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Development of Flash-Based Learning Media on Static and Dynamic Fluid Materials for Class XI High Schools

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ABSTRACT

This study aims to develop flash media based learning on the material of static fluid and dynamic fluid to support learning activities by using research & development methods. Research activities include analysis of needs, product development and validation. Media tests are carried out on material experts, media experts, small group tests and large group tests. Test the validity and reliability of the media test instruments using the moment and alpha-cronbach product correlation. Product test results show good results, then this flash-based learning media product has been appropriate to be used in supporting learning activities in schools.

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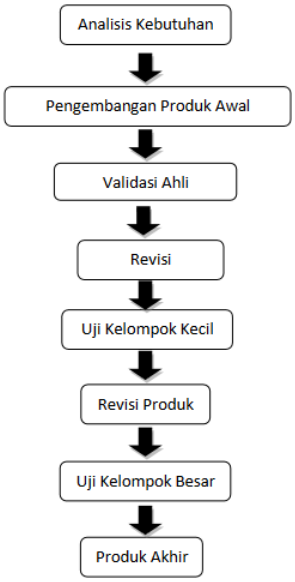
1. INTRODUCTION

Physics is part of Natural Sciences (IPA) which is a study of phenomena and natural phenomena or events. Physics also studies the nature and behavior of nature, thus enabling us to use nature for the benefit of humans with full responsibility. In the framework of mastering technology, we must also master physics as a basic science of science and technology. However, based on observations made on students from 3 high schools, it is known that the teacher's method of teaching is the main factor that causes students difficulty in understanding the material. Based on observations made to teachers, it was noted that 64% of teachers stated that the lack of media to support the learning process was the main factor causing students difficulty in understanding fluid material. This is what makes the form of learning that teachers do to teach physics material, especially for fluid material static and dynamic fluids, 47% of the forms of learning conducted by teachers to teach static and dynamic fluid material are lectures, 26.5% discussions, 21% presentations and 5.5% others are working on problems. So it appears that lecture is a form of learning most often used by teachers in teaching static and dynamic fluid material. This is certainly less effective, if you see the results regarding the level of difficulty of students in understanding mathematical concepts and formulas specifically for static fluid material and for dynamic

fluid material. As many as 61% of students think that some static material is difficult and there are some materials that are easily understood mathematical concepts and formulas, as many as 32% of students consider static fluid material as difficult to understand mathematical concepts and formulas and only 7% of students do not find it difficult to understand mathematical concepts and formulas for static fluid material. As for dynamic fluid material, as many as 61% of students consider that some dynamic fluid material is difficult and there are some materials that are easily understood mathematical concepts and formulas, as many as 36% of students consider dynamic fluid material as difficult to understand mathematical concepts and formulas and only 3% students who do not feel difficulties in understanding mathematical concepts and formulas for dynamic fluid material. And from several things in fluid material that make students difficult in learning it. As many as 68% of students assessed that the mathematical formulas contained in fluid material are difficult to understand, including 22% of students have difficulty visualizing it so that the concept of fluid material cannot be understood by students and only 10% of students who do not think so or in words There are other things in fluid material that make it difficult for students to learn it, such as difficulties in understanding questions or statements in the material. It can be concluded that students have more difficulty in understanding mathematical formulas than the concept of fluid itself. Even if students easily understand the concept of fluid, students will easily understand the relationship between quantities that affect the condition of the fluid and mathematical formulas will be easy to use. Therefore, the authors propose a design regarding the development of high school physics learning media for fluid material using flash-based animation. Because high school students will more easily understand definitions, concepts and formulas with the help of pictures, videos and animations. It is expected that with the learning material developed using flash-based animation, students will more easily understand the concepts of true and more interesting lessons.

2. METHOD

The The method used in this research is research and development (Research and Development). This method is a research method used to produce products, and test the effectiveness of these products.



research and development research center Research and Education Research Policy and Innovation Center, Ministry of National Education (2008), among others
: 1. Requirement analysis phase (need assessment)

The needs analysis phase is the initial step that must be carried out in research activities in the development field. At this stage the needs analysis questionnaire was distributed to class II students. In addition to distributing questionnaires to students, interviews were also conducted with Class II Physics teachers whose results would be used as research supporting data.

2. Initial product development stage

The product development phase is carried out with planning and development. Product development is carried out independently. The initial product that has been developed is then tested for eligibility.

3. The validation stage by the expert (expert judgment).

At this stage consists of validation of material and media validation. - Validation of material was carried out at the Department of Physics, Jakarta State University. Next, the material expert completes the questionnaire on the material expert suitability. Media validation consists of expert learning media development. After being tested, then the media expert will fill in the media eligibility questionnaire.

4. Revisions

After the product design is validated through the assessment of media experts and material experts, the researcher makes revisions to the product design made based on expert input.

5. Try the small group try-out.

A small group test was conducted on 15 students. Then students fill out the student eligibility questionnaire.

6. Product Revision Products can be improved for several reasons, namely: (a) trials conducted are still limited, so it does not reflect the actual situation and conditions, (b) in the trial found weaknesses and deficiencies of the product being developed.

7. Try the big group (field try-out).

Large group test was carried out on 26 students of class II. Then students fill out the student eligibility questionnaire. In addition, this test is also conducted on the Physical Class II teacher as a user, then the teacher fills in the eligibility test questionnaire.

8. Final Product

After testing the product in a large group, the final stage of product revision is carried out based on the input obtained. This stage is the final stage of research and development.

Sample

Media experts, material experts, small groups of students (15 people), large groups of students (26 people), and Physical Physics teachers grade II

Instrument

The instruments used in this research development are:

1. Analyze needs

This instrument contains questions that aim to determine the needs of students in learning Physics so that learning media will be developed in accordance with the needs and problems that occur

2. Teacher interviews

This activity is carried out to obtain information about the teaching process of the teacher which is used as supporting data for the research to be conducted.

3. Expert feasibility test instruments

The feasibility test instrument refers to the material expert's opinion of the material on the evaluation instrument used that aims to get input for product improvement. Instrument of the media expert test on the quality of evaluation instruments using flash-based animation. The results of the analysis will be used as input for product revision.

4. Instrument feasibility test to students

This feasibility test instrument is aimed at students who will use learning media that use

flash animation.
5. Feasibility test instruments to teachers as users
This feasibility test instrument is aimed at the Physical Physics teacher grade II.

3. RESULTS AND DISCUSSION

This study aims to produce products in the form of physics learning media for static and dynamic fluid materials using the Adobe Flash program using the Research and Development (R&D) research method. From the results of needs analysis in SMA 3Bekasi, SMA Negeri 6 Bekasi and SMA PGRI 1 Bekasi, it is known that 53% of students consider static fluid and dynamic fluid material to be mostly difficult. The stages of research that were passed are:

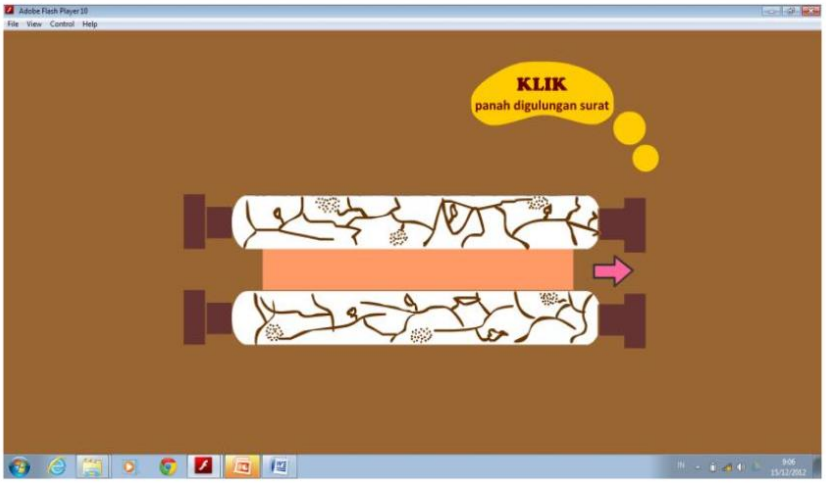
A. Need Analysis

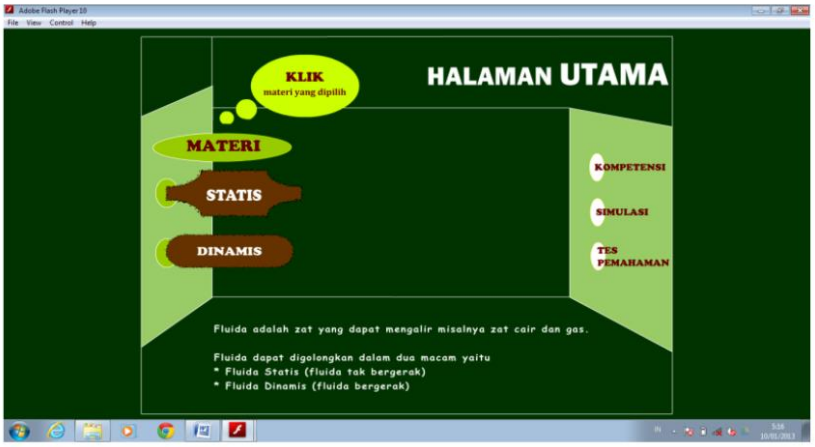
Needs analysis is done through the distribution of instruments in the form of questionnaires or questionnaires. This questionnaire is distributed to students and teachers, this is intended to determine the problems faced by teachers and students. media, and media models that want to be developed. While the student needs questionnaire includes aspects of understanding the material of static fluid and dynamic fluid, the need for learning media for students and what media are needed by students. Filling out the teacher needs analysis questionnaire involves physics teachers. This is due to the fact that most of the items in this questionnaire are related to teaching and learning activities presented by physics teachers.

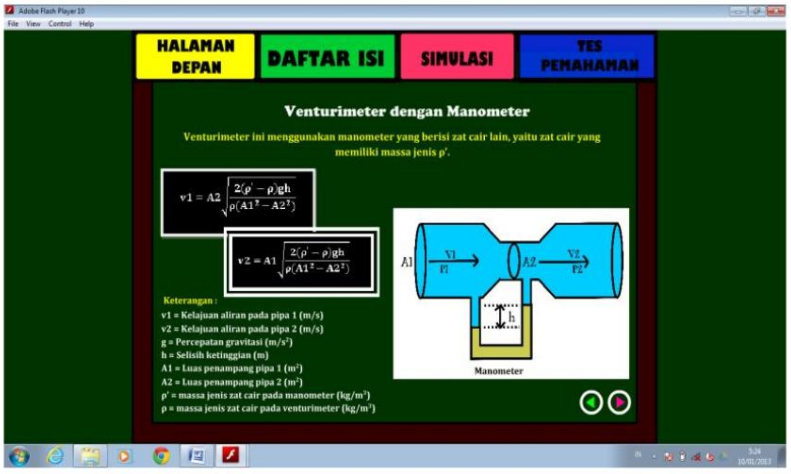
Based on student analysis data it is known that 53% of students assess that fluid material is one material that is considered difficult and 68% of students have difficulty understanding the use of mathematical formulas. It can be concluded that students have more difficulty in understanding mathematical formulas than the concept of fluid itself. Even if students easily understand the concept of fluid, then students will easily understand the relationship between quantities that affect the condition of the fluid. And mathematical formulas will also be easily understood in its use. Among these difficulties are supported by 86% of students who think the teacher's method of learning influences students to understand the material. Even though 63.9% of students consider there are times when there is an influence or not the use of media as a way to deliver learning information and increase understanding of teaching material. The learning media needed by students are those that include sound and visual elements. this is reflected in the analysis of student needs data which states that 19.5% chose the elements of images, 25% chose the elements of animation and 55.5% chose sound-visual. therefore in media development we need a media that combines these three elements, and one of the media that meets these elements is flash-based media.

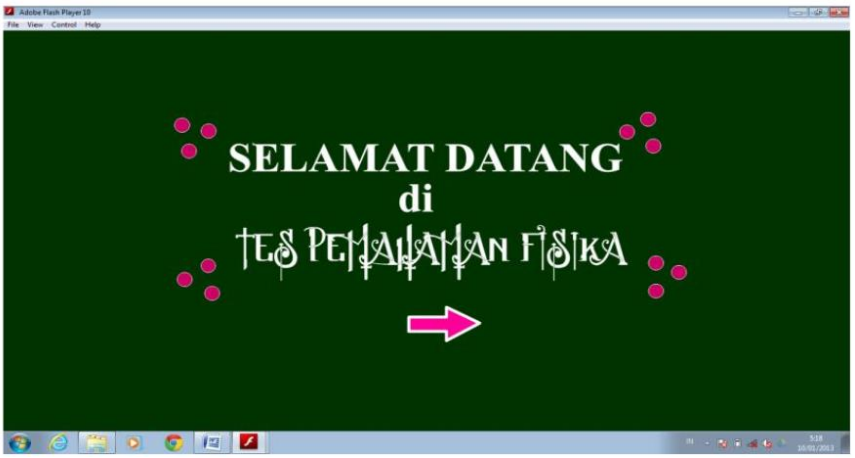
B. Initial Product Development

The initial idea of developing flashini-based learning media came from researchers by covering various matters regarding media development, such as content and design media. In addition, researchers also developed from several examples of fluid learning media that uses flash as a development program. Therefore, researchers develop from several examples that researchers get. This development includes combining all material in one media, so that users can choose the material used without having to keep closing and opening flash from different places, placing animations and writing (tools to understand material and animation) that are adjusted to their capacity so that not too much writings or only contain animation, because researchers understand users, namely teachers and students use this learning media to be able to understand material that initially there are some users who have not mastered the fluid material itself. Below are the initial media products.

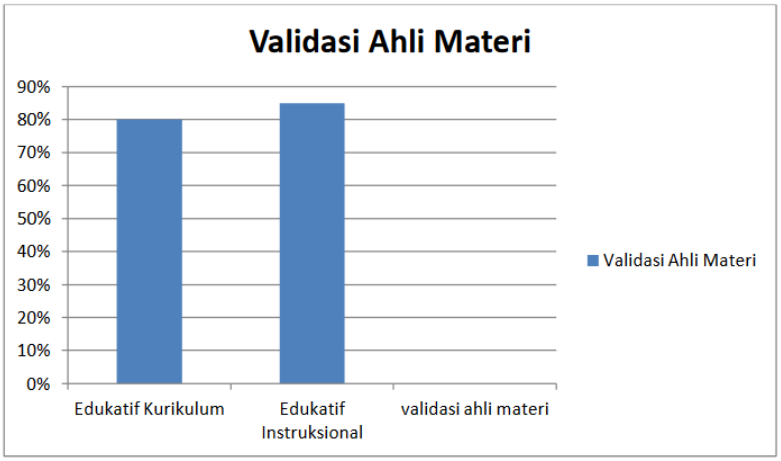

KLIK
panah digulungan surat


KLIK
materi yang dipilih
HALAMAN UTAMA
MATERI
STATIS
DINAMIS
KOMPETENSI
SIMULASI
TES PEMAHAMAN
Fluida adalah zat yang dapat mengalir misalnya zat cair dan gas.
Fluida dapat digolongkan dalam dua macam yaitu
* Fluida Statis (fluida tak bergerak)
* Fluida Dinamis (fluida bergerak)

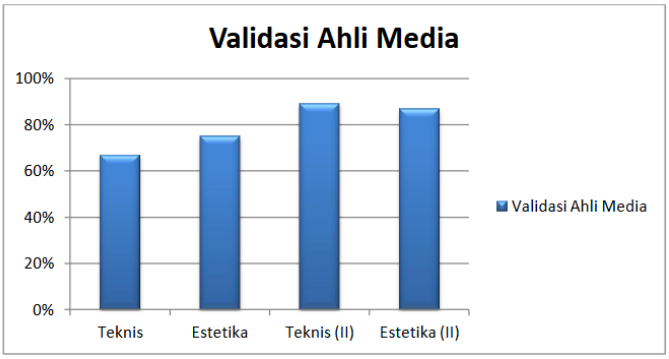

HALAMAN DEPAN
DAFTAR ISI
SIMULASI
TES PEMAHAMAN
Venturimeter dengan Manometer
Venturimeter ini menggunakan manometer yang berisi zat cair lain, yaitu zat cair yang memiliki massa jenis ρ'.
Keterangan :
v1 = Kelajuan aliran pada pipa 1 (m/s)
v2 = Kelajuan aliran pada pipa 2 (m/s)
g = Percepatan gravitasi (m/s²)
h = Selisih ketinggian (m)
A1 = Luas penampang pipa 1 (m²)
A2 = Luas penampang pipa 2 (m²)
ρ' = massa jenis zat cair pada manometer (kg/m³)
ρ = massa jenis zat cair pada venturimeter (kg/m³)
A1
A2
h
Manometer



C. Media Validation (Material Expert Test and Media Expert Test)
In validating the results of this initial product, the researcher conducts discussions, assessments and evaluations by material experts and media experts. development of instructional media and lecturers majoring in UNJ education curriculum and technology



Validation results in terms of material obtained an average score of all aspects of 82.5%. Based on the Likert scale, it was found that the quality of instructional media in terms of curriculum educative and instructional education was categorized as good. In the evaluation stage of Physics material, there were several suggestions for the development of instructional media, namely the concept needed to be improved and the translation was still like a book.



Based on the evaluation in terms of instructional media obtained an average score of all aspects of 88%. Based on the Likert scale obtained an assessment that the quality of

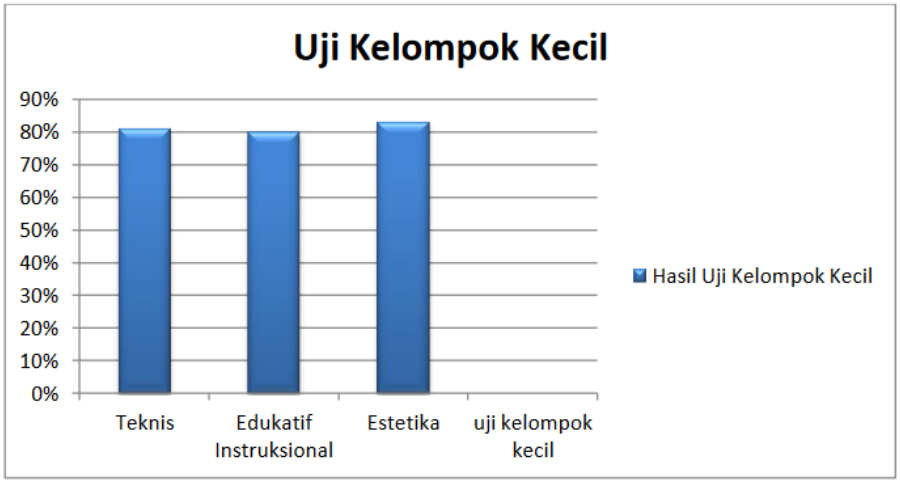
instructional media is considered good.

D. Revisions

After validating the results of the expert test of the material and the media and producing results that are already valid and reliable. However, there are still some inputs from each expert lecturer for the good of the results of the development of this media. as well as the color of the letters used, the number of sentences rather than pictures or animations, there are concepts that need to be improved and the translation is still like a book.

E. Small Group Test

Small group test on this media was conducted on 15 students. The results of the small group test questionnaire showed a value of 79%.

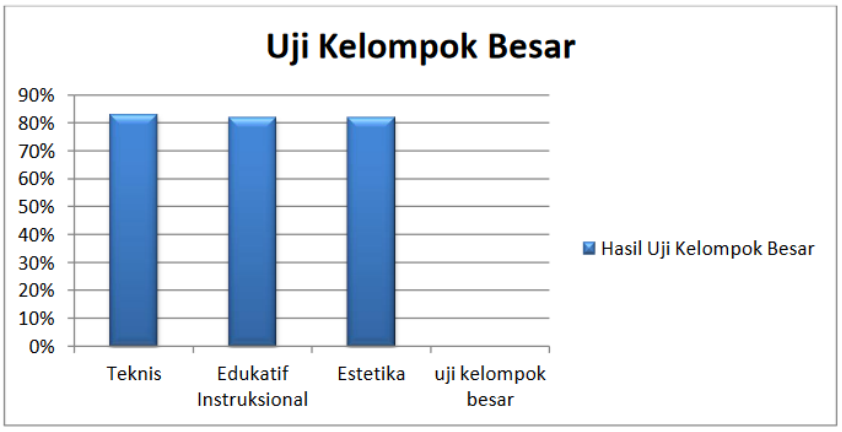


F. Product Revisions

From the results of this small group test, the media received a positive response. However, there was input related to the use of colors and fonts.

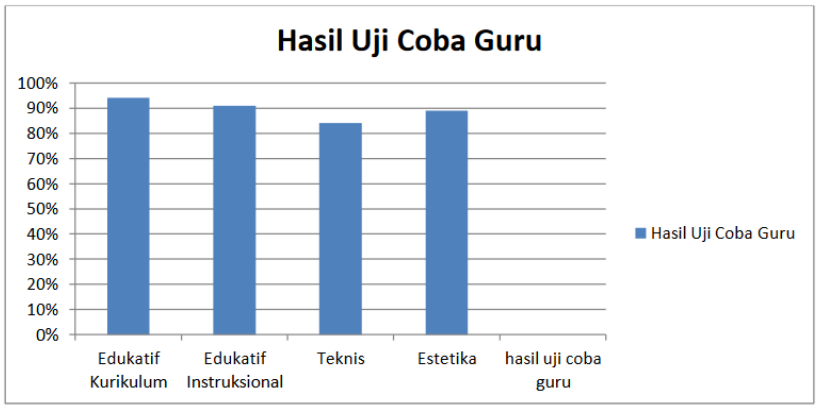
G. Large Group Test

Large group test respondents on this media were conducted on 26 students. The results of the large group test questionnaire showed a value of 82%. The interpretation of the validity of the large group test questionnaire was quite different from the interpretation of the validity of the small group test questionnaire. however this flash-based learning media has met the indicators of media feasibility and can be used in supporting teaching and learning activities in schools.



Trial Teacher of High School Physics

After being evaluated in terms of learning material and media then the learning media is tested on the High School Physics teacher which aims to find out whether the learning media developed are appropriate to the conditions at school and can be used in the field.



The results of teacher trials show a value of 89.5%. Which states that this learning media can very well be used to support learning in the classroom.

H. Final Products

Flash-based learning media products are made using Adobe Flash CS 5.0 software supported by Coreldraw X5. The development of flash-based learning media is based on analyzing the needs and characteristics of Static Fluid and Dynamic Fluid material so that a media is developed that combines elements of text, images, sound, animation and video to increase the number of senses used by students in learning activities. Therefore to support these elements developed media that includes menus as follows:

1.Menu material that is equipped with animation and video is expected to facilitate the student's flow of thinking in understanding fluid material

2.Menu example problems from previous material combined with images and which are combined with simple animations

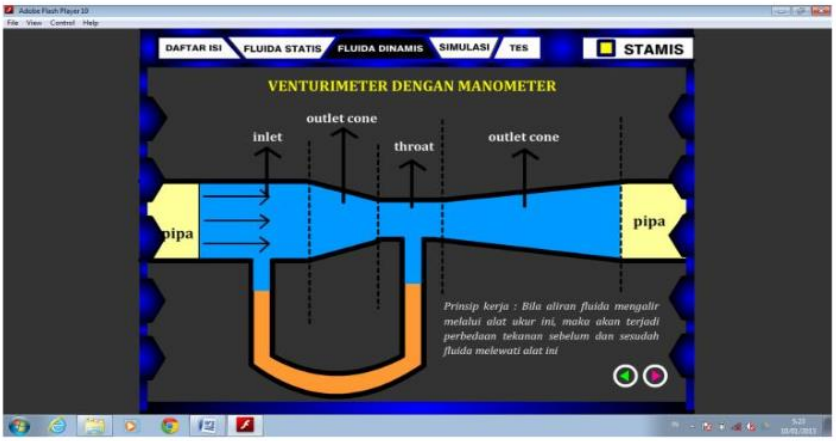
3. Simulation menu

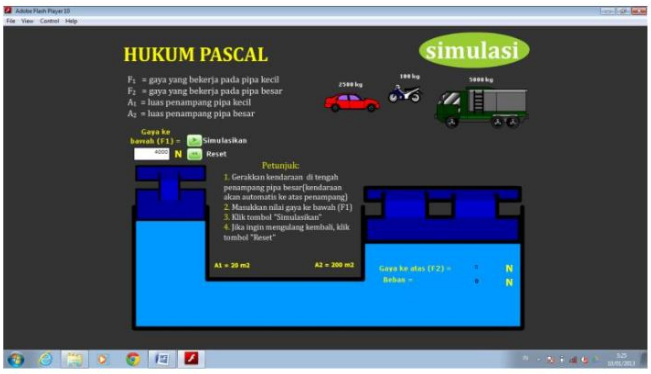
4.Menu test that is used as an evaluation of the explanation on the material menu.

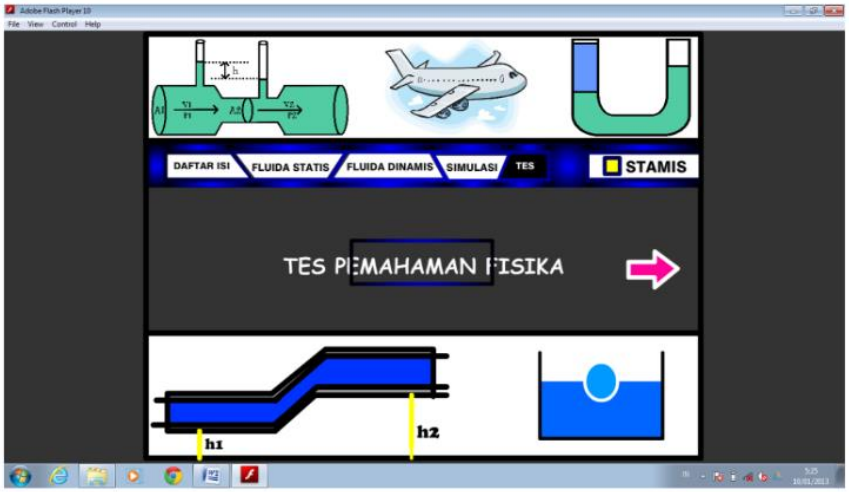
5.Menu about media, this menu describes the parties involved in making the design of flash-based learning media products.

This is the look of the final product


STAMIS
HALAMAN UTAMA
KOMPETENSI
SIMULASI
TES PEMAHAMAN
KLIK
materi yang dipilih
Fluida adalah zat yang dapat mengalir misalnya zat cair dan gas.
SUB-BAB
FLUIDA STATIS
FLUIDA DINAMIS


DAFTAR ISI
FLUIDA STATIS
FLUIDA DINAMIS
SIMULASI
TES
STAMIS
VENTURIMETER DENGAN MANOMETER
inlet
outlet cone
throat
outlet cone
pipa
pipa
Prinsip kerja : Bila aliran fluida mengalir melalui alat ukur ini, maka akan terjadi perbedaan tekanan sebelum dan sesudah fluida melewati alat ini


HUKUM PASCAL
simulasi
F1 = gaya yang bekerja pada pipa kecil
F2 = gaya yang bekerja pada pipa besar
A1 = luas penampang pipa kecil
A2 = luas penampang pipa besar
2500 kg
100 kg
5000 kg
Gaya ke bawah (F1) =
N
Simulasikan
Reset
Petunjuk:
1. Gerakkan kendaraan di tengah penampang pipa besar(kendaraan akan automatis ke atas penampang)
2. Masukkan nilai gaya ke bawah (F1)
3. Klik tombol "Simulasikan"
4. Jika ingin mengulang kembali, klik tombol "Reset"
A1 = 20 m2
A2 = 200 m2
Gaya ke atas (F2) =
Beban =
N
N



Product Discussion

Flashini-based learning media products are made using Adobe Flash CS 5.0 software. The development of flash-based learning media is based on an analysis of the needs and characteristics of Static and Dynamic Fluid material so that a media that integrates elements of text, images, sound, animation and video is developed to increase the number of senses used by students in learning activities.

In the Nugent (1982) study, the highest level of learning was obtained when students received a presentation of information through a combination of text and images (varied multimedia) or a combination audio and images (multimedia varies) compared to the same content presented via text only (monomedia), audio only (monomedia) or image only (monomedia).

Product test results show good results according to the results of the assessment of the quality of learning media using flash-based animation by media experts, material experts, students, and teachers based on the score interpretation criteria for the Likert scale. This can be seen from the results of the interpretation of the material expert test scores in terms of educative curriculum obtained by 80% (good category) and in terms of instructional education by 85%. (categorically very good) so as to obtain an average score of 82.5% (very good category), it's just that there are a few suggestions for the development of instructional media, namely the concept needs to be improved and the translation is still like a book. And based on evaluation in terms of instructional media if viewed from a technical point of view obtained 89% (very good category) and in terms of aesthetics by 87% (very good category) so that an average score of all aspects was obtained at 88% (very good category). Small group test on this media was carried out to class XII students with 15 respondents. Researchers using respondents with a higher intellectual level than respondents in the large group test and with more learning experience than large group respondents intended to obtain suggestions for the good of this media development. After revising some of the inputs from the results of the validation of the media experts and the results of the validation of the material experts, the research was conducted again by conducting a small group test. The results of the small group test questionnaire when viewed from a technical point of view were 81% (very good category), instructional terms were 77% (good category) and 79% (aesthetically good), so an average score of 79% was obtained. (good category). From the results of this small group test, the media received a positive response. But there is input related to the use of colors and font types. Therefore given some additional colors and changing the font used during the 2nd revision process was carried out. After the 2nd

revision was carried out, the research was carried out again by conducting a large group test and evaluating with several teachers in the school. Large group testing was carried out with grade II students totaling 26 people as the subject of his research. If viewed from the results of the large group test questionnaire when viewed from a technical point of view obtained 83% value (very good category), in terms of instructional educative values obtained 82% (very good category) and in terms of aesthetics obtained a value of 82% (very good category), so that the average value showed 82% (very good category). While the results of the teacher evaluation test questionnaire when viewed in terms of educational curriculum showed a value of 93% (very good category), in terms of instructional education obtained 92% (very good category), from a technical point of view was obtained 95% and in terms of aesthetics showed a value of 90% (very good category, so that an average value of 92.5% (very good category) is obtained Based on the value obtained during the study, this flash-based learning media product can be used as an alternative learning media that supports physics learning in the classroom

4. CONCLUSION

Product test results show good results according to the results of the assessment of the quality of learning media using flash-based animation by media experts, material experts, students, and teachers based on the score interpretation criteria for the Likert scale. This can be seen from the results of the interpretation of the material expert test scores obtained an average score of all aspects in terms of educational curriculum and instructional education of 82.5%. including very good categories .. And based on evaluation in terms of instructional media obtained an average score of all aspects of 88% including the very good category. If seen from the results of the large group test questionnaire showed a value of 82% and the results of the teacher evaluation test questionnaire showed a value of 89.5% then this flash-based learning media product can be used as an alternative learning medium that supports physics learning in the classroom. Presentation of media content consists of several menus, such as material that is equipped with animations and videos, examples of questions combined with simple animations, simulations, and tests. So that the developed media product combines elements of text, images, sound and animation aimed at increasing understanding of static fluid and dynamic fluid material

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