

Developing Digital Web-Based Teaching Materials for Indonesian SubjectChece Nurmalasari^{1*}, Nurhikmah H², Hamsu Abdul Gani³Corresponding author: checens@gmail.com

Abstract: This research was conducted to propose digital web-based teaching materials using link trees. Research is a research and development study that aims to examine the level of need, practicality and effectiveness of developing digital web-based materials in Indonesian Subjects for seventh grade students of Amir Islam Panyula Junior High School (SMP), Bone Regency. The type of research used is the type of development research (R and D). The development model used is the ADDIE model. Data collection techniques use observation techniques, questionnaires, documentation, pretest and posttest. Data analysis uses data analysis of validity, practicality and effectiveness by using data analysis techniques *n_gain* to find out how the level of effectiveness of digital web-based teaching materials is developed. Based on this research, it can be concluded that the teaching materials developed meet valid criteria with a validity level of 4.7, practical with a practicality level of 4.5 tested practically and effectively with an effectiveness level of 50 so that the teaching materials are effective enough to be used in the field. Digital web teaching materials are recommended for use in real learning.

Keywords: Development, Teaching Materials, Digital Web

Abstrak: Penelitian ini dilakukan untuk mengusulkan bahan ajar digital berbasis web dengan menggunakan link tree. Penelitian merupakan penelitian dan pengembangan yang bertujuan untuk mengkaji tingkat kebutuhan, kepraktisan dan efektivitas pengembangan materi berbasis web digital dalam mata pelajaran Bahasa Indonesia untuk siswa kelas VII SMP Amir Islam Panyula Kabupaten Bone. Jenis penelitian yang digunakan adalah jenis penelitian pengembangan (R dan D). Model pengembangan yang digunakan adalah model ADDIE. Teknik pengumpulan data menggunakan teknik observasi, angket, dokumentasi, pretest dan posttest. Analisis data menggunakan analisis data validitas, kepraktisan dan keefektifan dengan menggunakan teknik analisis data *n_gain* untuk mengetahui bagaimana tingkat keefektifan bahan ajar digital berbasis web yang dikembangkan. Berdasarkan penelitian ini dapat disimpulkan bahwa bahan ajar yang dikembangkan memenuhi kriteria valid dengan tingkat validitas 4,7, praktis dengan tingkat kepraktisan 4,5 diuji secara praktis dan efektif dengan tingkat keefektifan 50 sehingga bahan ajar cukup efektif untuk akan digunakan di lapangan. Bahan ajar web digital direkomendasikan untuk digunakan dalam pembelajaran nyata.

Kata Kunci: Pengembangan, Bahan Ajar, Web Digital

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INTRODUCTION

Education in Indonesia is currently required to develop along with the times, the world of education is also experiencing significant changes. Education greatly affects a person's lifestyle so that education is considered something very important. According to Dewi & Syahputri (2020) today, education is very important and has different goals in the past, education plays a role in the development of literacy, methodologies, scientific concepts, and skills in an advanced world like today both scientifically and technologically. Educators must keep up with progress with fundamental changes in implementing and delivering learning materials (Akhiruddin & Sujarwo, 2020; Aswat et al, 2022).

Education also requires individuals to see the progress of information and communication technology (Nurhikmah et al., 2017; Sujarwo et al., 2020; Akhiruddin et al., 2021; Sukmawati et al., 2022), along with the increasingly integrated technology in everyday life so that a person becomes increasingly dependent on the internet, regardless of how someone is connected to the internet, which is part of the board, laptop, or mobile drive-browser that usually needed (Nelson et al., 2019; Avianty et al., 2021). Further, the trend of changing innovation has vast implications in the world of education, i.e., changes in learning technology and changes in teaching and learning. In this modern world, educators are also mandated to have 21st-century skills that utilize information and communication technology (ICT) to help convey each learning competency to students. In addition, educators must provide learning tools to help facilitate the teaching and learning process (Edward C, Jimenez, 2020; Akhiruddin et al., 2020; Nurhikmah et al., 2021).

Currently, almost all activities switch through virtual face-to-face in cyberspace, so learning activities need to be designed with applicable and fun technology and information, and it is expected that students tend to be interested and show a higher interest in learning (Nalasari et al., 2021). Global demands also require the world of education to continuously make changes and learn innovations in accordance with the times they are facing. Besides, information technology has entered and developed the world of education today. Without information and communication technology, it is impossible to improve the quality of life and the quality of one's education (Veynberg et al., 2020).

Nevertheless, the difficulties educators and students face when learning by using information and communication technology or ICT in the learning process are mastery and selection of learning media. According to Wahyuni et al. (2020), interviews with certain teachers in Jember revealed that some students had difficulty understanding conceptual learning materials, so interactive teaching materials are needed. It is in accordance with the questionnaire results given to students, showing that 70% of students said they rarely used technology-based teaching materials, such as smartphones. Although 85% of students had smartphones, 60% of students felt dependent on technology, and 50% of students used smartphones to play games.

In online and face-to-face learning, Indonesian language learning is limited explicitly to printed textbooks, so there are several obstacles in the Indonesian language learning process at school. Meanwhile, language learning behavior refers to actions to improve students' language skills developed outside of school (Atmowardoyo & Sakkir, 2021). The first obstacle is the lack of motivation to learn using printed teaching materials in limited online and face-to-face learning. Second, using printed teaching materials with online learning does not increase student learning outcomes. Hence, educators must be able to produce quality teaching materials by using technology that suits the needs of students in learning Indonesian. In particular, learning Indonesian using printed teaching materials is deemed less efficient. Consequently, in the era of technology, the ability to create and develop teaching materials and learning media is needed to produce teaching materials that suit learning needs. According to Widyaningsih et al. (2020), the study results uncovered that various computer media, such as animation programs, are not in accordance with the concept of learning.

Furthermore, ICT, especially computers in various fields, can improve performance and activities carried out quickly, precisely, and accurately; computer technology can also provide innovation in the distance learning process or face-to-face (Ferdiansyah et al., 2021; Nurhikmah et al., 2021). The provision of learning devices that use technology will make educators more efficient in creating teaching materials to be used. According to Saddhono et al. (2019), it is appropriate for today's educators to use ICT to facilitate their work and enrich the knowledge of students and educators. In addition, the objectives of learning and mastery of 21st-century skills that prioritize learning carried out by educators today are learning oriented to the development of higher thinking skills and problem-solving and the use of computer media and ICT (Malik et al., 2021). Many types of internet-based learning models are offered for implementing learning in the present and the future (Arismunandar et al., 2018; Hakim et al., 2018).

Notably, web teaching materials are a breakthrough used today, and media design is made by building a web page structure navigation that guides users to the web pages provided (Saputra, 2021). The web-based education system has also become widespread in Europe and the United States, and its rapid implementation is facilitated by the development of information and communication technologies, a superior level of computer literacy, and ubiquitous internet access (Proskura & Lytvynova, 2020). Besides, using the digital web can easily make students obtain learning materials that subject teachers and educators have provided to monitor the student learning process with the digital web. In this case, the digital link tree web is practical for students and school educators as teaching material. It is also a tool in the learning process both at and outside school. Based on the analysis results in the field, 10 out of 16 students often used websites on their android phones, and all students stated that they often used cell phones as a medium to search for learning materials.

For that reason, this study aims to determine (1) the need for digital web-based teaching materials, which is essential in the learning process to meet the needs of teaching materials in schools. Thus, teaching materials for students in the learning process can be fulfilled with the digital web teaching materials developed. (2) The digital web teaching program development design for Indonesian subjects was through the ADDIE model development stage by conducting five stages of development: analysis, design, development, implementation, and evaluation. After the teaching materials were developed, validation was conducted by media validators and materials. Then, (3) digital web-based teaching materials for Indonesian subjects were developed validly, seen from experts' indicators of the validation test assessment. In addition, the levels of practicality and effectiveness of developing digital web-based teaching materials for Indonesian subjects have been proven practical and effective for the learning process. It is evident from the results of assessing student activities that digital web-based teaching materials were tested to be valid, practical, and effective for use in learning.

Later, this research is expected to be a meaningful input for several parties, theoretically and practically. The theoretical benefits resulting from this research are a means and forum for expanding scientific insights regarding information and communication technology in the field of education and improving the quality of the student teaching and learning process with the support of information technology. Aside from the theoretical benefits, this research also produces practical benefits. For students, teaching materials are expected to optimally develop students' potential and make the teaching and learning process more effective, especially in learning Indonesian. To carry out teaching, supervision in practice, ease of material transfer for junior high school principals, and improvement of Indonesian language competence, these teaching materials can develop and improve the quality of education to support national development.

Based on the explanation above, choosing learning media must be in accordance with what students need and in line with the teaching materials to be used. Media that can be used for learning to overcome these problems is to use abstract learning media based on website media, which is used as

a variance in the application of online learning (Syakur et al., 2020). One can be done by developing digital web-based teaching materials using a link tree. Thus, the researchers developed teaching materials by utilizing the web as teaching materials. The digital web using a link tree for the development of teaching materials is also currently considered especially useful so that it can make it easier to optimize learning. In addition, optimal use of information and communication technology is necessary for good planning, utilization, and use of various information and communication technology processes.

In this study, the digital web was selected using a link tree because it can accommodate various links on one website. The features in the link tree are also pretty simple and easy to use and understand, so it can make it easier for educators to provide information or teaching materials to students. A link tree is also a digital web with features that make it easier for users to apply it, so the researchers are interested in developing teaching materials using link trees. Moreover, the link tree is expected to be a solution to facilitate the process of learning Indonesian at SMP Amir Islam Panyula for class VII students.

Based on the description stated above, the development of digital web-based teaching materials is needed to add insight to students and educators in the use of information and communication technology to develop their potential in utilizing 21st-century technology and solve problems in the learning process faced by educators and students so that the learning process provides more motivation to learn for students.

Therefore, the objectives to be achieved in this research are to measure the level of need for developing digital web-based materials in Indonesian subjects, design the development of digital web-based materials in Indonesian subjects, and measure the practical validity and effectiveness of developing digital web-based materials in Indonesian language subjects for seventh-grade students of SMP Amir Islam Panyula, Bone Regency.

METHOD

This research and development (R&D) type produced valid, effective, and practical teaching materials for Indonesian subjects suitable for developing teaching materials by utilizing the digital link tree web. According to Sudaryono (2016), research and development methods have been widely used in natural sciences, engineering, and information technology. Almost all technological products have been produced and developed using research and development methods so that product development can suit the needs. To produce teaching material products, the research applied needs analysis and product n-Gain effectiveness tests so that teaching materials were used according to the needs of students. The subjects of this study were class VIIB students of SMP Amir Islam Panyula, Bone Regency, with a total of 16 students.

The research and development procedure applied the ADDIE model. This model was selected based on the consideration that the ADDIE model is easy to understand. Besides that, this model is structured systematically and based on the developed learning design theory. The ADDIE model can also be described as an approach that emphasizes analyzing how each component interacts with one another by coordinating according to the existing phase (Ryanto & Sugianti, 2020). Hence, developing web design-based teaching materials was carried out systematically and arranged in Indonesian subjects in class VIIB of SMP Amir Islam Panyula in accordance with the ADDIE model development procedure. Generally, the purpose of developing the ADDIE model is to design a learning system. The stages of developing the ADDIE model (Arofah & Cahyadi, 2019) comprise analysis, design, development, implementation, and evaluation (ADDIE).

Then, data collection techniques employed quantitative and qualitative data. Quantitative data were collected using a general assessment questionnaire about Indonesian language learning utilizing a link tree. The data were obtained in the testing phase to determine the validity, effectiveness and practicality, and attractiveness of the resulting product. In addition, quantitative data collected through questionnaires were an assessment of students and teachers, including the product's appearance and content, to achieve the goal of utilizing and increasing the product's attractiveness in Indonesian subject for class VIIB students of SMP Amir Islam Panyula, Bone Regency. Meanwhile, qualitative data were collected through the assessment results, input, criticism, feedback, and suggestions for improvement obtained through questionnaires and observations.

RESULTS AND DISCUSSIONS

To obtain the validation test results of developed teaching materials, validation test activities were then carried out by experts following the expertise, consisting of two expert validators. Based on the recapitulation results of teaching materials that the validators of teaching materials had validated, it was declared valid, with an overall average value of 4.7.

Validity Level

At this stage, media validation was done by providing suggestions related to the background color, type of writing, each material's title, and the material's arrangement on the web digital link tree. This stage aimed to produce digital link tree web teaching materials that attract students' interest in the learning process. The inputs were then revised to the link tree web teaching materials. After the validators checked again on the inputs and approved the results of the next revision, validation was carried out by the material expert validator. The material validation provided some input on the lesson plans regarding learning objectives, evaluations, and assignments. The following are the media validation results:

Table 1. Media Validation Results

No	Rating Points	Validator (Value)
Media Aspect		
1	Media suitability with teaching materials	5
2	The suitability of the use of media with the characteristics of students	5
3	Suitability of font selection	5
4	Appropriateness of font size selection	5
5	Clarity of color contrast between text and background	4
6	Clarity of navigation buttons used	4
Average		4.7
Design Aspect		
7	Clarity of program identity	5
8	Usage explanation	4
9	Image display clarity	5
Average		4.7
Usability Aspect		
11	Ease of creating media	5
12	Easy to understand the application	5

13	Key function and navigation accuracy	5
14	Ease of accessing the product menu	5
15	Applications can serve as support for the learning process.	5
	Average	5
Utilization Aspect		
16	Compatibility of program components	5
17	Having a visual appeal that includes colors, images, illustrations, shapes, and font sizes	4
18	The media can overcome time constraints.	5
19	Interesting media used	5
20	Media can minimize misperceptions of misperceptions in students.	5
	Average	4.8

Based on the assessment of the media and design expert validators on the media aspect, an average value of 4.7 was obtained, indicating that the aspect was valid. In the design aspect, it acquired an average of 4.7, which suggests that the design of teaching materials was in the valid category. In the aspect of use, it obtained an average of 5, denoting that the use of teaching materials was very valid. In the aspect of utilization, it got an average value of 4.8, meaning that this aspect was valid. Thus, it can be concluded that the development of digital web-based teaching materials had valid values. The following are the material expert validation:

Table 2. Material Expert Validation

No	Aspects of assessment	Validator (Value)
Theory		
1	The suitability of the material presented with the curriculum	5
2	Encouraging independent learning of students	5
3	Easy to understand application instructions	5
4	Applications can serve as support for the learning process.	5
6	The suitability of the material and the characteristics of students	4
7	Interesting material content	5
8	Readability of material arrangement	4
	Average	4.7
Contents		
9	The material is presented clearly and concisely.	5
10	Scope (breadth and depth) of content	4
11	The material presented in the systematic application is in accordance with the indicators.	5
	Average	4.3
Aspects of completeness, accuracy and meaningfulness		
13	The media presented includes competence.	5
14	The application presented stimulates students to understand the material presented.	5
15	The media used can make it easier to achieve learning objectives.	5
	Average	5

Based on the assessment of the material expert validator on the learning aspect, it was obtained an average of 4.7, which indicates that the aspect was valid. In the aspect of completeness of the content, the average value of 4.3 means that the aspect of completeness of the material's content was at a valid level. In the aspect of completeness, accuracy, and meaningfulness, the average value was 5, which was a very valid level. Hence, it can be concluded that developing digital web-based teaching materials in Indonesian subjects was valid.

The last stage was the evaluation stage. After the implementation was carried out, an assessment was conducted. At this stage, the evaluation of the developed teaching materials was seen from the practical aspects and effectiveness of digital web teaching materials. Then, the digital web-based teaching materials were developed through validation and testing and utilized through valid, practical, and effective criteria.

Practicality Level

Determining the practicality level of teaching materials could be seen from the assessment/validation results of the teacher's response instrument. The educator response questionnaire was given to obtain information from educators about digital link tree web teaching materials.

In addition to collecting student response data, data from the teacher's responses were also taken to assess the practicality of teaching materials regarding the feasibility of content, presentation of material, and language. The practicality of digital link tree web teaching materials was then evaluated by giving student response questionnaires, as presented below.

Table 3. Analysis of Educator Response Results

No.	Question	Response
1	Media can overcome the limited experience students have.	5
2	Media can overcome classroom boundaries.	5
3	The overall media appearance is understandable.	5
4	The language used in the media can be understood.	4
5	The presentation of teaching materials used in the media is arranged systematically.	5
6	Teaching materials in the media are easy to understand.	5
7	The use of language in the media is clear and easy.	5
8	The types of learning media in the link tree vary.	4
9	Media is different from the usual teaching materials.	5
10	Media can control student learning speed.	4
11	Media trains students to enrich students knowledge.	4
12	Media will make it easier for students to express opinions orally or in writing.	4
13	Media makes it easier for students to obtain material.	4
14	The material in the media is interesting.	4
14	Media makes it easier for students to understand the learning material.	4
15	The use of media makes it easy for students.	5
	Average	4.5

Based on Table 3, educators of Indonesian subjects at SMP Amir Islam Panyula, Bone Regency, obtained an average score of 4.5 after learning activities, meaning that the educator responded by using digital link tree web teaching materials that were practical to support learning activities. The student response results also showed that the average score of the seventh-grade students of SMP Amir Islam Panyula, Bone Regency, was 3.96 after participating in the learning activities, indicating that the student's responses were in the practical category, supporting learning activities.

Effectiveness level

Student test data retrieval was used to see student scores after using digital link tree web teaching materials. The following is the recap of post-test scores for seventh-grade students at SMP Amir Islam Panyula, Bone Regency

Table 4. Descriptive Statistics

	N	Minimum	Maximum	mean	Std. Deviation
N_Gain_Score	29	.14	1.00	.5732	.21859
N_Gain_Percent	29	14.29	100.00	57.3213	21.85874
Valid N (listwise)	29				

The table above shows that the mean value obtained for the N_Gain_score was 0.52, indicating that the digital web teaching materials were in the medium category. Then, N_gain_Percent demonstrates that the mean value obtained was 57, which suggests that the digital web teaching materials were quite effective. In other words, using web-based digital link tree teaching materials was considered quite effective at SMP Amir Islam Panyula, Bone Regency. The development results were also considered, where teaching materials were developed based on the needs in the learning process so that they could provide benefits for schools, educators, and students.

Moreover, effective and efficient digital link tree web teaching material products allow users or students to control navigation and materials so students can move materials freely. The learning product developed by the researchers for digital web teaching materials was deemed suitable because the validity level of the two validators was very good. The level of practicality after being given a field test in which students were given a post-test obtained an average value of 3.96. Thus, the digital link tree web teaching materials on Indonesian subjects could help educators facilitate a more effective learning process.

Other results of the study stated that there was a statistically significant improvement in the number of high-level reflective indicators in the second reflection task compared with the first. In addition, the web-based platform was perceived by participants as a medium that enabled easy access and the development of better portfolio artifacts (Oner & Adadan, 2011). This study is also supported by other research that, based on the validation results by experts, this media is feasible to be used as a learning medium that helps students learn heat and temperature topics (Ramadannisa & Hartina, 2021). Another study revealed that the group of students exposed to the 2.0 applications showed more motivation, enthusiasm, excitement, and higher scores compared to the group that was not exposed to the applications. The study implies that Jing can be applied to more complex kanji orthography, particularly those that require more than ten strokes (Shabudin et al., 2014).

Furthermore, the condition of students is an indicator of school development, i.e., the results of educational management, because students are a vital component in the ongoing learning process at school. Facilities and infrastructure are also elements that strongly support the effectiveness of learning activities. Thus, adequate facilities can improve the quality of good educational services, and complete school equipment will also make it easier for educators to make breakthroughs and variations in the presentation of learning materials to students. In addition, adequate facilities can support education so

that the quality of education can improve in Indonesian textbooks because previously, the number was limited, so textbooks were only owned by educators, while students did not have handbooks. Nevertheless, the limitation of this research is that not all students had an internet package to access the teaching materials provided, and the learning medium of PowerPoint was not very interesting.

CONCLUSION AND SUGGESTIONS

This research is expected to become a solution in the world of education to improve digital literacy so that students can learn by using teaching materials provided by educators, facilitating and providing motivation and modification in learning. Then, using web digital link trees, it is suggested to re-modify the inserted learning media and observe the media used suitable for the selected subject.

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