

Development of Website-Based Interactive Media in Natural and Social Science Subjects for Fourth Grade Students

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Abstract

This study aims to produce interactive web-based media in natural and social science subjects for fourth-grade students that are suitable for use in learning with valid, practical, and effective criteria. The subjects of this research are material and media experts, and students of the fourth-grade A Bandarharjo 02 Primary School of 25 students. The object of this research is website-based interactive media in natural and social science subjects. The research results obtained: (1) the validity of website-based interactive media gets the criteria of "Very Good" with material expert scores 3,85 (very good) and media experts 3.95 (very good); (2) the practicality of website-based interactive media gets the criteria of "Very Practical" with a student response questionnaire score of 3.72 (very practical); (3) The effectiveness of website-based interactive media from student test results obtained a percentage of student completeness of 96% and was declared effective for learning.

Keywords: *Interactive Media, Websites, Natural and Social Sciences*

1. Introduction

Education is an effort toward the formation of quality human beings. Education is a place for sowing the seeds of culture in society (Dewantara, 2013). Education is the basis for realizing the nation's civilization (Rahayuningsih, 2021). The Pancasila Student Profile embodies the goals of education to realize the civilization of the Indonesian nation. The Pancasila Student Profile has the main goal of maintaining the nation's noble and moral values, readiness to become world citizens, realizing social justice, and achieving 21st century competence (Rusnaini *et al.*, 2021).

The Indonesian government implements the Merdeka Curriculum to optimize the achievement of educational goals. This curriculum is designed to adapt to changing times. One of the new things in the Merdeka Curriculum is the subject of natural and social sciences in elementary schools. Natural and social sciences is a combination of natural sciences and social sciences subjects at the elementary level. This merger is based on the Decree of the Head BKSAP Number 033/H/KR/2022 concerning learning outcomes.

Natural and social sciences is a science that studies living and inanimate things in the universe and their interactions and studies human life as individuals as well as social beings who

interact with their environment. Natural and social sciences helps students grow their curiosity about the phenomena that occur around them. This curiosity can trigger students to understand the universe works and interacts with human life. With this knowledge, it will be possible to identify various problems and find solutions to achieve sustainable development goals.

Teachers have not carried out learning of natural and social sciences optimally. Teachers still use student books as the learning resource. Limited material in student books makes students experience difficulties in learning. In addition, teachers need to create learning media that are adapted to the characteristics and environment of students. One effort to overcome these problems is to use learning media. Learning media helps students achieve learning goals optimally. Learning media has a role in delivering material, making the learning process clearer and more interesting and interactive, time and effort efficiency, improving the quality of learning outcomes, enabling the learning process to be carried out anywhere and anytime, growing each student to the material and learning process, and adding the teacher's role becomes more positive and productive (Nabilah *et al.*, 2020).

The development of science and technology can be used to develop more interactive learning media. Interactive learning media is software that is composed of combining various multimedia elements such as text, images, animation, video, and audio which are presented interactively for teaching purposes (Tambunan & Siagian, 2022). Interactive media can involve students actively in learning. Students can interact directly in studying learning material. The use of this media will reduce the dominance of the teacher in learning so that learning can be student-centered.

The advancement of internet technology can be utilized to provide learning media. A website is one of the online resources that may be utilized as an interactive teaching tool. A website is a collection of pages that are used to display multimedia elements, both static and dynamic, which form an interconnected series, where each page is connected to a network of pages (Fazain & Anistiyasari 2017). The website has the advantage of being easily accessible via the internet network. This convenience can be utilized to develop website-based interactive media.

Website-based learning media can create a more dynamic learning atmosphere and an effective, interesting, interactive learning process, and can generate student learning motivation (Setyadi & Qohar, 2017). This media can combine assorted multimedia assets such as text, images, audio, video, online quizzes, educational games, and self-evaluations. These assets can attract students' attention to learning. The characteristics of websites that combine various pages with navigation buttons make website-based interactive media able to accommodate assorted learning materials in one website address. Teachers can design learning materials according to the characteristics of students and the environment in which they live.

The results of learning observations and interviews with the fourth-grade teachers at Bandarharjo 02 Primary School, stated that teachers still had difficulties in carrying out learning in the Merdeka Curriculum including science subjects. Teachers are still adapting to the new curriculum. The Merdeka Curriculum makes it difficult for teachers to apply it. Teachers still rely on student books as learning resources. Learning materials in student books are still limited. During learning, the teacher only shows pictures and videos randomly taken directly from the internet. The materials and features of pupils have not been taken into account by teachers while creating learning

media. While passive students are unenthusiastic about engaging in the learning process, learning is dominated by the teacher. Meanwhile, students have a smartphone to learn. This school also has good electricity and an internet network.

This fact is a challenge to be able to integrate technology in the manufacture of learning media. The research and development of website-based interactive media have been imposed on function material at SMA Negeri 15 Medan by Tambunan & Siagian (2022). The results showed that the developed media received a valid category with a score of 4.37 for material experts and 4.35 for media experts; the practicality of the media gets very good criteria with a score of 4.8 by the teacher and the students get 4.38 on a small scale and 4.44 on a large scale; the effectiveness of the media is indicated by the percentage of student completeness of 80%.

Based on the description above, researchers are interested in conducting research and development of website-based interactive media in class IV natural and social science subjects. The formulation of the problem in this study is how to develop website-based interactive media in natural and social science subjects for grade IV students that are valid, practical, and effective. The purpose of this development research is to produce a website-based interactive media in natural and social science subjects for fourth-grade students with valid, practical, and effective criteria.

2. Research Methods

2.1 Type of Research

This research is a type of research and development using the ADDIE model. This research focuses on the development of website-based interactive media in natural and social science subjects for fourth-grade students. The product of this research is a website-based interactive media in class IV natural science subjects which can be accessed online anywhere and anytime via electronic devices such as smartphones, tablets, computers, and laptops.

2.2 Subject and Object

The subjects of this research are material and media experts, as well as students of the fourth-grade A SDN Bandarharjo 02 of 25 students. The object of the research is a website-based interactive media on the subjects of natural and social life sciences.

2.3 Research Procedures

The procedure for research and development of website-based interactive media uses the ADDIE model. Five stages make up the ADDIE model: analysis, design, development, implementation, and evaluation.

2.3.1 Analysis

The analysis level includes analyzing the needs of media development, the feasibility, and requirements of website-based interactive media. This level focuses on gathering and analyzing information consisting of observation activities, preliminary studies (literature), and interviews with teachers regarding learning media in schools.

2.3.2 Design

The design level is the level of website-based interactive media design. The media design is in the form of a media prototype/draft. At this level, the researcher also compiled research instruments that would use as an assessment of the developed learning media.

2.3.3 Development

The researchers created website-based interactive media at this stage. Material and media expert validators validate the products that have been made. The validator will provide input regarding the strengths and weaknesses of the draft. Validation is carried out until the developed media is feasible so that it is valid to be implemented.

2.3.4 Implementation

This level is the implementation of website-based interactive media. This level involves research subjects using the media. Students are given tests and questionnaires for student responses after using media. Questionnaire student responses are used to find out the practicality of media. The test is used to know the effectiveness of the media.

2.3.5 Evaluation

This level is carried out by evaluating the lack of website-based interactive media. This level aims for the final assessment of the revised media. At this final stage, it is hoped that the developed media will be valid, practical, and effective.

2.4 Instruments

The website-based interactive media validation instrument uses a validity questionnaire sheet. Website-based interactive media validators include material experts and media experts. Practitioners also use questionnaires to validate product feasibility. The media expert validation questionnaire consists of four aspects. This questionnaire contains 15 statements. The material expert validation questionnaire consists of four aspects. This questionnaire contains 18 statements

The media practicality instrument uses a student response questionnaire. Students fill up questionnaires after using learning media. The results of the questionnaire will be analyzed to determine the practicality of the media. The student response questionnaire consists of four aspects. This questionnaire contains 10 statements.

The media effectiveness instrument uses a test. Student test results can be used to determine the effectiveness of learning media. The test used consisted of 20 questions. The test used is by the learning objectives to be achieved.

2.5 Data Analysis

2.5.1 Validity Data Analysis

The feasibility of website-based interactive media is done by analyzing the results of material validity and media validity. The analysis was carried out by calculating the average score obtained from each aspect. The average score of each indicator is then averaged to find out the total average score. The material and media aspects of website-based interactive media can be said to be valid if the results of the validity test show “Good” or “Very Good” criteria. Criteria for the validity of learning media can be seen in Table 1.

Table 1 Criteria for the Validity of Learning Media

Average Score Interval	Criteria
$3,25 < \bar{x} \leq 4,00$	Very Good
$2,50 < \bar{x} \leq 3,25$	Good
$1,75 < \bar{x} \leq 2,50$	Not Good
$1,00 \leq \bar{x} \leq 1,75$	Very Less Good

2.5.2 Practicality Data Analysis

Media practicality analysis was obtained from student response questionnaire data. The questionnaire is given after the students used website-based interactive media. The scores obtained are then averaged. Website-based interactive media is declared practical if the results of the student response questionnaire analysis show “Practical” or “Very Practical” criteria. Criteria for the practicality of learning media can be seen in Table 2.

Table 2 Practicality Criteria of Learning Media

Average Score Interval	Criteria
$3,25 < \bar{x} \leq 4,00$	Very Practical
$2,50 < \bar{x} \leq 3,25$	Practical
$1,75 < \bar{x} \leq 2,50$	Less Practical
$1,00 \leq \bar{x} \leq 1,75$	Very Less Practical

2.5.3 Effectiveness Data Analysis

The media effectiveness analysis was taken from the number of students who met the minimum competency standards. The data is obtained from the learning outcomes test. The number of students is then calculated to determine the percentage of complete learning outcomes. The media is declared effective if the results of calculating the percentage of student learning completeness $\geq 80\%$.

3. Results and Discussion

3.1 Research Results

3.1.1 The Validity of Website-Based Interactive Media in Natural and Science Subjects

Media validation is carried out by two validators, namely lecturers who are experts in developing learning media and teachers as practitioners who have master academic qualifications. Media validation includes four aspects. The aspects are language/communication, presentation, overall display format, and media effects on learning. The results of the media expert validity test can be seen in Table 3.

Table 3 Media Expert Validity Results

Aspect	Average Score		Average Score	Criteria
	Validators 1	Validators 2		
Language/Communication	4,00	4,00	4,00	Very Good
Presentation	4,00	3,60	3,80	Very Good
Overall Display Format	4,00	4,00	4,00	Very Good
Media Effects on Learning	4,00	4,00	4,00	Very Good
Average Score	4,00	3,90	3,95	Very Good

Based on the validity criteria of learning media, the score obtained by media expert lecturer, and practitioner is 3,95. This acquisition is included in the criteria of "Very Good". The media aspects of website-based interactive media are said to be valid.

Material validation is carried out by two validators, namely lecturers who are experts in natural and social science materials and school principals who have experience in teaching. Material validation includes four aspects, namely objectives, materials, sources, and learning evaluation. The results of the material expert validity test can be seen in Table 4.

Table 4. Material Expert Validity Results

Aspect	Average Score		Average Score	Criteria
	Validators 1	Validators 2		
Objectives	4,00	4,00	4,00	Very Good
Materials	3,78	3,89	3,83	Very Good
Sources	3,50	4,00	3,75	Very Good
Evaluation	3,80	3,80	3,80	Very Good
Average Score	3,77	3,92	3,85	Very Good

Based on the criteria for the validity of learning media, the score obtained by material experts carried out by lecturers and practitioners is 3,85. This acquisition is included in the "Very Good" criteria. The material aspects of website-based interactive media are said to be valid.

In addition to providing scores, media and material experts also provide suggestions for the media to be developed. The suggestions given are additional information for media development. Criticism and suggestions are also a consideration for further improvement of learning media.

3.1.2 The Practicality of Website-Based Interactive Media in Natural and Science Subjects

The practicality of website-based interactive media is obtained from the results of student response questionnaires. Response questionnaires were given after students used learning media. The results of the student response questionnaire can be seen in Table 5.

Table 5 Student Response Questionnaire Results

Aspect	Average Score	Criteria
Usefulness	3,78	Very Practical
Media facilities are used	3,65	Very Practical
Kemudahan media dipelajari	3,72	Very Practical
Media facilities are studied	3,80	Very Practical
Average Score	3,72	Very Practical

Based on the practicality criteria of learning media, the average student response questionnaire score was 3.72. The score is included in the "Very Practical" category. The website-based interactive media developed can be said to be practical.

3.1.3 The Effectiveness of Website-Based Interactive Media in Natural and Science Subjects

The effectiveness of website-based interactive media is obtained from student learning outcomes. Student learning outcomes are measured using a test instrument. The tests that have been made have been adjusted to the learning objectives. Student learning outcomes can be seen in Table 6.

Table 6 Student Learning Outcomes

Category	The number of students	Percentage
Completed	24	96%
Not Completed	1	4%

In this study, the learning media developed were said to be effective if the percentage of learning completeness was $\geq 80\%$. Table 6 shows that the percentage of student learning completeness after using instructional media is 96%. The website-based interactive media developed can be declared effective.

3.2 Discussion

Website-based interactive media in the natural and science subject for fourth-grade students is said to be feasible and can be used in learning when it meets the three assessment criteria, namely valid, practical, and effective.

3.2.1 The Validity of Website-Based Interactive Media in Natural and Science Subjects

The feasibility of learning media was obtained from validity tests conducted by media and material experts (Purba *et al.*, 2017). Media expert validation on website-based interactive media includes four aspects. The language/communication aspect gets an average score of 4,00 in the "Very Good" category. The format and overall appearance of the media aspect get an average score of 3,80 in the "Very Good" category. The overall display format of the media aspect get an average score of 4,00 in the "Very Good" category. The effect of media on learning aspect get an average score of 4,00 in the "Very Good" category. The final results of media validation by experts and

practitioners show that website-based interactive media in science subjects gets an average score of 3,95 in the "Very Good" category. Media experts also provide additional suggestions to improve the media compiled. The advice given is to enlarge the display of pictures and letters so that they are more comfortable to read.

Material expert validation on website-based interactive media includes four aspects. Aspects of learning objectives get an average score of 4,00 in the "Very Good" category. Aspects of learning materials get an average score of 3,85 in the "Very Good" category. Aspects of learning resources get an average score of 3,75 in the "Very Good" category. The learning evaluation aspects get an average score of 3,80 in the "Very Good" category. The final results of material validation by experts and practitioners show that website-based interactive media in science subjects gets an average score of 3.85 in the "Very Good" category.

3.2.2 The Practicality of Website-Based Interactive Media in Natural and Science Subjects

The practicality of learning media is determined from the results of student response questionnaires (Purba *et al.*, 2017). Student response questionnaires in the development of website-based interactive media have four aspects. The usefulness aspect gets an average score of 3,78 with the "Very Practical" criteria. The ease of use of the media aspects get an average score of 3,65 with the "Very Practical" criteria. The ease of learning media aspects get an average score of 3,72 with the "Very Practical" criteria. The satisfaction aspects get an average score of 3,80 with the "Very Practical" criteria. The final result of the average score of student response questionnaires to website-based interactive media in the Sciences subject was a score of 3,72 with the "Very Practical" criteria.

3.2.3 The Effectiveness of Website-Based Interactive Media in Natural and Science Subjects

The effectiveness of learning media can be determined by student learning outcomes on cognitive knowledge (Tambunan & Siagian, 2022). Learning outcomes are obtained from student test results after carrying out learning using website-based interactive media in science lessons. In this study, the media is declared effective if the percentage of learning completeness is $\geq 80\%$. The test results show the percentage of learning completeness is 96%. These results prove that interactive web-based media in science subjects is declared effective.

Based on the results of the validity test, student responses, and learning achievement tests, the website-based interactive media in natural and social sciences subjects for the fourth-grade students that are developed can be declared of high quality. Quality learning media in this study are learning media that meet three criteria, namely valid, practical, and effective.

4. Conclusion

Based on the results of research and discussion of the development of website-based interactive media in natural and social science subjects for fourth-grade students, the conclusions are:

- 4.1 The validity of website-based interactive media in natural and social science subjects for fourth-grade students is obtained from the validation results of material and media experts. The material expert validity results get a score of 3,85 with "Very Good" criteria. The results of the validity of media experts get a score of 3,95 with "Very Good" criteria. Based on the material and media expert validation results, the website-based interactive media developed has valid criteria and is suitable for use in learning.
- 4.2 The practicality of website-based interactive media in natural and social science subjects for fourth-grade students is obtained from the results of student response questionnaires. The results of the student response questionnaire got a score of 3,72 with the criteria of "Very Practical". Based on these data, the website-based interactive media in natural and social science subjects for fourth-grade students developed is stated to be practical and suitable for use in learning.
- 4.3 The effectiveness of website-based interactive media in natural and social science subjects for fourth-grade students is obtained from the percentage of student learning completeness of $\geq 80\%$. The percentage results of student learning completeness after using interactive web-based media in natural and social science subjects for fourth-grade students was 96%. Based on these data, website-based interactive media in natural and social science subjects for fourth-grade students is declared effective and appropriate for learning.

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