing Character for Elementary School Students. 1st International Conference on Information Technology and Education (ICITE 2020), 265–271.

[4] Andajani, K., Andayani, E. S., Priyatni, E. T., Supriyanto, A., Putra, A. P., & Widyastuti, S. (2020). Online Training Design to Improve Basic Teaching Skills Using Flipped Classroom. 2020 6th International Conference on Education and Technology (ICET), 148–151.

[5] Borg, W. R. & Gall, M. D. 2003. Educational Research. An Introduction (7th ed.). New York: Person Education Inc

[6] Cvitkovič, M. K. (2016). E-Learning Materials in Teaching English as a Second Language. Proceedings of The 4th Global Virtual Conference. https://doi.org/10.18638/gv.2016.4.1.780

[7] Dewi, W. A. F. (2020). Dampak Covid-19 terhadap implementasi pembelajaran daring di Sekolah Dasar. Edukatif: Jurnal Ilmu Pendidikan, 2(1), 55–61.

[8] Gak, D., & Pleše, D. (2016). Designing teaching materials – necessity or luxury? Journal of Foreign Language Teaching and Applied Linguistics, Vol. 3. https://doi.org/10.14706/jfltal16314

[9] Hargis, P. G., & Smith, D. A. (1997). Syllabi and Instructional Materials for Teaching Comparative and Historical Sociology. Teaching Sociology, Vol. 25, p. 192. https://doi.org/10.2307/1318668

[10] Herlina, H., & Suherman, M. (2020). Potensi Pembelajaran Pendidikan Jasmani Olahraga Dan Kesehatan (Pjok) Di Tengah Pandemi Corona Virus Disease (Covid)-19 Di Sekolah Dasar. Tadulako Journal Sport Sciences And Physical Education, 8(1), 1-7.

[11] Lubis, I. R. & Ikhsan, J. 2015. Pengembangan Media Pembelajaran Kimia Berbasis Android untuk Meningkatkan Motivasi Belajar dan Prestasi Kognitif Peserta Didik SMA. Jurnal Inovasi Pendidikan IPA. 1(2): 191-201. (Online). (https://journal.uny.ac.id/index.php/jipi/article/view/7504/6500), diakses pada tanggal 24 Juni 2021.

[12] Mahadiraja, D., & Syamsuarnis, S. (2020). Pengembangan Modul Pembelajaran Berbasis Daring Pada Mata Pelajaran Instalasi Penerangan Listrik Kelas XI Teknik Instalasi Tenaga Listrik TP 2019/2020 Di SMK Negeri 1 Pariaman. JTEV (Jurnal Teknik Elektro dan Vokasional), 6(1), 77-82.

[13] Praherdhiono, H. & Adi, E. P. 2008. Panduan Praktikum Multimedia. Malang: FIP Universitas Negeri Malang.

[14] Putra, A. P., Nawawi, I., Badawi, A., Sutarno, Pratiwi, I., Kim, J., … Umaroh, M. (2019). Interactive Multimedia Analysis in Thematic Learning: A Study of Practical Aspect. 2019 5th International Conference on Education and Technology, ICET 2019. https://doi.org/10.1109/ICET48172.2019.8987218

[15] Putra, A. P., Andajani, K., & Pratiwi, I. (2020). Development of Interactive Multimedia based on Adobe Flash in Thematic Learning in Elementary Schools. 603–607. https://doi.org/10.2991/assehr.k.201214.305

[16] Rigianti, H. A. (2020). Kendala Pembelajaran Daring Guru Sekolah Dasar di Banjarnegara. Elementary School: Jurnal Pendidikan Dan Pembelajaran Ke-SD-An, 7(2)

[17] Rüschoff, B., & Sudhoff, J. (2018). Teaching Aids and Materials. The TESOL Encyclopedia of English Language Teaching, pp. 1–7. https://doi.org/10.1002/9781118784235.eelt0209

[18] Sadikin, A., & Hamidah, A. (2020). Pembelajaran Daring di Tengah Wabah Covid-19. Biodik, 6(2), 214–224.

[19] Salsabila, U. H., Seviarica, H. P., & Hikmah, M. N. (2020). Urgensi Penggunaan Media Audiovisual Dalam Meningkatkan Motivasi Pembelajaran Daring Di Sekolah Dasar. INSANIA: Jurnal Pemikiran Alternatif Kependidikan, 25(2), 284-304.

[20] Shalikhah, N. D., Primadewi, A., & Iman, M. S. 2017. Media Pembelajaran Interaktif Lectora Inspire sebagai Inovasi Pembelajaran. 20(1). WARTA LPM. (Online). (http://journals.ums.ac.id/index.php/warta/article/view/2842/2718), diakses pada tanggal 25 Januari 2021

[21] Seels dan Glasgow. 1990. Exercieses in Instructionals Design. Colombus: Merril Publishing Company

[22] Setiawan, A. 2007. Dasar-dasar Multimedia Interaktif (MMI). Bandung: SPS UPI Bandung.

[23] Tresnawati, D., Satria, E., & Adinugraha, Y. 2016. Pengembangan Aplikasi Komik Hadist Berbasis Multimedia. Jurnal Algoritma. 13(1): 99-105. (Online). (https://sttgarut.ac.id/jurnal/index.php/algoritma/article/view/310), diakses pada tanggal 24 Juni 2021.

[24] Wahyuningtyas, P., Bintartik, L., & Putra, A. P. (2020). Lectora-Based Interactive E-Book Development for Elementary Schools. 1st International Conference on Information Technology and Education (ICITE 2020), 257–264.