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Development of Interactive Learning Media for H5P-Based Elasticity Materials in the Mobilizing School Curriculum

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Abstract: The curriculum in Indonesia has undergone several changes and improvements with the aim of realizing technological developments in the era of the industrial revolution 5.0. provide new color variations in the educational aspect as a means of implementing the driving school curriculum. Research and development (research and development / R&D) is a research method used to develop or validate products used in education and learning. Material expert validation results get a percentage of 94.12% in the Very valid category, or can be used without revision, product testing by 28 students gets a percentage of 91.42% in the Very valid category, or can be used without revision so that this media can be used as an alternative media in learning. Based on the results of the study it is suggested that elasticity Interactive Learning Media can be concluded that H5P-based elasticity learning media is appropriate for use and supports school programs in the field of school digitization.

Keywords: Curriculum; Elasticity Materials; Interactive Learning Media; Mobilizing School

Introduction

Crucial policies in improving the world of education lie in the process of curriculum development and change (Priestley & Drew, 2017). The curriculum is an educational program created by an educational institution (Sachdeva et al., 2008) that contains learning plans that are given to students to be used as a guideline for educational achievement in preparing future students to become individuals who have creative, critical and innovative thinking skills to be applied in society's living environment (Turiman et al., 2012).

The curriculum in Indonesia has made changes and improvements several times (Pramana et al., 2021) with the aim of realizing technological developments in the 5.0 industrial revolution era to provide a new color variation in the educational aspect as a means of implementing the curriculum according to current trends (Satriawan et al., 2021). One of the curricula at the moment is the Mobilization School which aims to produce Pancasila Student Profiles that are not only outstanding but can apply the principles of diversity in everyday life.

One of the Mobilizing School Programs is the digitization of schools which is used as an important step in accelerating the realization of Indonesia's educational vision (Rotty et al., 2022). School digitalization is an intervention that encourages the provision of fast, automatic and open services so that they can be in line with today's developments in technology and information (Wibawa, 2017). Schools need to improve educational services through the use of various digital platforms so as to reduce complexity, increase inspiration, increase efficiency, and provide a customized approach (Syafi'i & Fahrian, 2021).

In the implementation of learning, teachers are expected to be able to use technology in accordance with the needs and situations and conditions (Budiyono, 2020). For this reason, the application of information and communication technology (ICT) in learning Physics can help teachers to make the learning methods more efficient, especially when delivering material that

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requires a more detailed and more concrete explanation of the process. One of the factors causing the lack of interest in students is the lack of learning facilities provided. Therefore, the use of technology is expected to generate positive emotions in the learning process (Satriawan et al., 2021).

Based on the conditions above, the authors conclude that there are several obstacles encountered in the learning process, namely learning resources that still use conventional systems (Harsiwi & Arini, 2020). This problem must be overcome immediately by developing a media as a learning resource. So, one of the media needed is interactive multimedia, in this multimedia students can move objects on the computer / cellphone screen or vice versa the computer / cellphone asks students to move these objects (Yulia, 2022).

Based on the explanation and description above, looking at the problems that occur at this time, the authors are confident to conduct development research with the title "Development of Interactive Learning Media for H5P-Based Elasticity Material in the Mobilizing School Curriculum".

Method

This type of research is research and development. The development of audio-visual-based learning media on elasticity material was developed using the ADDIE development model (Nurahman et al., 2018). Research and development (research and development / R&D) is a research method used to develop or validate products used in education and learning (Ramadani et al., 2020; Sugiyono, 2017). The development model used in this study uses research and development steps which refers to the research and development methods of Brog and Gall. The steps are as follows :

Potential Problems

Data on potentials and problems do not have to be searched alone, but can be based on other people's research reports or documentation of activity reports from individuals. Observational methods can be used to explore the potential and problems that occur in students.

Data Collection

Data collection can also be done by increasing the number of literature studies starting from KI/KD, syllabus and learning objectives.

Product Design

To get interactive learning media from predetermined material, it is necessary to design a screen display that is made to make it easier for programmers to translate it into a programming language or to an animation that will be made. The design is made in the form of a storyboard to make it easier to implement the design.

Design Validation

After the design is made the next step is validation by experts. This validation is carried out by 2 experts, namely material experts and media experts to determine the feasibility of the media before being implemented in the field and provide input to improve the media.

Design Revision

After being validated by experts, then the interactive learning media was revised based on expert input. If the validated media meets the category and does not need to be revised, then the interactive learning media is ready to be implemented in the field.

Product Trials

After the design has been revised, the next step is Product Trial. Testing is carried out to obtain information about the effectiveness and efficiency of the product.

Product Review

The results of the product trials are then revised according to the input results of the product trials. Products that have undergone product revisions are then tested for use. This is done to find out whether the product is suitable for use in learning.

Product revisions are carried out if there are deficiencies or weaknesses in its use that are obtained after product trials on large groups. This is done in order to find out its weaknesses to perfect the product. The final results of the learning media developed based on validation, revision, and product testing were carried out and then published.

In this study it was only carried out up to stage 9, namely without mass production. The subjects in this study were 3 lecturers (expert validators), 8 teachers/colleagues, 28 students from class XI MIPA, consisting of 13 students and 15 students from class XI SMAIT Ulil Albab Batam which is located on Jalan Diponegoro, Bukit Tempayan Village, District Batu Aji, Batam City, Riau Archipelago Province. The data collection technique in this study is by observation and using a closed questionnaire, where the final page is accompanied by a comment column.

The types of data in this research are qualitative and quantitative data, which are analyzed statistically descriptively. Qualitative data in the form of comments and product improvement suggestions from media experts and material experts were then analyzed and described qualitatively to revise the product being developed. Quantitative descriptive analysis techniques are used to process data in the form of numbers and are obtained from questionnaires in descriptive form. The

formula used to calculate the percentage of each subject by Formula equation 1 (Mualfah & Ramadhan, 2020):

$$P = \frac{x}{xi} \times 100\% \quad (1)$$

Clarity:
P = Percentage Questionnaire / Questionnaire
x = The number of assessment scores in one item
xi = Total ideal score in one item

Furthermore, to calculate the percentage of all subjects is to use the Formula equation 2:

$$P = \frac{\sum x}{\sum xi} \times 100\% \quad (2)$$

Clarity:
P = Overall percentage
∑x = Total score
∑xi = Total ideal score overall

Where to give meaning and make decisions on the feasibility level, the conversion level of achievement is used as follows Table 1.

Table 1. Eligibility Level Criteria

Validity Criteria (%)	Validity Level
85.01 – 100.00	Very Valid, or can be used without revision.
70.01 – 85.00	Valid enough, or can be used but needs minor revision.
50,01 - 70.00	Invalid, it is recommended not to use it because it needs major revisions.
50.00 <	Invalid, or cannot be used.

Result and Discussion

Development of Learning Media

The process of developing interactive learning media for H5P-based Elasticity Material in Physics for class XI students at SMAIT Ulil Albab Batam based on Sugiyono's research and development steps is as follows:

Potential and Problems

The observation method is used to explore the potential and problems that occur in class XI students at SMAIT Ulil Albab Batam, especially in the Subject of Physics on Elasticity. The data obtained from the observation activities by steps: half of the students in one class have laptops that can be used for studying outside school hours; all students have mobile phones which are used as communication tools and which can be used as learning media in class; the process of teaching and learning activities uses power point learning media which is still not effective in helping students understand the concept of elasticity; teachers still use conventional methods when learning so that students do not understand what is conveyed by the teacher; the teacher has difficulty visualizing elasticity material using only power point media. The material value of elasticity is also that there are still some students who are under Learning Mastery; and the digitalization process in schools has not been able to support the Mobilizing School Curriculum Program.

Data collection

Data collection can be done by studying the literature starting from basic competencies, Syllabus and Learning Objectives. The basic competencies that corresponds to the elasticity material is basic competencies 3.2. Analyzing the elasticity properties of materials in daily life and basic competencies 4.2. Conduct experiments on the elasticity properties of a material and presentation of the results of experiments and their utilization. The learning objectives in this media are: explain in your own words about the characteristics of elastic objects; explain in your own words the difference between stress and strain; explain in your own words about Young's Modulus; explain the characteristics of elastic bodies according to Hooke's law; analyze the spring arrangement; and Analyze the potential energy that arises in the spring (Fitria, 2020).

Product Design

The stages in this product design are Objective Analysis and Designing interactive learning media (Dasilva et al., 2019). Analysis of this goal is to determine the purpose of making learning media. Next is to analyze the concept by preparing all teaching materials related to the selected basic competencies and analyzing system requirements. The hardware used to make this learning media is a Personal Computer (PC) or mobile phone with the Windows 7 operating system specifications. A minimum processor of 2 GHz, and a minimum of 2 Gb of RAM. The software used are HTML5 Package (H5P) Software, Moodle edukati.com, youtube.com, liveworksheet and PhET Simulation phet.colorado.edu.

This learning media contains:
Login menu

Where before completing and studying the material, students are welcome to log in first using the NISN username and password 12345678 and can be edited by students.

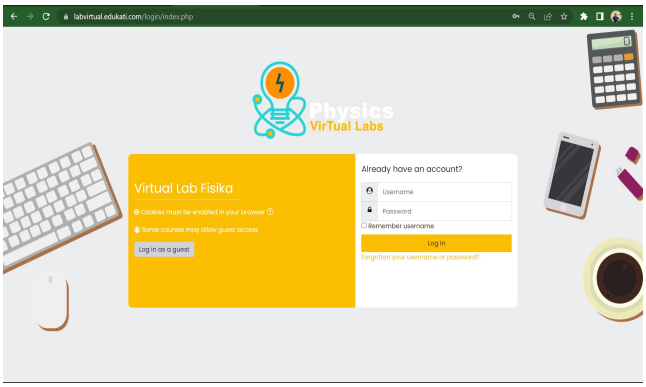

Figure 1. Login display of Elasticity Learning Media

General Instructions for Use

Contains general instructions that students must understand in using interactive learning media.

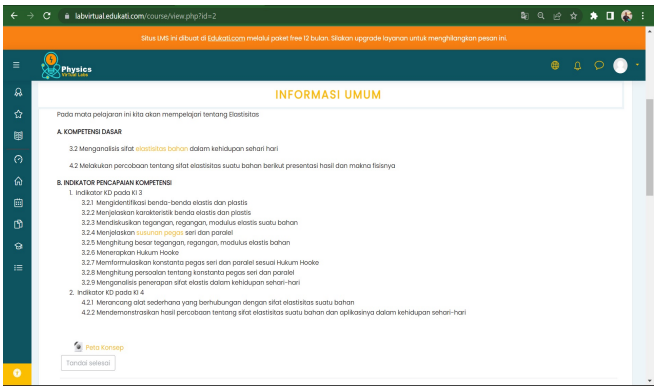

Figure 2. Display General Instructions

Concept Maps

Contains content competencies and basic competencies on elasticity in high school physics subjects.

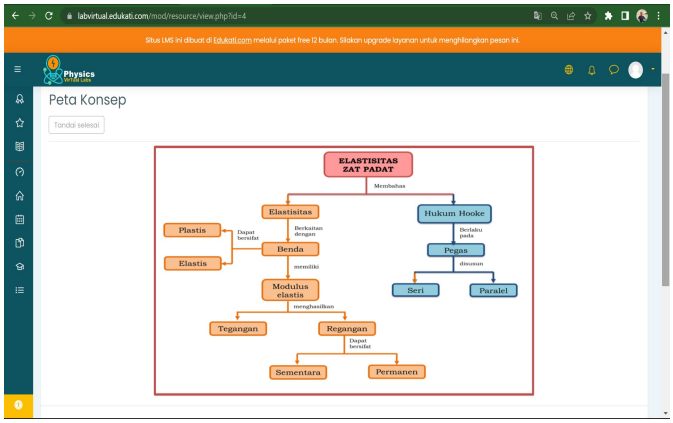

Figure 3. Display Concept Maps

Material Chart

Contains the sub-matter that will be studied in the elasticity subject matter of high school physics.

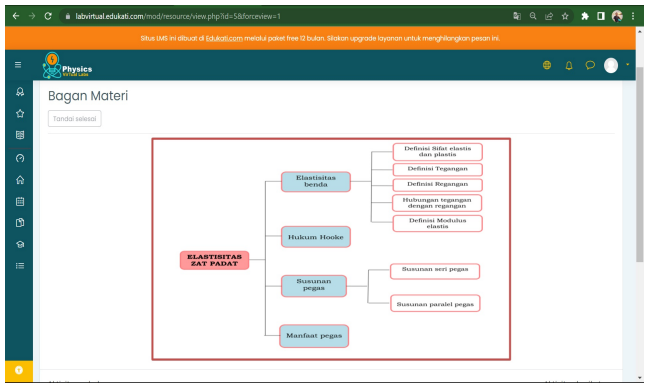

Figure 4. Display Material Chart

Class

Contains the distribution of material for each grade level in high school which includes 3 junior high levels for Integrated Science subjects and 3 high school levels for Physics subjects. In each class there are learning materials that have been adjusted for each level according to the applicable curriculum.

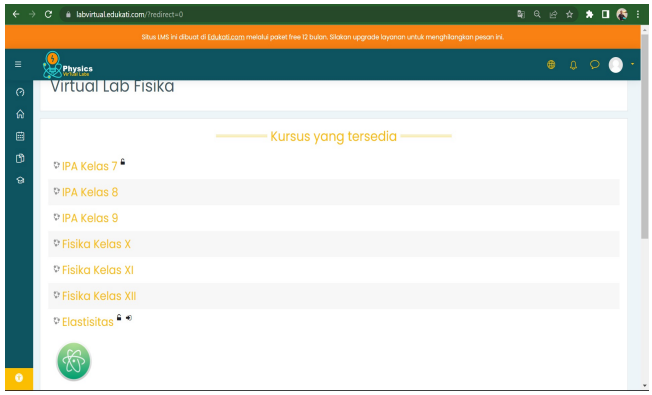

Figure 5. Display Class

Material

Contains material on elasticity which includes the characteristics of elastic bodies, differences in stress and strain, Young's Modulus, Hooke's Law, the arrangement of springs and the potential energy that arises in springs.

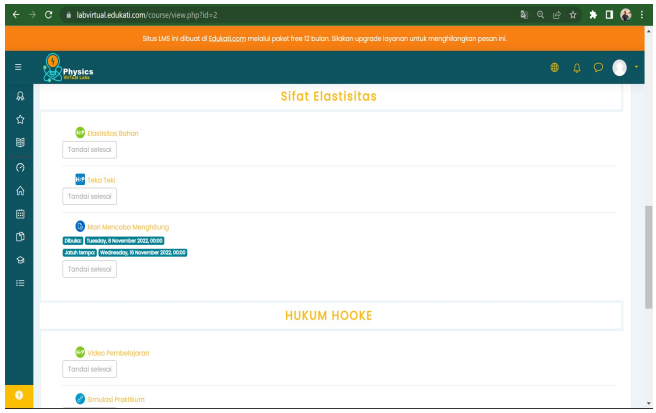

Figure 6. Display of Elasticity Material

Trial Simulation

It contains experimental simulations of elasticity which include elasticity, stress and strain differences, Young's Modulus, Hooke's Law, spring arrangement and potential energy.

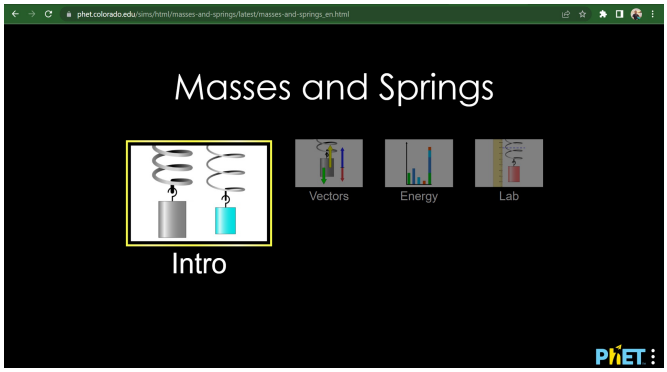

Figure 7. Display Simulation

Assessment

Contains student assessments in the form of calculating a case and understanding in a crossword puzzle.

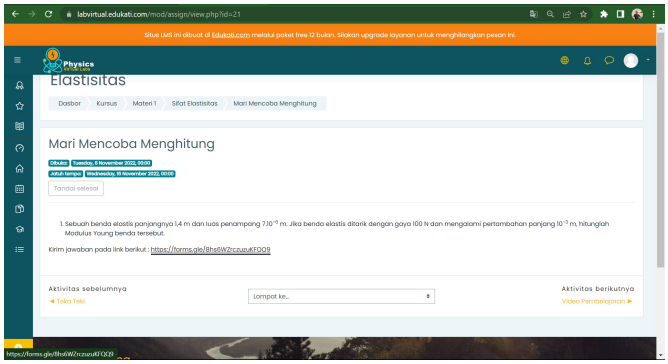

Figure 8. Calculations

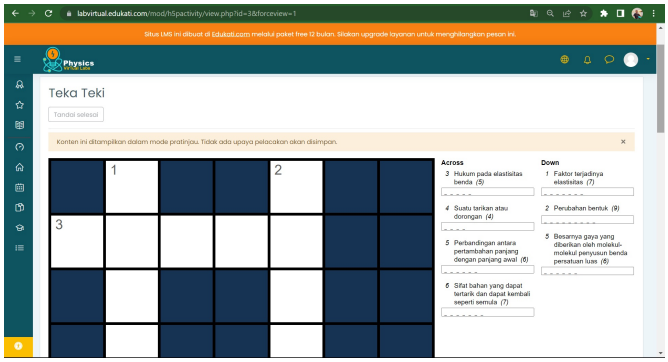

Figure 9. Crossword puzzle

Design Validation

Validation to material experts includes several aspects, namely the content feasibility aspect, the presentation feasibility aspect and also the contextual assessment aspect (Anggraini et al., 2019; Hamida & Desnita, 2021), where each aspect has an assessment indicator and also an assessment item. The validator for material experts is a Physics Teaching Inquiry Lecturer, Mr. Dr. Zulirfan, S.Si., M.Si. Postgraduate Lecturer at the University of Riau. The validation results can be seen in Figure 10.

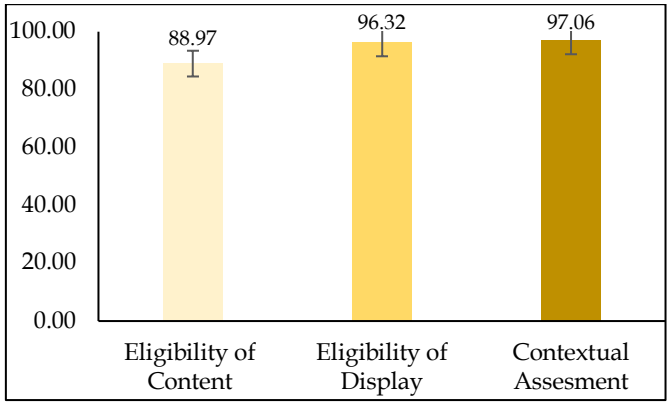

Figure 10. Material Expert Validation

From the graph above it can be explained that the feasibility aspect of the content of elastic interactive learning media gets a percentage of 88.97%, the feasibility aspect of media presentation is 96.32% and the aspect of contextual assessment is 97.06%. The overall percentage of elastic interactive learning media material experts is 94.12%. Based on the results of these scores, the percentage results obtained are then converted into Table 1 of the eligibility level criteria. Then the elasticity interactive learning media material is classified as a very valid qualification, or can be used without revision from a material expert.

Media expert validation includes several aspects, namely display design, aspects of media content and linguistic aspects (Dwitiyanti et al., 2020; Serevina & Muliyati, 2015), where each aspect has assessment indicators and also assessment items. In this study, the media expert validator, namely Dr. Muhammad Nasir, S.Si., M.Kom as Postgraduate Lecturer at the University of Riau. The media validation results can be seen in Figure 11.

From the graph above it can be seen that in the Display Design aspect of interactive learning media the elasticity gets a percentage of 88.97%, the Content aspect of Learning Media gets a percentage of 91.92% and the Language aspect gets a percentage of 90.44%. The overall percentage of elastic interactive learning media experts is 90.44%. Based on the results of these scores, the percentage results obtained are then converted into table 1 of the eligibility level criteria. Then the logic gate interactive learning media is classified as a very valid qualification, or can be used without revision from a media expert.

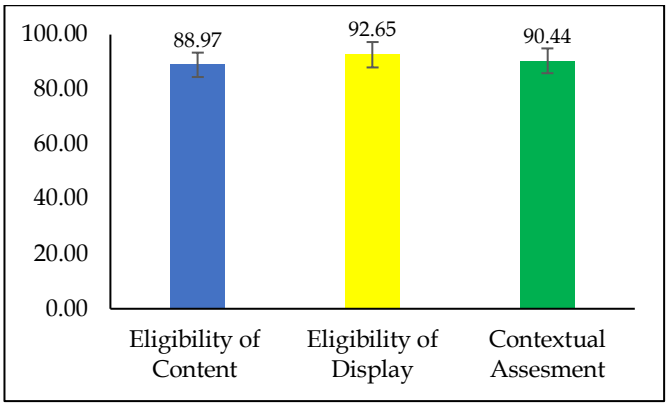

Figure 11. Media Validation

Design Revision

The results of the validation from material experts showed several improvements including an explanation in the elasticity interactive video section so that students could understand the concept of elasticity. The step that has been taken is to provide an explanation in the form of audio on the learning video. From media experts, improvements were made to video features in learning media which still need to be improved so that they can be maximized. The step that has been taken is to re-upload an existing video.

Product Trials

Implementation is the stage that translates the design stage into actual appearance. Implementation of product trials can be carried out using laptops and cellphones which can be seen in Figure 12.

Figure 12. Implementation of H5P Media in the Learning Process in the Classroom

Product trial analysis is divided into 3 aspects, namely interest, material and appearance. In this study, product test analysis was carried out by implementing learning media to 28 students at SMAIT Ulil Albab Batam. Figure 13 shows that the average value on the interest aspect is 97.79%, from the material aspect it gets a percentage of 80.15% and from the display aspect it gets a percentage of 83.82%.

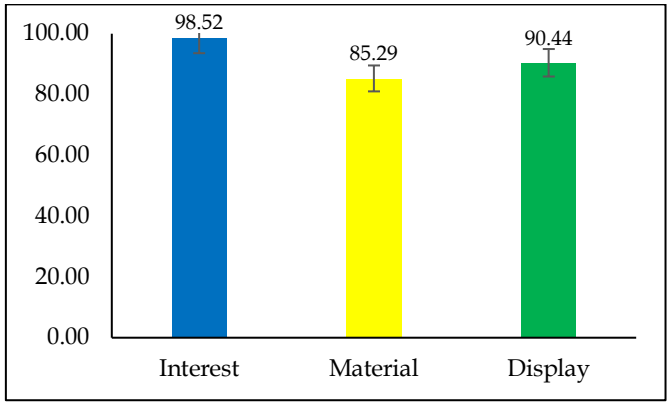

Figure 13. Product Trial

The overall percentage of elasticity interactive learning media product tests is equal to 87.25%. Based on the results of these scores, the percentage results obtained are then converted into table 1 of the eligibility level criteria. Then the elasticity interactive learning media is classified as a very valid qualification, or can be used without revision and can be continued to trial use.

Product Revision

From the product trials, there were several improvements including video sound that was less loud and also additions to the game. The step that has been taken is to re-record the gate video which still lacks audio.

Usage Test

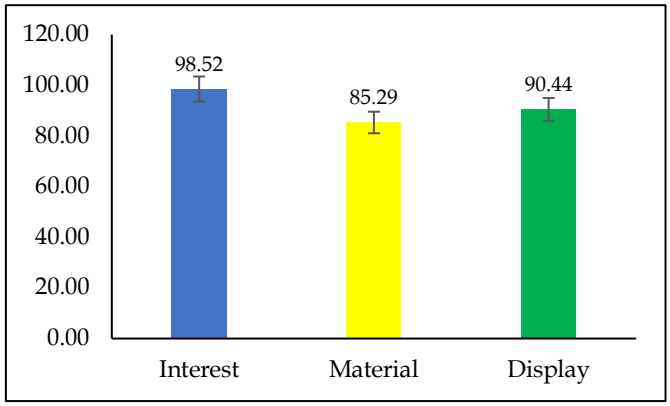

Figure 14. Usage Trial

Figure 14 shows that the average value on the interest aspect is 98.79%, from the material aspect it gets a percentage of 85.29% and from the display aspect it gets a percentage of 90.44%. The overall percentage of

elasticity interactive learning media use test is 91.42%. Based on the results of these scores, the percentage results obtained are then converted into table 1 of the eligibility level criteria. So the elastic interactive learning media is classified as very valid, or can be used without revision and can be used as an alternative medium in learning.

Product Revision

From the trial use, there were several comments, namely the volume of the audio or music accompaniment was too loud, so the improvement made was to reduce the volume of the music accompaniment. The revised results of the use trial are then made into the edukati.com Moodle LMS which is ready to be used for virtual-based learning.

Implementation of H5P Media to Support the Mobilizing School Curriculum

Mobilizing Schools are schools that focus on developing student learning outcomes holistically by realizing the Pancasila Student Profile which includes competence and character that begins with superior human resources (principals and teachers) (Afrina et al., 2022; Islamiyah et al., 2022). Driving schools have 5 intervention programs that are interrelated and cannot be separated, namely consultative and asymmetric assistance, strengthening school human resources, learning with a new paradigm, data-based planning, and school digitalization (Kemendikbud, 2021). One of the objectives of this research is to support the driving school program, especially in school digitalization.

From the trials of learning media using H5P media that have been carried out, audio-visual-based research and development on elasticity material, was developed using the ADDIE development model. Based on the results of the feasibility test of learning media according to Sugiyono (2019), it can be concluded that the H5P-based elasticity learning media is suitable for use and supports school programs in the field of school digitization.

Conclusion

Material expert validation results get a percentage of 94.12% in the Very valid category, or can be used without revision, product testing by 28 students gets a percentage of 91.42% in the Very valid category, or can be used without revision so that this media can be used as an alternative media in learning. Based on the results of the study it is suggested that elasticity Interactive Learning Media can be concluded that H5P-based elasticity learning media is appropriate for use and supports school programs in the field of school digitization.

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