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Article

Development of Website-Based Science Learning Media to Integrate Student Curiosity Material on Plant and Animal Reproductive Systems

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ABSTRACT

This research aims to determine the feasibility and effectiveness of a science website that integrates thinking about students' curiosity in the material on Plant and Animal Reproductive Systems. This research is development research using a 4D development model with define, design, develop and disseminate stages. This research uses a pretest posttest control group design. IPA website feasibility research was carried out by material experts and media experts for product feasibility. The results of the feasibility assessment by material and media experts obtained a score of 0.9 for material and 0.8 for media with an average of 0.85 declared suitable and good for use in the learning process at school. The results of the normalized gain score for the experimental class were greater than the control class. The experimental class got a gain score of 0.76, which can be seen in table 6, where the results are included in the high category, while the control class got a gain score of 0.62, which can be seen in table 7, where the results are included in the medium category. The effectiveness of learning was carried out using the independent sample t-test, showing the results that the sig. is 0.007 (> 0.05), then Ho is rejected and Ha is accepted, so it can be concluded that there is a significant difference between the experimental class and the control class. The results of the research show that integrated website-based science learning media considers students' curiosity in the material on Plant and Animal Reproductive Systems, apart from being developed and feasible and also effective in increasing students curiosity.

INTRODUCTION

According to the Ministry of Education, Culture, Research and Technology, there are several characters that students must improve, including religious, tolerant, disciplined, hard working, honest, democratic, national spirit, love of the country, love of peace, creative, fond

of reading, independent, friendly or communicative, curious, socially or environmentally conscious, and responsible (Silmi & Kusmarni, 2017). Nowadays, the science learning process often only focuses on cognitive development without involving development in the affective area including attitudes, motivation and morals (Dwianto et al., 2017). It turns out that on the other hand, science subjects themselves are related to how to find out about nature logically. Science lessons can now be interpreted not only as mastering various knowledge in the form of facts, concepts or principles, but science subjects study a process of discovery. This makes science learning emphasize providing direct knowledge to students so that they know the natural surroundings objectively. Therefore, the position of character education itself is very important in science learning. One of the characters that students need to develop in learning science is the character of curiosity.

The science learning process with interesting and enjoyable situations can increase students' learning motivation and curiosity. During the implementation of the second internship practicum at Madrasah Tsanawiyah Negeri 1 Ponorogo, it was found that the results of observations included that during the learning process, only a few students asked questions or provided rebuttals. Not only that, when students do not understand the material they are reluctant and embarrassed to ask questions. It can be concluded that this indicates that students have a lack of curiosity. It is possible that this situation is caused by students' curiosity being still relatively low because it is influenced by discussions and questions and answers between teachers and students who are not massive enough, this is also influenced by the teachers asking questions or problems that are still at a low cognitive level. Asking questions does not encourage explaining ideas or expressing students' thoughts, questions are only oriented towards the answers in the book. So, with a situation like this, development in the area of students' curiosity character at the learning level in class can be carried out with more massive and open-ended discussion activities in providing feedback, with the help of technology-based learning media. It is hoped that this can arouse curiosity. know students and gain a total understanding of the material.

Science learning is a process of seeking experience and resulting in mastery of knowledge in the form of understanding concepts. Media is a tool or material to facilitate the distribution of information to someone. Media in the learning process can be in the form of images, graphic tools, dissemination of visual or verbal information. Engagement in using various tools such as learning media to create effective lesson plans can help teachers identify new ways to teach complex concepts in the classroom, especially in science education (Peters-Burton et al., 2022). Teachers can utilize ICT (Information and Communication Technology) during the learning process through teaching materials such as learning resource materials. Schools have an internet network in the form of Wi-Fi but teachers tend to still use conventional technological media such as PowerPoint. Now the use of practical technology, such as websites, makes it easier for teachers to convey material. Making a website a learning medium is felt to have contributed to making science learning fun and attracting attention as well as increasing students' curiosity about what they are going to learn. Based on the problems that have been described, it is necessary to develop further technology-based science learning media in the form of websites.

In various aspects of progress, lifestyle is one of the highest aspects of progress (Erlina, 2021). The impact of progress in behavior causes chaos if there is no balance in various areas of life and the environment. It is hoped that by 2030, all students will be required to obtain the knowledge and skills needed to socialize sustainable development through science learning media which can foster curiosity in students. Science learning is a scientific discipline that examines natural events using scientific methods. In ESD (Education for Sustainable Development) students are given various capabilities including knowledge, skills, values and attitudes which it is hoped that in the future students will be able to decide on responsible

actions for environmental integrity, economic sustainability and a just society. This is in line with the research that will be conducted that the development of learning media with technology integration can increase students' curiosity and interest in learning about science so that the hopes of ESD (Education for Sustainable Development) can be realized.

Education for sustainable development (Education for Sustainable Development) is an integral element of quality education and the main supporting factor for sustainable development. It now demands a lot of high attention for quality research that must be carried out by focusing on the use and impact of new technology both in the school environment (Alberts, 2009). Contextual learning, especially science learning, can be realized by integrating learning objectives and learning content as well as taking the form of technology in the form of website-based learning media. With this, it is hoped that the integration of technology in science learning will foster curiosity in students. The relevance between the character of curiosity and ESD (Education for Sustainable Development), when to find out the individual benchmarks of a student who has a high curiosity is that students will prefer to explore information, which if the exploration activities are carried out using a platform students will feel very motivated. The use of website-based learning media will provide interest and cause their curiosity to explore menu after digital menu on the website. The hope for this is to The characteristics of students' curiosity can help them understand and understand the learning material delivered by teachers through learning media (Fatkul Jannah et al., 2021). With this, the aim of this research is to determine the feasibility of website-based science learning media innovation. Which integrates thinking about students' curiosity in Junior High School science material.

METHODS

The Four-D type of development (R&D) model used in this research consists of stages including define, design, develop and disseminate. The innovation that is planned to be developed is website-based science learning media to integrate the curious thinking of SMP/MTs students. Measurements taken on the development of website-based learning media innovations are (1) observations in the Madrasah Tsanawiyah area to determine obstacles or disruptions in learning science, (2) Development of learning media innovations, (3) Validation tests (content or material validation and design validation) or the practicality of the learning media, (4) Field test to determine the level of effectiveness of the learning media then calculations using SPSS. The data collection instruments used were non-test instruments in the form of (1) interview sheets for preliminary studies; (2) product feasibility assessment sheet for material and media expert validators and (3) curiosity observation sheet to measure students' curiosity during learning using website-based science learning media. The product trial was carried out in September at MTsN 1 Ponorogo. The choice of trial location was adjusted to the 2 researchers' internship practicum. The trial subjects were class IX students in the even semester of the 2023/2024 academic year. Product trials were carried out by field trials using a quasi-experimental method with a pretest-posttest control group design. The field trial subjects were 60 students including 30 students in class IX I and 30 students in class IX J. The selection of field trial samples was carried out randomly with the results of class IX I as the experimental class (learning using website learning media) and class IX J as a control class (conventional learning by the teacher).

Feasibility test

The first research and development stage is the define stage. The define stage is divided into several analyzes including needs analysis, student analysis, and task analysis. Needs analysis is used to obtain information regarding the learning process, teaching materials, learning resources used as references, and problems that arise related to the preparation of teaching materials by teachers through observation interviews at MTsN 1 Ponorogo. Student

analysis to obtain information about students curiosity in learning. Task analysis includes curriculum analysis, material analysis, and concept map preparation. The second stage is the design stage, the design stage includes the steps of selecting media and format as well as product design. In determining the media and format, the researcher chose the Google site as a forum for delivering learning media. The development of website-based science learning media was created on the Google site and then there was a menu display including home, objectives, materials, videos, e-LKPD and evaluation.

The third stage is the develop stage, the develop stage is the step of validating website-based science learning media by material expert validators and media experts then field tested. Validation carried out by material experts and media experts is used to determine the feasibility of this website-based science learning media, then field trials are used to determine the practicality of this website-based science learning media in learning. The validation results obtained are then calculated in percentage form and presented in tabular form. The percentage is calculated by comparing the score obtained and the maximum score multiplied by 100%. Conclusions can be drawn from the lowest and highest validation results as well as the need for suggestions and improvements in the preparation of the module and whether or not the module is suitable for use. After obtaining the validation results, they are calculated based on the Aiken's V equation analysis.

$$V = \frac{\sum S}{(N(C-1)}$$

Information:
S: r – lo
lo: lowest validity assessment number
c: highest validity assessment number
r: the number given by the validator
n: number of appraisers

The validity categories according to the Aiken's coefficient can be seen in the following table.

Table 1. Product Validity Category

Intervals	Category
≥0,61 – 1,00	Valid
<0,61	Invalid

Source: (Azwar, 2015)

The fourth stage is disseminate, disseminate is the dissemination of the product so that it can be used by many people. This activity is carried out to disseminate products that have been developed and have been tested for use by other people. Products that have been tested for validity and effectiveness are then disseminated to Natural Science subject teachers in class IX Junior High School. However, the dissemination stage of this research has not been carried out because of the researcher's time constraints. Maybe someday it will be developed at this dissemination stage.

Field trials

The field trial used a pretest-posttest control group design. Sample selection was carried out randomly, then both samples were tested before and after treatment with observation. Data on the feasibility of website learning media and its practicality by practitioners were analyzed qualitatively using a scale with four criteria, namely very good, good, quite good and not so good. Meanwhile, student response questionnaire data was analyzed based on the percentage of students who gave positive responses. Field test results in the form of pretest and posttest scores as well as the results of questionnaire distribution were converted into quantitative data with Equation 1.

$$\dot{x} = \frac{\sum xi}{N} \text{ ..... (1)}$$

Based on Equation 1, x is the mean (average) assessment score, ∑xi is the total number of scores for each component, and N is the number of assessors. Data on feasibility and practicality results were then converted into a qualitative scale using the criteria in Table 2.

Table 2. Qualitative Score Conversion Guidelines

Score Range	Score	Category
x ≥ ẋ + 1.sbx	A	Very Good
ẋ + 1.sbx > x ≥ ẋ	B	Good
x > x ≥ ẋ - 1.sbx	C	Pretty Good
x < ẋ - 1.sbx	D	Not Good

Source: (Mardapi, 2008)

The effectiveness of website-based science learning media that integrates students' curious thinking is analyzed using normalized gain scores and independent sample t-test. The normalized gain score is obtained by Equation 2.

$$<g> = \frac{<\%post> - <\%pre>}{100 - <\%pre>} \text{ ..... (2)}$$

Based on Equation 1, <g> is the average gain score. <%post> is the average percentage of students' posttest scores. Meanwhile <%pre> is the average percentage of students' pretest scores. The gain scores that have been obtained are then categorized according to Table 3.

Table 3. Category Average Gain Score

Score <g>	Category
<g> ≥ 0.7	Tall
0.7 > <g> ≥ 0.3	Curently
<g> < 0.3	Low

Source: (Hake, 1999)

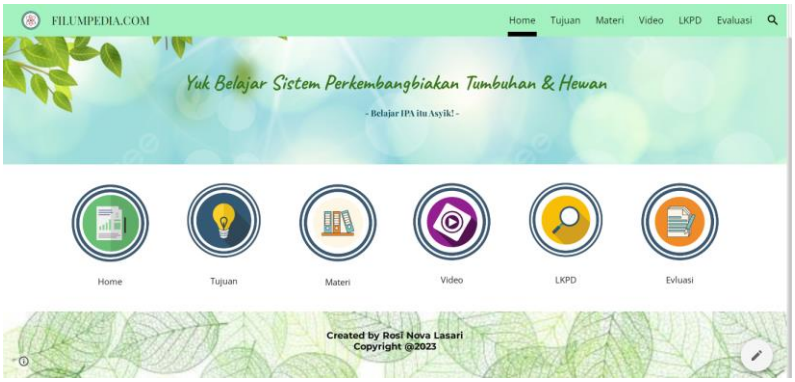
Test effectiveness using the independent sample t-test. This test can be carried out if the prerequisite tests are met, namely the normality and homogeneity tests. Prerequisite tests are carried out using SPSS. The normality test aims to test whether the data samples used are normally distributed or not, while the homogeneity test is carried out to find out whether the populations of the two samples are homogeneous or not.

The normality test was carried out with Shapiro Wilks at the significance level. Data comes from a normally distributed population if the significance value is > 0.05. Homogeneity test using Levene's Test at a significance level of 0.05. Data comes from a homogeneous population if it meets a significance value of > 0.05.

After the prerequisite tests are fulfilled, the independent test can be continued until the t test with the Ho hypothesis, namely that there is no difference in the use of website-based science learning media, integration of thinking and curiosity in SMP/MTs students. Ha, there are differences in the use of learning media, websites, integration of the curious character of Madrasah Tsanawiyah students.

RESULTS AND DISCUSSION

The results of research and development of innovative website-based science learning media that integrates thinking about students' curiosity with the material theme "Plant and Animal Reproductive Systems". The science website format developed includes menu pages, namely homepage, learning objectives, materials, learning videos, LKPD, and evaluation. Innovation-based science learning media that integrates students' curiosity thinking with the material "Plant and Animal Reproductive Systems" can be accessed on the page bit.ly/FILUMPEDIA. The front page of the website can be seen in picture 1 below.



Picture 1. Website Display

Feasibility Test Results

At the development stage, a validity test or assessment of the suitability of website-based science learning media is carried out. Validity testing is carried out by validators which consist of material and media validators. The validity test was carried out as part of the development stage of the media and with the aim of determining the suitability of website-based science learning media, whether it is suitable for use or not as an instrument for collecting research data (Susanto & Kiswantoro, 2020). Similarly, research conducted by Nida (2020) states that an instrument is said to be valid or correct if it has a high level of validity. In implementing the validity testing stage, it can be carried out by inviting several experts who are experienced experts to assess a product. The results of validation tests or assessments of the feasibility of learning media material experts and media experts can be seen in Table 4 below.

Table 4. Percentage of Validation of Website-based Science Learning Media

No.	Validation Aspect	Presentase
1	Materi	80%
2	Media	90%

Validity testing by material experts in table 4 resulted in a percentage of 80%, which means that the material on the website meets the criteria and standards for preparing website-based learning materials that integrate curious thinking. In the validity of website material experts, there are aspects that are validated, including suitability of the material with basic competencies, lesson indicators, learning objectives, actualization of the material presented, easy to understand material, ease of management, and ease of use. The validity test by media experts in table 1 resulted in a percentage of 90%, meaning the design on the website meets the criteria and standards for making website designs. In the validity of website media experts, there are aspects that are validated, including effectiveness in use, reusability or ease of use, attractiveness of the media, communicativeness or language that is easy to understand, creative and innovative, choice of typeface and suitability of images that support the material.

From these two validity results, the results show that the website-based science learning media with material on Plant and Animal Breeding Systems received validation by 90% by media experts and 80% by material experts. The results from material experts obtained the second highest percentage of 80%, where the material development on this website already contains complete material and is then arranged systematically, relevantly and interactively so that it can directly support the thinking process of curiosity and support students' understanding. The results from media experts obtained the first highest percentage of 90% where the design development on the website was attractive, systematic, sequential and orderly so that it attracted interest in reading and in terms of presentation media starting from the content and design. Then the layout of the image illustrations is also relevant to the material discussed.

Overall, the validity results are analyzed based on the Aiken's V coefficient, which is in Table 5.

Table 5. Validation Results of Website-based Science Learning Media

No.	Validation Aspect	Mark
1	Material	0.8
2	Media	0.9
		Amount: 1.7 Average: 0.85 Category: Valid

From table 5 of the validation results, it is concluded that the website-based learning media which contains integrated Plant and Animal Reproductiove Systems material, thinking curiosity is suitable for use because it is ≥0.61 – 1.00 and is included in the valid category based on Aiken's V theory after improvements. Overall, website-based science learning media is in the appropriate category because it gets a high percentage so it can be applied to students and will have an impact on students in terms of learning interest, curiosity and increasing students understanding. If students easily understand the material on the website which is supported by an attractive design, then the website material on Plant and Animal Reproductive Systems can be further developed or refined in order to achieve learning objectives.

Field Trial Results

The results of field trials were carried out on 30 students in class IX I as an experimental class who were given teaching treatment using website-based science learning media and 30 students in class IX J as a control class who were given learning treatment using classical or lecture methods. The effectiveness of the website on students' curiosity is measured by comparing the average normalized gain score. The results of the pretest and posttest curiosity scores and the results of the normalized gain score analysis can be seen in table 6, 7 and 8. Based on figure 6, it shows that there was an increase in the pretest and posttest scores. The increase in the experimental class was greater than the control class. The increase in the experimental class was 29.00, while the control class experienced an increase of 23.20.

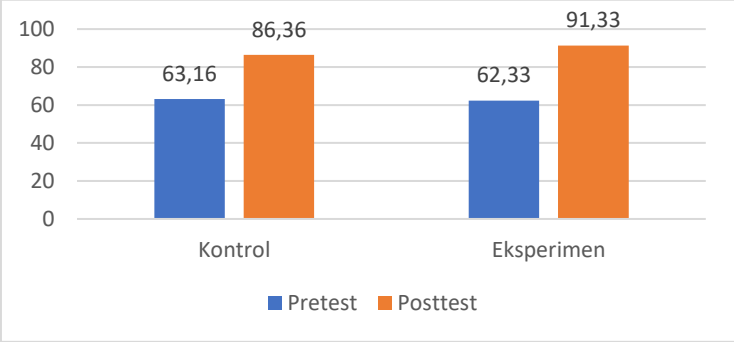


Table 6. Average Curiosity Score

This data is also supported by the normalized gain score for the experimental class which is greater than the control class. The experimental class got a gain score of 0.76, which can be seen in table 6, where the results are included in the high category, while the control class got a gain score of 0.62, which can be seen in table 7, where the results are included in the medium category. Based on the analysis, the normalized gain score in the experimental class is much higher than the control class. This is because the use of learning media on this website has several interesting menus that discuss plant and animal breeding systems, which is something new, interesting and meaningful for students. Learning in the control class uses classical

learning (lectures) and is based on textbook learning resources, which is different from the experimental class which uses website-based learning media so that students' curiosity and enthusiasm in learning science is lacking. Feeling enthusiastic and interested in learning science is part of curiosity (Latiifani et al., 2016).

Table 7. Control Class N-Gain Value

	N	Minimum	Maximum	Mean	Std. Deviation
Ngain_Score	30	.20	1.00	.7626	.19639
Ngain_persen	30	20.00	100.00	76.2619	19.63855
Valid N (listwise)	30				

Table 8. Experimental Class N-Gain Values

	N	Minimum	Maximum	Mean	Std. Deviation
Ngain_Score	30	.29	1.00	.6262	.18218
Ngain_persen	30	28.57	100.00	62.6151	18.21834
Valid N (listwise)	30				

Before carrying out the effectiveness test, prerequisite tests are first carried out, namely the normality test and homogeneity test. The results of the univariate normality test using the Shapiro-Wilks test are in Table 9, which produces a significance value for the control class of 0.060 and for the experimental class of 0.058. The significance value obtained is more than 0.05, so the data sample used is normally distributed.

Table 9. Hasil Uji Normalitas Shapiro-Wilks

	Kolmogorov-Smirnov[a]			**Shapiro-Wilk**		
	Statistic	**df**	**Sig.**	**Statistic**	**df**	**Sig.**
Kelas Kontrol	.168	30	.031	.933	30	.060
Kelas Eksperimen	.156	30	.059	.933	30	.058
a. Lilliefors Significance Correction						

In Table 10, the homogeneity test results obtained a significance value of 0.964. The significance value obtained is more than 0.05, so that both samples come from a homogeneous population. The results of the prerequisite tests have been met, so it can be continued for the independent sample t test.

Table 10. Homogeneity test results

		Levene Statistic	**df1**	**df2**	**Sig.**
Hasil Belajar Siswa	Based on Mean	.002	1	58	.964
	Based on Median	.000	1	58	1.000
	Based on Median and with adjusted df	.000	1	57.830	1.000
	Based on trimmed mean	.001	1	58	.970

The effectiveness of website-based learning media can be seen from the results of the independent sample t test on the normalized gain score in Table 11. The results of the independent sample t test show a sig value. (2-tailed) is 0.007, this value is smaller (< 0.05). So Ho is rejected and Ha is accepted, so it can be concluded that there is a significant difference between the experimental class and the control class. Thus, the product website-based learning media developed is not only feasible but also effective in increasing students curiosity.

Table 11. Independent Sample T-Test Test Results

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Hasil Belajar Siswa	Equal variances assumed	002	.964	-2.776	58	.007	-5.00000	1.80145	-8.60599	-1.39401
	Equal variances not assumed			-2.776	57.982	.007	-5.00000	1.80145	-8.60601	-1.39399

The learning process that involves website-based learning media will still require guidance from teaching staff in interacting directly with students (Nugraheni & Dina, 2017). The guidance given to students is carried out by teaching staff in situations where students find it difficult to operate the website. The Student Worksheet activities contained in one of the website menus contain activities that support the process of critical thinking skills and internalize students' inner character through the knowledge they already have by utilizing various learning sources so that learning becomes more meaningful. The activities contained in the website menus are integrated with the theme "Plant and Animal Reproductive Systems", this theme is felt to have an appeal for learning and can be used as a problem that is solved based on students' curiosity.

Indicators of the character of curiosity are explorer, discover, adventurous, and questioning (Fatkul Jannah, Wirawan Fadly and Aristiawan, 2021). The indicators contained in the character of curiosity are the essence of the scientific attitude developed in science learning as a reference that is expected in the learning process (Miaturrohmah and Fadly, 2020). This personal aspect is a curious character that can direct students in the aspect of critical or active reasoning, active observers, and likes to open up worlds that are full of challenges to learn. The reason for using plant and animal breeding material as test material for this website's learning media is because plants and animals are interesting things to explore further, including how they reproduce and what technology can help the process of plant and animal reproduction, so with this theme you can becomes an interesting theme for learning and can be used as a problem. This is in line with research conducted by Pluck & Johnson (2011) that if problems are given to students, on the other hand it will increase their curiosity in finding solutions to problems along with the level of the problem. The use of the breeding theme can increase the curiosity of students at Madrasah Tsanawiyah, one of the Madarasah in Ponorogo.

It was shown in research conducted by Hidayah (2018) that the results of research were in line with the implementation of research carried out by observers, namely that the website media used in the learning process provided the development of motivation and interest in students in the area of learning about science. According to Yulianti (2017), the use of website media in learning provides convenience and students have the opportunity to search for information from various sources so that understanding the material is easier in the area. Then, that website media acts as a media equivalent to teaching materials which provide students with a fun, interesting, creative, effective and innovative learning situation. Moreover, the addition

of videos of the material displayed on one of the menus on the website is felt to make it easier for students who prefer to understand the concepts in the material being taught when presented in a visual video explaining the material. Therefore, the development of website-based learning media innovations such as bit.ly/FILUMPEDIA is a new innovation in the development of learning media with the integration of technology and the curious nature of students. Because according to Pritasari & Jumadi (2018) that the process combined between learning with an appropriate approach and learning content can provide benefits in realizing quality education.

CONCLUSION

The results of the feasibility assessment by material and media experts obtained a score of 0.9 for material and 0.8 for media with an average of 0.85 declared suitable and good for use in the learning process at school. The results of the normalized gain score for the experimental class were greater than the control class. The experimental class got a gain score of 0.76, which can be seen in Figure 2, where the results are included in the high category, while the control class got a gain score of 0.62, which can be seen in Figure 3, where the results are included in the medium category. The effectiveness of learning was carried out using the independent sample t-test, showing the results that the sig. is 0.007 (> 0.05), then Ho is rejected and Ha is accepted, so it can be concluded that there is a significant difference between the experimental class and the control class. The results of the research show that integrated website-based science learning media considers students curiosity in the material Plant and Animal Reproductive Systems, apart from being developed and feasible and also effective in increasing students curiosity.

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