Wahana Pendidikan Fisika (2023) 8 (2): 101-108
https://doi.org/10.17509/wapfi.v8i2.54067
2406-9205 (Print) | 2477-4820 (Online)

ORIGINAL RESEARCH

Development of physics learning media "delight physics web" on elasticity and hooke's law to increase student learning motivation

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Received: 4 January 2023 · Accepted: 28 February 2023 · Published Online: 30 September 2023

Abstract

This student learning motivation on physical subject matter elasticity and Hooke's Law is still low, because this requires appropriate learning media in order to increase student learning motivation. The use of Google Site-based learning media is considered capable of increasing student learning motivation. Based on this, a medium called Delight Physics Web was developed as a solution to this problem. The purpose of this study is to determine the level of feasibility and reliability of Delight Physics Web learning media to increase students' learning motivation on Material Elasticity and Hooke's Law. This type of research is Research and Development (Research and Development) using the 4D model which consists of the stages of defining, designing, developing, and disseminating. However, this research was only carried out until the develop stage due to time constraints in conducting research. The instrument used in this study was a validation sheet consisting of 10 questions with 4 aspects, namely aspects of material content, presentation of material, media design, and language. The validation sheets were given to two validators, namely expert validators (physics lecturers) and practicing validators (physics teachers) who are experts in the field of media development and physics learning content to assess the learning media that have been developed. The results of this study obtained a validity value using a Likert scale of 1 to 4 indicating an average value in the aspect of material content 93.75%, material presentation 87.5%, media design 87.5%, and language 100%, while for the calculation results reliability with the Percentage of Agreement (PA) equation shows an average value in the aspect of material content of 93.33%, material presentation of 92.86%, media design of 85.71%, and language of 100%. The results of this study showed that Delight Physics Web's physical learning media to increase students' learning motivation on the Elasticity of Materials and Hooke's Law that had been developed was stated to be very feasible to use and reliable.

Keywords: *Elasticity · Hooke's Law · Learning Media · Learning Motivation · Physics Web*

INTRODUCTION

The discovery and development of science and technology which has been increasing rapidly lately is one of the factors for globalization. In the field of education, globalization has triggered a shift in the world of education, namely conventional face-to-face learning to more open learning. Utilization of information technology can provide convenience to educational institutions, especially for educators and students. Information about science can now be accessed through information technology in the form of the internet (Hawkridge, 2022). One of the uses of the internet is that it can be used as a learning resource for educators and students.

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How to Cite: Ningsih, D.A., & Diyana, T.N. (2023). Development of Physics Learning Media "Delight Physics Web" on Elasticity and Hooke's Law to Increase Student Learning Motivation. *Wahana Pendidikan Fisika*, *8*(2), 101-108. https://doi.org/10.17509/wapfi.v8i2.54067

Through this, educators are expected to have the ability to utilize modern technology as a medium to assist the teaching and learning process and improve the quality of learning (Fitra & Maksum, 2021). This ability can be in the form of selecting the right learning media. The use of learning media is very important for educators to support the learning process because it can increase learning motivation so that students obtain maximum learning outcomes (Dwijayani, 2019). This is done by packaging the material in a medium that can support the learning process without any space and time limitations in learning.

One of the interactive learning media that can be accessed without space and time limitations that can be utilized in the process of making teaching materials is the Google Site Application (Aulia et al., 2021). Google Site is an online (online) application launched by Google to create a class, school, or other website. In using Google Site, users can take advantage of various features that are used according to their needs in one place including text, images, videos, presentations, attachments, and others. The use of Google Site can be utilized by all users only by having a Google account and free of charge (Alakurt & Bardakci, 2017). Therefore, the Google Site can be used as an interactive learning medium with full features and free of charge.

Web-based learning media has several advantages to facilitate learning (Karuku, 2023). Some of these advantages include easy access anywhere and anytime, facilitating supervision of students, updating media content easily, and the affordability of the required operational costs. In addition, users can add learning materials and combine various features. One of the goals of using features is to provide a more realistic picture of learning so as to reduce ambiguous and abstract misconceptions. One of the interesting feature combinations is the attachment, where you can attach a simulation that allows students to conduct experiments online and can immediately respond to their learning outcomes in the attachments that have been provided (Lai et al., 2022). So from this, combining various features in learning media based on Google Sites can make the learning process more interesting, effective, and make it easier to achieve learning objectives properly and clearly.

The process of learning physics in class is still faced with several difficulties, especially the use of learning media. Lack of use of learning media can lead to low motivation of students in learning due to boredom and lack of interest in learning (Zaharah & Susilowati, 2020). The low motivation of students in learning can have an impact on student's critical thinking skills and understanding of students' concepts. In addition, most students still think that physics is a subject that is difficult to understand and complicated. One of the materials in physics that is difficult to understand is elasticity and Hooke's law. Some learning difficulties in this material include difficulty understanding concepts, difficulty linking between concepts, difficulty mastering formulas, and difficulty operating formulas in solving problems. So from this, we need a learning media that can increase students' learning motivation so as to improve students' critical thinking skills and understanding of students' concepts, especially in the material of Elasticity and Hooke's Law.

Learning motivation is one of the factors that influence the success of student learning in the classroom. Learning motivation is the urge to make a change in behavior, which can come from within or outside of an individual (Wulandari & Surjono, 2013). Each individual's learning motivation level is different, some have high, medium, or low motivation. The characteristics of students with high learning motivation in the class can be shown by their high learning

https://doi.org/10.17509/wapfi.v8i2.54067

interest such as being diligent in doing the assignments that have been given by the teacher. The characteristics of students with low learning motivation can be shown by the behavior of students when participating in learning such as looking bored, sleepy, and ignoring the explanations given by the teacher in class and having difficulty doing the assignments that have been given. The low learning motivation of students can create a less active learning atmosphere and reduced interaction between teachers and students. The existence of complexity in learning material which causes students' learning motivation to decrease is the cause of participants who are less interested in reading and studying the physics books that have been provided. This shows that the learning media used in class has an influence on students' learning motivation.

Based on this description, the researcher decided to develop a Google Site - based website interactive learning media called Delight Physics Web or abbreviated as DePhyW. This website is about Elasticity and Hooke's Law material, in which there are many features that can make the learning process more interesting. In addition, this learning media can be accessed easily. According to research results from Arumdani et al., (2018), states that the use of the Google Site as a learning resource will help students in seeking broader insights apart from textbooks, while seen from within students that is related to learning motivation which will increase because it encourages interest students in learning through the internet. Based on the results of this study it was concluded that there was a significant influence between the use of Google Site -based website learning media and increased student learning motivation.

In contrast to Arumdani's previous research Arumdani et al., (2018) which examined the use of the Google Site as a source of learning and motivation to study in economics subjects. This research develops learning media using the Google Site in physics subjects to increase students' motivation to learn under the name Delight Physics Web. Where the Delight Physics Web will later contain several sub-chapters regarding the material on Elasticity and Hooke's Law, practice questions, photos, videos, quizzes, and simulations related to this material. The material will be presented with several menus so that all users, especially students, can access it easily. Therefore, Delight Physics Web learning media using Google Site assistance is expected to increase students' motivation in learning, especially on the topic of Elasticity and Hooke's Law. The purpose of this study is to determine the feasibility level of Delight Physics Web learning media to increase students' learning motivation in the subject of Elasticity and Hooke's Law.

METHODS

Types of research

The type of research used is research and development or Research and Development (R&D). This type of research Research and Development (R&D) is a research process used to develop products and obtain validation of an educational product (Setyosari, 2016).

Research procedure

This study uses the research procedure used in this R&D, namely the 4D development model. The 4D model consists of four stages, namely define , design , develop , and disseminate. This research procedure was only carried out up to the development stage due to limited research time.

https://doi.org/10.17509/wapfi.v8i2.54067

Data Collection Instruments

The data collection instrument used in this study was in the form of validation sheets given to two validators including one expert validator , namely a physics lecturer and one practicing validator , namely a physics teacher who has expertise in the field of media development and physics learning content to assess the learning media that has been developed. The contents of the validation sheet instrument provided contain 10 questions with four aspects that are measured including material content, material presentation, media design, and language.

Data analysis technique

This study used two stages of data analysis techniques to determine the feasibility of the learning media that had been developed, namely validity and reliability analysis using a Likert scale . The equation 1 used for the data analysis technique for the validity of the developed learning media.

$$P = \frac{f}{n} \times 100\% \quad (1)$$

Information : P = percentages (%); f = score; n = total score. The results of the percentages are then converted in the form of eligibility criteria/validity of learning media as seen in Table 1.

Table 1 . Criteria for Feasibility/Validity of Learning Media

Percentage (%)	Eligibility/Validity
0 – 49.99	Not feasible
50.00 – 59.99	Less Worthy
60.00 – 79.99	Worthy
80.00 - 100	Very Worth it

(Latifah, 2016)

The percentage of agreement (PA) method using the equation 2.

$$PA = \left(1 - \frac{A - B}{A + B}\right) \times 100\% \quad (2)$$

Information : PA = Reliability percentage obtained; A = Greater validator score; B = Smaller validator score as seen in Table 2.

Table 2. Learning Media Reliability Criteria

Percentage (%)	Eligibility/Validity
0 – 75	Not Reliable
76 - 100	Reliable

RESULT AND DISCUSSION

Define Stage

At the define stage, it is known that there are problems in the physics learning process, and the learning media used, as well as reviewing the current curriculum. Based on the results of the literature conducted, it is known that the current learning process uses the 2013 curriculum (K-13) with less varied learning models. This causes a lack of student motivation in learning physics which is considered difficult and complicated. This happened in one of the physics

https://doi.org/10.17509/wapfi.v8i2.54067

materials, namely Elasticity and Hooke's Law where students had difficulty understanding concepts, had difficulty connecting between concepts, had difficulty mastering formulas, and had difficulty operating formulas in solving problems. Therefore, appropriate interactive learning media is needed to increase students' learning motivation in learning physics, especially in the material of Elasticity and Hooke's Law.

Design Stage

The design stage is the initial design stage of the learning media that will be developed. The interactive learning media is in the form of a Google Site-based website called Delight Physics Web or abbreviated as DePhyW. Delight Physics Web contains several sub-chapters regarding Elasticity and Hooke's Law, practice questions, photos, videos, quizzes, and simulations related to these materials. Figure 1 is an overview of the Delight Physics Web developed.

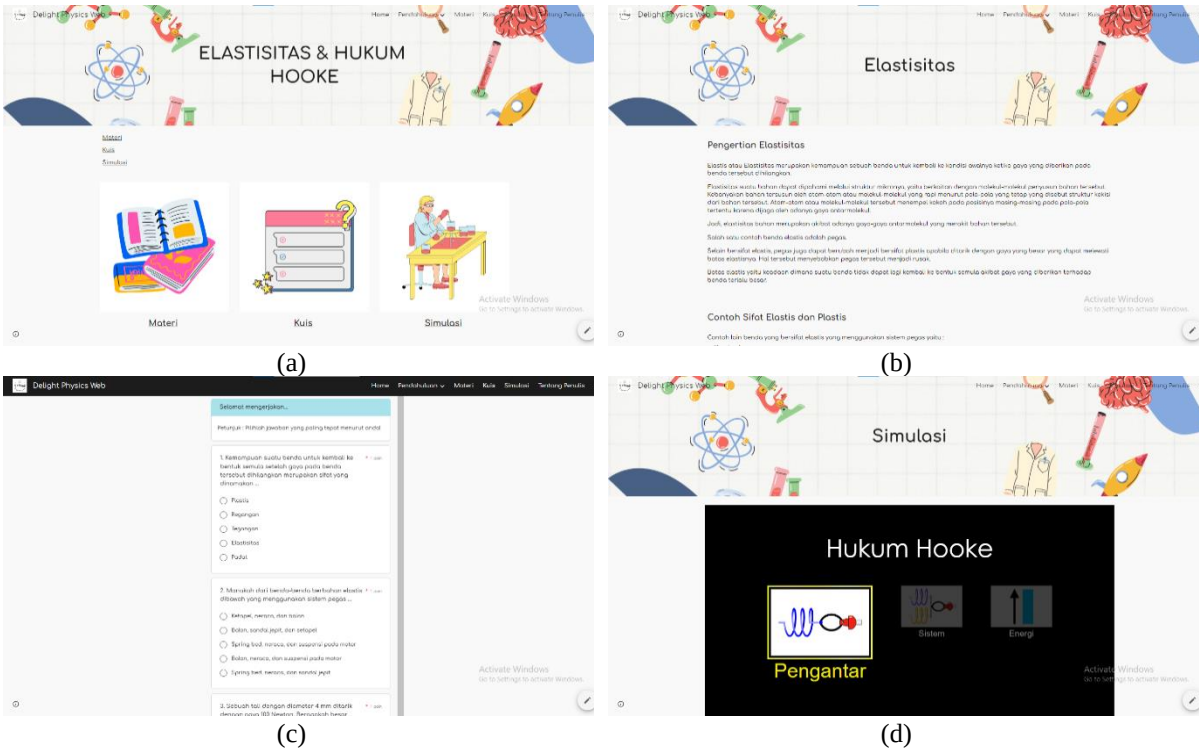

Figure 1. Display of the Delight Physics Web (a) Front view (b) material section, (c) quiz section, (d) simulation section

Development Stage

The Development stage is the stage of producing learning media in accordance with the objectives, namely to determine the feasibility of Delight Physics Web learning media to increase students' learning motivation on Elasticity and Hooke's Law material. At this stage the test is carried out the feasibility and reliability of learning media by two validators including one expert validator , namely a physics lecturer and one practitioner validator, namely a physics teacher who already has expertise in the field of media development and physics learning content . The following results from the feasibility test of the Delight Physics Web learning media that have been developed are presented in Table 3.

https://doi.org/10.17509/wapfi.v8i2.54067

Table 3. Due Diligence by Validators

Aspect	Average Percentage		Information
	Expert Validator	Practitioner Validator	
Content Material	87.5%	100%	Very worth it
Material Presentation	81.25%	93.75 %	Very worth it
Media Design	75%	100%	Very worth it
language	100%	100%	Very worth it

The results of the reliability test of the Delight Physics Web learning media that have been developed are presented in Table 4.

Table 4. Reliability Test by Validators

Aspect	Percentage of agreement (PA)	Information
	Expert Validator & Practitioner	
Content Material	99.33%	Reliable
Material Presentation	92.86%	Reliable
Media Design	85.71%	Reliable
language	100%	Reliable

Discussion

The interactive learning media developed is in the form of a Google Site- based website called Delight Physics Web or abbreviated as DePhyW to increase students' learning motivation on Elasticity and Hooke's Law. The developed learning media was assessed by two validators, one expert validator, namely a physics lecturer and one practitioner validator, namely a physics teacher. The assessment was carried out based on the Likert scale to determine feasibility and the Percentage of agreement (PA) method to determine the reliability of the learning media that had been developed. The developed learning media is assessed by using four aspects with the details of the assessment results as follows.

Based on Tables 3 and 4 above, it can be seen that the first aspect of the material content in the developed Delight Physics Web learning media is included in the very feasible category with an average test value of 93.75% and reliable with a reliability test value of 93.33 %. The content aspect of this material consists of the suitability of the material with KI and KD and the ease of the Delight Physics Web in increasing learning motivation. The highest value is given by the practitioner validator, namely 100%. In this aspect there are no suggestions from the two validators, but there are comments regarding websites that take quite a long time to load . This may occur due to inadequate signal or device factors and the large number of people accessing the website .

Delight Physics Web learning media is included in the very feasible category with an average test value of 87.5% and reliable with a reliability test value of 92.86%. The presentation aspect of this material consists of the sequence of the material, completeness, suitability of the questions, and suitability of the images, videos and virtual labs presented on the Delight Physics Web . The highest score was given by the practitioner validator, namely 93.75%. In this aspect there were no comments from the two validators, but there were suggestions that the media could be developed into an e-book to make it easier to use.

Delight Physics Web learning media are included in the very feasible category with an average feasibility test score of 87.5% and reliable with a reliability test score of 85.71%. This

aspect of media design consists of the design and appearance of website pages , the clarity of the menu buttons on each website page , and the clarity of the images presented on the Delight Physics Web . The highest value is given by the practitioner validator, namely 100%. In this aspect there are no comments from the two validators.

Delight Physics Web learning media is included in the very feasible category with an average feasibility test score of 100% and reliable with a 100% reliability test score. This aspect of discussion consists of conformity of writing sentences with PUEBI on the Delight Physics Web . The value given by expert validators and practitioners is the same, namely 100%. In this aspect there are no comments from the two validators.

Overall, the Delight Physics Web that has been developed has been declared very feasible and reliable. The contents of the Delight Physics Web that have been developed have also been adjusted to meet indicators to increase students' learning motivation in learning physics on Elasticity and Hooke's Law. Where according to Zaharah & Susilowati (2020) and Nurzaman et al (2021) that the low motivation of students can be caused by the lack of utilization of learning media which causes boredom and less interest. The availability of completeness regarding Elasticity and Hooke's Law material, practice questions, photos, videos, quizzes, and simulations related to the material is expected to reduce boredom, foster a diligent attitude, and increase students' interest and motivation in learning material, trying virtual laboratories, and do quiz.

Delight Physics Web learning media received a good response from the validators. These results are in accordance with the results of previous research regarding the creation of Google Site- based learning media (Arumdani et al., 2018). The difference is in the selection of subjects, namely physics and in the more complete content of the Delight Physics Web so that it can further increase students' motivation in learning physics, especially in the material on Elasticity and Hooke's Law. Furthermore, it is hoped that this Delight Physics Web can be used by students in learning physics material Elasticity and Hooke's Law.

CONCLUSION

Based on the results of the feasibility and reliability tests, it can be stated that the Delight Physics Web learning media to increase students' learning motivation in the material developed for Elasticity and Hooke's Law is stated to be very feasible to use and reliable. Feasibility and reliability can be proven from the results of the feasibility and reliability tests that have been carried out. As for the scores obtained, namely the validity test shows an average value in the aspect of material content at 93.75%, presentation of material at 87.5%, media design at 87.5%, and language at 100%, while the reliability test results show an average the average score on the aspect of material content is 93.33%, material presentation is 92.86%, media design is 85.71%, and language is 100%. The suggestions for research are expected to be able to develop Google Site-based learning media for other physics subjects and materials.

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