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Website-Based Learning Media on Reading and Numeracy Content for Third Grade Elementary Schools

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ABSTRAK

Teknologi pembelajaran terus mengalami peningkatan seiring dengan perkembangan zaman. Peranan teknologi saat ini memiliki perkembangan yang sangat pesat dalam berbagai bidang. Banyak media yang dapat membantu meningkatkan kualitas dan kuantitas pembelajaran, salah satunya adalah penerapan pembelajaran berbasis website. Penelitian ini bertujuan untuk mengembangkan media pembelajaran berbasis website pada muatan materi membaca dan berhitung untuk siswa kelas III sekolah dasar, serta menguji kelayakan media pembelajaran tersebut. Penelitian ini menggunakan metode pengembangan R&D (Research and Development) dengan model pengembangan MDLC versi Luther Sutopo. Metode yang digunakan untuk mengumpulkan data yaitu suryev. Instrument yang digunakan untuk mengumpulkan data yaitu kuesioner. Subjek penelitian yaitu 2 ahli media pembelajaran, 2 ahli materi pembelajaran. Teknik analisis data yang digunakan yaitu kuantitatif. Hasil penelitian yaitu hasil penilaian yang berikan oleh ahli media pembelajaran memiliki nilai rata-rata koefisien V 0,87 dinyatakan valid. Validator ahli materi memiliki nilai rata-rata keofisien V 0,81 dinyatakan valid. Hasil rata-rata angket pengguna yaitu siswa kelas III sekolah dasar bernilai 83,12 pada kategori acceptable. Berdasarkan hasil pengujian yang dilakukan, media pembelajaran berbasis Website pada muatan membaca dan berhitung untuk siswa kelas III sekolah dasar layak untuk digunakan.

ABSTRACT

Learning technology continues to improve along with the times. The role of technology currently has very rapid development in various fields. Many media can help improve the quality and quantity of learning, one of which is the application of website-based learning. This study aims to develop web-based learning media on reading and arithmetic content for third-grade elementary school students and test the feasibility of these learning media. This study used the R&D (Research and Development) development method with the Luther Sutopo version of the MDLC development model. The method used to collect data is suryev. The instrument used to collect data is a questionnaire. The research subjects were two learning media experts and two learning material experts. The data analysis technique used is quantitative. The research results, namely the assessment given by learning media experts, have an average value of coefficient V 0.87, declared valid. The material expert validator has an average efficiency value of V 0.81, declared valid. The average result of a user questionnaire, namely grade III elementary school students, is 83.12 in the excellent category. Based on the results of tests, Web-based learning media on reading and arithmetic content for grade III elementary school students is feasible.

1. INTRODUCTION

Learning technology continues to improve along with the times. The implementation of daily learning is also often found with the use of technological developments in the world of education, as is usually done by teachers or lecturers, namely combining specialized tools in the learning process (Agustin et al., 2020; Lynch et al., 2021; Martins et al., 2018). However, technology will not only bring positive benefits but will also be able to bring negative impacts. The development of science and technology has a positive impact by becoming more open and spreading information and knowledge from and to all over the world through the boundaries of space and time (Ahmadi, 2018; Aini et al., 2020; Kartal et al., 2022). The negative effect changes behavior, ethics, norms, rules, or morals of life that are contrary to society's ethics, standards, and morals (Chang et al., 2020; Huang et al., 2016).

Learning media improves student learning so that participants do not get bored during the teaching and learning process. Using media in teaching and learning activities is to help the learning process run. The use of media in education is one of the efforts to improve the quality of student education (Ayuni & Setiawati, 2019; Nugroho & Arrosyad, 2020; Sulasteri et al., 2018). The quality of students can be seen from how the

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results of the learning process that has been carried out during their education period. Learning media is one of the main ingredients in the learning process in schools (Aris et al., 2019; Siahaan et al., 2021). Student learning outcomes are determined based on the learning media used (Aris et al., 2019; Wicaksono, 2016).

Learning media is anything that is channeled through messages, which can stimulate thoughts, which can be channeled to the feelings, and willingness of students so that the learning process in students can be created (Silaban & Rizal, 2020; Wicaksono, 2016). Learning media is needed as a tool to support the process of teaching and learning activities. In order to make it easier for the teacher to convey the material and make it easier for students or students to understand what is given by the teacher (Ahmad et al., 2021; Buchory et al., 2017). There are still many educational institutions that use conventional learning media (Jasman et al., 2018; Sulasteri et al., 2018). The teacher's delivery of material still uses learning media such as guidebooks, teaching aids, or even just conveying material orally, and students only listen to it. This makes it necessary to have a new atmosphere in learning where learning can take place in a more creative, innovative, and fun atmosphere.

Patterns create a pleasant atmosphere in the teaching and learning process, and teachers use tools when teaching, for example, in singing or music lessons using musical instruments, in drawing lessons using drawing tools of various colors and shapes, and in several other subjects that use tools. However, when reading and arithmetic lessons, only use guidebooks which are sometimes damaged due to poor maintenance and the use of pencils that are owned by students, and often the teacher also uses a blackboard which is as useful as the guidebook. Counting is also the basis of knowledge for early childhood, which includes cognitive aspects; counting can develop logical reasoning abilities (Annisa et al., 2020; Delfia & Mayar, 2020; Nasution et al., 2020). To produce better results and services, it is necessary to create learning models (Dina et al., 2019; Romero-Rodríguez et al., 2020; Sukardjo & Salam, 2020). One of the learning models that is widely used is the Luther Sutopo MDLC development model.

The Luther-Sutopo model is a development model specifically intended for multimedia developers so that the development stages are by the multimedia creation process. By using this model, developers can use it directly without using modifications to other development models to suit the multimedia product to be made. The Luther-Sutopo model can help solve the problem being researched. There is compatibility between the names of the stages in the method and what was done at that stage to facilitate and understand how the development of multimedia devices will be carried out. In addition, digital-based learning media is needed to help students learn.

Interactive learning multimedia can be interpreted as an application program (software) consisting of various media elements such as text, graphics, photos, animation, video, and sound, which are presented interactively for learning purposes. Interactive media is a system in which the delivery media presents the material in the form of video recordings with computer control (Amelia & Harahap, 2021; Astuti et al., 2017; Fauyan, 2019). This is in line with research, that interactive media is a delivery media system that presents recorded video material with control (Rosalina & Suhardi, 2020; A. C. Sari et al., 2019). Computer to students who not only hear and see video and sound but also give an active response, and that response determines the speed and sequence of the presentation. In addition, interactive media also has audio-visual elements (including animation) and is called interactive because this media is designed to actively involve the user's response (Gever et al., 2021; Kurniawan & Saragih, 2016).

In general, the benefits that can be obtained are that the learning process is more exciting and more interactive, the amount of teaching time can be reduced, the quality of student learning can be improved, and the teaching and learning process can be carried out anywhere and anytime. Students understanding of attitudes can be improved. Previous research findings state that the use of media can facilitate students' learning (Damayanti & Qohar, 2019; Rachmavita, 2020; Suarsana et al., 2018). Other findings also state that learning media can improve student learning outcomes (Rachmavita, 2020; N. M. A. Sari & Manuaba, 2021; Suarsana et al., 2018). Based on this, the purpose of this study namely to develop web-based interactive multimedia learning media on reading and arithmetic teaching materials that are able to attract interest and improve student quality.

2. METHOD

The research method used in this study is the Research and Development (R&D) method. The Research and Development (R&D) method is a method that contains stages to perfect existing products where these products can be accounted for. The product that is created does not have to be in the form of a tangible device or called a tool, but can be in the form of software or often calledan application that is installed on a computer. The multimedia development model used in this research is the Luther version of the Multimedia Development Life Cycle (MDLC) developed by Sutopo, which consists of concept, design,

material collecting, assembly, testing, and distribution. The development model framework includes six stages: concept, design, material collecting, assembly, testing, and distribution (Priatno & Sumantri, 2021).

The research was conducted on class III MI Muhammadiyah Bolon students. The stages in this research are basically trying to apply the data collection method by way of a survey using a questionnaire which was previously tested using validity and reliability techniques. After that, the questionnaire will be distributed to respondents in the form of a questionnaire or questionnaire. The results of data collection will later be used as a reference for building a web-based interactive learning media system and database that will be developed. After the system has been developed using the MDLC model, data collection will be carried out by means of a survey using a questionnaire previously tested using validity and reliability techniques. After that, the questionnaire will be distributed to respondents in the form of a questionnaire or questionnaire. The data collection results will later be used as a reference for conclusions.

The variables used in this study are divided into Dependent Variables (bound) and Independent Variables (free). In analyzing customer satisfaction, researchers used five independent variables: benefits, appearance, interaction, procedures, and independence factors. The dependent variable in this study is user satisfaction. In this study, the dependent variable is defined as a relationship made at the user's initiative. The primary data needed for this study is a questionnaire given to respondents. This form of questionnaire consists of 4 parts. Namely, part 1 contains the respondent's identity data. Part 2 is a qualitative questionnaire, part 3 is a quantitative questionnaire, and part 4 is a filled-in questionnaire. To support this research, researchers need secondary data. The secondary data required are 1) material reading and arithmetic and Data of class III students and teachers.

The data collection method used are questionnaire and literature. Questionnaire method is the method of distributing questionnaires to be filled out about the process of implementing academic activities related to the variables to be searched. Questionnaires were given to respondents to be filled in according to the actual situation without direction from the researcher. When finished, the respondent returned the questionnaire to the researcher. Literature / Documentation Method is the method of collecting, identifying, and processing is written data inthe form of relevant books, regulations, activity reports, and data relevant to research. Descriptive analysis is used in the initial research and final research in this writing. The reason for using descriptive analysis is that descriptive study can represent the results of a questionnaire that uses a Likert scale from 1 to 5. Using the frequency of occurrence of indicators in each response variable from the respondents, it can be analyzed using descriptive analysis. The analytical model used in this study is object-oriented analysis modeling, and the tools used are UML (Unified Modeling Language) to describe the functional model. The diagrams used are use case diagrams, class diagrams, sequence diagrams, activity diagrams, state diagrams, and table schema. The designs made in the development of web-based interactive learning media include system architecture designs, input data formats or forms, relationships between entities, process flow diagrams, system data, and user interface designs.

3. RESULT AND DISCUSSION

Result

The data and analysis of the teacher's role in MI Muhammadiyah Bolon, In this case, the determination of respondents is based on students filling out a questionnaire about the product to be developed. Respondents involved in this study were elementary school students in class III, MI Muhammadiyah Bolon. This is because it is third-grade students become the subject of the research. The methods and instruments used at the data collection stage include. First, measurements related to benefits, appearance, interactions, procedures, and independence are carried out by questionnaire to product users and learning experts. Measurements were carried out before and after the learning media were developed. Second, measuring questionnaires carried out on the quality of the interactive learning media that was developed for media users. In testing or validating learning media developed in small groups, a data collection tool was given as a questionnaire with a Likert scale. The scores obtained using the Likert scale are then averaged. For qualitative analysis, each answer obtained is given a score.

The population in this study were third-grade students at MI Muhammadiyah Bolon Elementary School. At the same time, the number of samples was determined based on the measurement formula performed on each item V (value). Testing the instrument filled by media and material experts used Aiken's (1980, 1985) validation coefficient analysis technique, where measurements were made on each item V (value). Interpretation testing is obtained through instruments that media experts and material experts have filled in. The usability test was conducted using a questionnaire filled in by class III students at MI Muhammadiyah Bolon. The questionnaire used is the System Usability Scale (SUS), according to John Brooke. The rating scale on the System Usability Scale (SUS).

The calculation rules for SUS are that for each odd-numbered question, the score obtained from the user will be reduced by 1. For each even-numbered question, the final score obtained from a value of 5 will be reduced by the score obtained by the user. The SUS score results are obtained by adding the scores for each question and multiplying by 2.5. After obtaining the results of the calculation of the average SUS, the predicate of product results is determined by referring to the SUS table. The following is the SUS score predicate from John Brooke (1996). The SUS Score, used to measure the calculation results obtained from a questionnaire filled out by users, including 3-grade scale assessments, adjective ratings, and acceptability ranges.

System testing is carried out to determine the results of the system that has been created and to ascertain whether the system can be used as an interactive learning medium for grade III students in particular and elementary school students in general. The trial of this system was carried out by researchers starting from the beginning of data collection, namely on November 3, for the initial observation stage. Data collection was held on November 7 to obtain information and also fill out a questionnaire about the media requirements needed for the interactive learning process. Then on the 24th, a system test was carried out involving media experts, material experts, and students. After the respondents filled out the questionnaire, all of the data was recapitulated to obtain the original score according to the table. So that the score of the SUS questionnaire can be calculated for each respondent as follows: Based on the SUS score of each respondent, the average score is found using the equation. The data above is the score or average value of the questionnaire filled out by 16 class III MI Muhammadiyah Bolon students. The average value obtained through the calculation of the System Usability Scale (SUS) is 83.12, which is included in the acceptable category of 10 questions.

The research results obtained from the calculation of the questionnaire data that has been filled in by media experts, material experts, and students are as follows. First, the average result of the coefficient V of media experts obtained a value of 0.87; it can be concluded thatall items are valid. The results of the percentage of interpretation have a value above 62% so that web-based learning media on reading and arithmetic content is feasible to use. Second, the average result of the coefficient V of material experts is 0.81; it can be concluded that all items are valid. The results of the interpretation percentage are above 62%, so web-based learning media on reading and arithmetic content is feasible to use. Third, the average result of the student questionnaire obtained a score of 83.12 in the acceptable category, which is included in the excellent grade scale B in the System Usability Scale (SUS) category.

Discussion

In class learning, there is a learning method applied by the teacher. To support learning in the classroom, teachers need tools or media as intermediaries to convey material to students (Hidayati & Astuti, 2020; Isdaryanti et al., 2018). Many teachers still use makeshift learning media such as books, visual aids, blackboards, and the like, especially in elementary schools (Amelia & Harahap, 2021; Buchori et al., 2017). The Author's target is class 3 at MI Muhammadiyah Bolon. In this case, the teacher must continue to innovate with the times and the changing curriculum. Game-based interactive learning media using a website platform to learn to read and count is an innovation developed to meet the needs of teachers in conveying material to students and making it easier for students to learn (Anastasiadis et al., 2018; Wang et al., 2018).

The media is the delivery of messages from the sender to the recipient. Thus the media is a vehicle for transmitting learning information or distributing messages (Nugroho & Arrosyad, 2020; Sulasteri et al., 2018). Media is used to support learning so that learning can run well. The media can also be interpreted as a link between the giver and recipient of information (Ayuni & Setiawati, 2019; Siahaan et al., 2021). Media use as a link between educators and students is learning (Aris et al., 2019; Wicaksono, 2016). In other words, active learning requires media support to deliver the material they will learn. Previous research findings also state that learning media is used as a learning tool in schools to improve the quality of education (Ahmad et al., 2021; Silaban & Rizal, 2020). Other findings also state that the media improves the quality of learning (Lidiana et al., 2018; Sukardi et al., 2020).

In this case, the application design process uses the PHP programming language and Adobe Flash as one of the media that will lead to making web-based learning media. The process of collecting all the materials needed to develop instructional media includes KI & KD, theory, picture, audios, quiz questions, button. The goal of user interface design (UID) is to design an effective interface for a software system. Effective means ready to use, and the results are as needed. Requirements here are the needs of its users. Users often judge the system from the interface, not from its function but from the user interface. If the user interface design could be better, that is often the reason not to use the software. A good user interface must unify userinteraction and information presentation. Make the questions varied, meaning that when the quiz is opened, the questions that appear randomly between one user and another are different. It is

expected that educational institutions can continue to support the systems that have been developed and also continue to innovate in order to realize more interactive learning.

4. CONCLUSION

The results of the tests carried out show that the learning media developed are in the acceptable "acceptable" and excellent "excellent" categories, so the media is suitable for use by class III MI Muhammadiyah Bolon students. This application is a development medium that can be continued to facilitate learning that is more interactive and according to needs.

5. REFERENCES

Agustin, F., Aini, Q., Khoirunisa, A., & Nabila, E. A. (2020). Utilization of Blockchain Technology for Management E-Certificate Open Journal System. *Aptisi Transactions on Management (ATM)*, *4*(2), 134–139. https://doi.org/10.33050/atm.v4i2.1293.

Ahmad, D. N., Astriani, M. M., Alfahnum, M., & Setyowati, L. (2021). Increasing creative thinking of students by learning organization with steam education. *Jurnal Pendidikan IPA Indonesia*, *10*(1), 103–110. https://doi.org/10.15294/jpii.v10i1.27146.

Ahmadi, D. M. R. (2018). The Use of Technology in English Language Learning: A Literature Review. *International Journal of Research in English Education*, *3*(2), 115–125. https://doi.org/10.29252/ijree.3.2.115.

Aini, Q., Rahardja, U., Tangkaw, M. R., Santoso, N. P. L., & Khoirunisa, A. (2020). Embedding a Blockchain Technology Pattern Into the QR Code for an Authentication Certificate. *Jurnal Online Informatika*, *5*(2). https://doi.org/10.15575/join.v5i2.583.

Amelia, D. P., & Harahap, A. (2021). Application of Interactive Multimedia-Based Mathematics Learning Media to Increase Students' Interest in Learning. *Budapest International Research and Critics Institute (BIRCI-Journal): Humanities and Social Sciences*, *4*(2), 3153–3161. https://doi.org/10.33258/birci.v4i2.2040.

Anastasiadis, T., Lampropoulos, G., & Siakas, K. (2018). Digital Game-based Learning and Serious Games in Education. *International Journal of Advances in Scientific Research and Engineering*, *4*(12), 139–144. https://doi.org/10.31695/ijasre.2018.33016.

Annisa, E. N., Supriyati, Y., & Nurani, Y. (2020). Peningkatan Pemahaman Berhitung dan Kardinalitas melalui Penggunaan Media Rangkasbitung. *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*, *4*(2). https://doi.org/10.31004/obsesi.v4i2.441.

Aris, B., Ardian, A., & Ferry, M. (2019). Pengembangan Media Pembelajaran Berbasis E-Learning Pada SMK di Pontianak. *Jurnal Nasional Komputasi dan Teknologi Informasi (JNKTI)*, *2*(2), 133. https://doi.org/10.32672/jnkti.v2i2.1556.

Astuti, I. A. D., Sumarni, R. A., & Saraswati, D. L. (2017). Pengembangan Media Pembelajaran Mobile Learning Berbasis Android. *JPPPF- Jurnal Penelitian dan Pengembangan Pendidikan Fisika*, *3*(1), 57–62. https://doi.org/10.21009/jrpk.072.10.

Ayuni, D., & Setiawati, F. A. (2019). Kebun Buah Learning Media for Early Childhood Counting Ability. *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*, *3*(1), 1. https://doi.org/10.31004/obsesi.v3i1.128.

Buchori, Rahmawati, S., & Wardani, S. (2017). The Development of A Learning Media for Visualizing the Pancasila Values Based on Information and Communication Technology. *Jurnal Cakrawala Pendidikan*, *36*(3), 502–521. https://doi.org/10.21831/cp.v36i3.12748.

Buchory, Rahmawati, S., & Wardani, S. (2017). The development of a learning media for visualizing the pancasila values based on information and communication technology. *Jurnal Cakrawala Pendidikan*, *36*(3). https://doi.org/10.21831/cp.v36i3.12748.

Chang, Y.-Z., Yu, C.-W., Chao, C.-M., & Lin, F.-C. (2020). Influences on medical app adoption by patients: the unified theory of acceptance and use of technology model and the moderating effects of technology readiness. *The Social Science Journal*. https://doi.org/10.1080/03623319.2020.1848338.

Damayanti, P. A., & Qohar, A. (2019). Pengembangan Media Pembelajaran Matematika Interaktif Berbasis Powerpoint pada Materi Kerucut. *Kreano, Jurnal Matematika Kreatif-Inovatif*, *10*(2), 119–124. https://doi.org/10.15294/kreano.v10i2.16814.

Delfia, E., & Mayar, F. (2020). Analisis Pembelajaran Berhitung melalui Media Prisma Pintar pada Anak Usia Dini. *Jurnal Obsesi : Journal of Early Childhood Education*, *4*(1). https://doi.org/10.31004/obsesi.v4i1.350.

Dina, Z. H., Ikhsan, M., & Hajidin, H. (2019). The Improvement of Communication and Mathematical Disposition Abilities through Discovery Learning Model in Junior High School. *JRAMathEdu (Journal*

of Research and Advances in Mathematics Education), *4*(1), 11–22. https://doi.org/10.23917/jramathedu.v4i1.6824.

Fauyan, M. (2019). Developing Interactive Multimedia Through Ispring on Indonesian Language Learning with The Insights of Islamic Values in Madrasah Ibtidaiyah. *Al Ibtida: Jurnal Pendidikan Guru MI*, *6*(2), 177. https://doi.org/10.24235/al.ibtida.snj.v6i2.4173.

Gever, V. C., Tunca, E. A., Boluwatife, A. A., Nwogbo, V., & Chibueze, B. N. C.-O. (2021). Visual media and learning: Effect of interactive television instruction as an intervention strategy for improving the critical thinking skills and disposition of out-of-school nomadic children in Nigeria. *Learning and Motivation*, *76*. https://doi.org/10.1016/j.lmot.2021.101767.

Hidayati, A., & Astuti, S. (2020). Pengembangan Media Pembelajaran Buku Kata Bergambar Berbasis Android Untuk Meningkatkan Kemampuan Menulis. *Journal for Lesson and Learning Studies*, *3*(2). https://doi.org/10.23887/jlls.v3i2.27446.

Huang, K.-E., Wu, J.-H., Lu, S.-Y., & Lin, Y.-C. (2016). Innovation and technology creation effects on organizational performance. *Journal of Business Research*, *69*(6), 2187–2192. https://doi.org/10.1016/j.jbusres.2015.12.028.

Isdaryanti, B., Rachman, M., Sukestiyarno, Y. L., Florentinus, T. S., & Widodo, W. (2018). Teachers' performance in science learning management integrated with character education. *Jurnal Pendidikan IPA Indonesia*, *7*(1), 9–15. https://doi.org/10.15294/jpii.v7i1.12887.

Jasman, M. I., Rukun, K., & Sukardi, S. (2018). Pengembangan Modul Pembelajaran Interaktif Aplikasi Adobe Flash Bahasa Java Pada Mata Pelajaran Object Oriented Programming (Oop). *Jurnal Pendidikan Teknologi Kejuruan*, *1*(3), 101–110. https://doi.org/10.24036/jptk.v1i3.1923.

Kartal, T., Kiziltepe, İ. S., & Kartal, B. (2022). Extending Technology Acceptance Model with Scientific Epistemological and Science Teaching Efficacy Beliefs: A Study with Preservice Teachers. *Journal of Education in Science, Environment and Health*. https://doi.org/10.21891/jeseh.1055590.

Kurniawan, D., & Saragih, A. H. (2016). Pengembangan Bahan Pembelajaran Media Interaktif Pada Mata Pelajaran Ppkn. *Jurnal Teknologi Informasi & Komunikasi Dalam Pendidikan*, *3*(1), 1–13. https://doi.org/10.24114/jtikp.v3i1.5001.

Lidiana, H., Gunawan, G., & Taufik, M. (2018). Pengaruh Model Discovery Learning Berbantuan Media PhET Terhadap Hasil Belajar Fisika Peserta Didik Kelas XI SMAN 1 Kediri Tahun Ajaran 2017/2018. *Jurnal Pendidikan Fisika dan Teknologi*, *4*(1), 33. https://doi.org/10.29303/jpft.v4i1.519.

Lynch, M., Sage, T., Hitchcock, L. I., & Sage, M. (2021). A heutagogical approach for the assessment of Internet Communication Technology (ICT) assignments in higher education. *International Journal of Educational Technology in Higher Education*, *18*(1). https://doi.org/10.1186/s41239-021-00290-x.

Martins, M., Farias, J. S., Albuquerque, P. H. M., & Pereira, D. S. (2018). Adoption of technology for reading purposes: A study articles of e-books acceptance. *Brazilian Business Review*, *15*(6), 568–588. https://doi.org/10.15728/bbr.2018.15.6.4.

Nasution, N., Yaswinda, Y., & Maulana, I. (2020). Analisis Pembelajaran Berhitung melalui Media Prisma Pintar pada Anak Usia Dini. *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*, *4*(1). https://doi.org/10.31004/obsesi.v4i1.311.

Nugroho, F., & Arrosyad, M. I. (2020). Learning Multimedia Development Using Articulate Storyline for Students. *International Journal of Elementary Education*, *4*(4), 575–579. https://doi.org/10.23887/ijee.v4i4.27763.

Priatno, E. A., & Sumantri, R. B. B. (2021). Dukungan Perangkat Lunak Authoring dalam Prespektif Multimedia Development Life Cycle (MDLC) Luther. *Jurnal Ilmu Komputer dan Teknologi*, *2*(2). https://doi.org/10.35960/ikomti.v2i2.708.

Rachmavita, F. P. (2020). Interactive media-based video animation and student learning motivation in mathematics. *Journal of Physics: Conference Series*, *1663*(1). https://doi.org/10.1088/1742-6596/1663/1/012040.

Romero-Rodríguez, J. M., Aznar-Díaz, I., Hinojo-Lucena, F. J., & Cáceres-Reche, M. P. (2020). Models of good teaching practices for mobile learning in higher education. *Palgrave Communications*, *6*(1). https://doi.org/10.1057/s41599-020-0468-6.

Rosalina, S. S., & Suhardi, A. (2020). Need Analysis of Interactive Multimedia Development With Contextual Approach on Pollution Material. *INSECTA: Integrative Science Education and Teaching Activity Journal*, *1*(1), 93. https://doi.org/10.21154/insecta.v1i1.2107.

Sari, A. C., Fadillah, A. M., Jonathan, J., & Prabowo, M. R. D. (2019). Interactive Gamification Learning Media Application For Blind Children Using Android Smartphone in Indonesia. *Procedia Computer Science*, *157*, 589–595. https://doi.org/10.1016/j.procs.2019.09.018.

Sari, N. M. A., & Manuaba, I. B. S. (2021). Development of Interactive E-Module Based on Human Digestive

System Material Inquiry on Theme 3 About Healthy Foods for Fifth Grade Elementary School. *Indonesian Journal Of Educational Research and Review*, *4*(1), 54. https://doi.org/10.23887/ijerr.v4i1.33297.

Siahaan, A. U., Marennanta, W. A., Dzikri, A., & Neta, F. (2021). Developing Interactive Learning Multimedia Based on Simulation Model. *Pedagogy : Journal of English Language Teaching*, *9*(1), 15. https://doi.org/10.32332/joelt.v9i1.2687.

Silaban, R. A., & Rizal, F. (2020). The Development of Program Logic Control (PLC) Trainer Media in Vocational High Schools. *Journal of Education Research and Evaluation*, *4*(2), 121. https://doi.org/10.23887/jere.v4i2.24606.

Suarsana, I. M., Mahayukti, G. A., Sudarma, K., & Yoga, N. B. A. (2018). Development of Interactive Mathematics Learning Media on Statistics Topic for Hearing-impaired Student I Made Suarsana a. *International Research Journal of Engineering, IT & Scientific Research*, *4*(6), 55–66. https://doi.org/10.21744/irjeis.v4n6.377.

Sukardi, Mayefis, R., & Usmeldi. (2020). Effectiveness of Mobile Learning Media on Computer Assembly at Vocational High School Effectiveness of Mobile Learning Media on Computer Assembly at Vocational High School. *Journal of Physics: Conference Series*, 1–6. https://doi.org/10.1088/1742-6596/1594/1/012012.

Sukardjo, M., & Salam, M. (2020). Effect of concept attainment models and self-directed learning (SDL) on mathematics learning outcomes. *International Journal of Instruction*, *13*(3), 275–292. https://doi.org/10.29333/iji.2020.13319a.

Sulasteri, S., Rusydi Rasyid, M., & Akhyar, M. (2018). the Effect of the Use of Learning Media Based on Presentation Media on Interest and Mathematical Learning Outcomes. *MaPan: Jurnal Matematika dan Pembelajaran*, *6*(2), 221–236. https://doi.org/10.24252/mapan.2018v6n2a8.

Wang, S. Y., Chang, S. C., Hwang, G. J., & Chen, P. Y. (2018). A Microworld-based Role-playing Game Development Approach to Engaging Students in Interactive, Enjoyable, and Effective Mathematics Learning. *Interactive Learning Environments*, *26*(3), 411–423. https://doi.org/10.1080/10494820.2017.1337038.

Wicaksono, S. (2016). the Development of Interactive Multimedia Based Learning Using Macromedia Flash 8 in Accounting Course. *Journal of Accounting and Business Education*, *1*(1), 122. https://doi.org/10.26675/jabe.v1i1.6734.