Jurnal Phi

Article Type: *orginial research*

# DEVELOPMENT OF INTERACTIVE PHYSICS LEARNING VIDEOS BASED ON *SCIENCE ENVIRONMENT TECHNOLOGY SOCIETY* AT THE HIGH SCHOOL LEVEL

**Cut Rahma Julia[1], Misbahul Jannah [2], Rusydi [3] , Abdul Hamid[4]**

[1,2 & 3] Physics Education Study Program, Faculty of Tarbiyah and Teacher Training, Ar-Raniry State Islamic University, Banda Aceh
[4] SMK Lubuk Buntar, Serdang, Kedah Malaysia

*Corresponding e-mail*: cutrahmajulia11@gmail.com

**KEYWORDS:**
Learning Videos, Interactive Physics, *Science Environtment Technology Society*

Accepted: 09 July 2024
Revised: 23 July 2024
Published: 23 July 2024

**ABSTRACT.** This research is motivated by the use of learning methods that are still monotonous and uninteresting, the discussion of one of the physics materials that is difficult for students to understand, namely static fluid materials. This results in students having difficulty understanding the concepts and equations contained in static fluid materials. To overcome this problem, an interactive physics learning video based on *the Science Environment Technology Society* (SETS) was developed in order to provide students with an understanding of static fluid materials and become a digital media that can be used in the long term because it is flexible so that it can be used anywhere to repeat static fluid materials. The objectives of this research are: (1) To design interactive physics learning videos based on SETS at the high school/MA level; (2) To find out the feasibility of interactive physics learning videos based on SETS at the high school/MA level and (3) To find out the practicality of interactive physics learning videos based on SETS at the high school/MA level. This study uses *the Research and Development* (R&D) method based on the Alessi and Trollip development model. In this study, a product was produced in the form of interactive physics learning videos based on SETS. The results of the study show that SETS-based interactive physics learning videos have met the category of very feasible. This is determined based on the results of validation from media experts with a percentage of 90.4% included in the "very feasible" criteria and the validation results from material experts obtained a percentage of 91.2% with the "very feasible" criteria and user validation results with a percentage of 93.2% with the "very feasible" criteria. The results of the practicality assessment by students received a percentage of 95% with the category "very practical" used in the learning process. Thus, it can be concluded that SETS-based learning videos can be used in the learning process.

## 1. Introduction

The achievement of student learning outcomes in science subjects, including physics, in Indonesia is still very concerning. The essence of physics learning should be a tool to train students to master knowledge, concepts, and also physics principles. Physics learning does not only focus on mastery of concepts, but also involves four elements, namely content or product, process or method, attitude, and technology. Therefore, students' understanding of physics becomes holistic. The study shows the need for serious efforts to improve the science education process, including physics education at various levels. These efforts can be directed to various focuses, including the quality of teachers, the quality of learning and learning technology. On this basis, physics learning does not only dwell on theory, but rather on how a student can think globally in solving problems, both at the local, national, and international levels, according to the level of learning ability. In addition, it is hoped that students can re-explain concepts in their own words that are easier to understand and apply the learning in daily life.

Physics learning activities are more about pursuing the fulfillment of KKM targets and the maximum learning outcomes that are forced. For example, when students are not paid attention to what difficulties they face, but high intellectual values are required. Another circumstance is the use of inappropriate physics learning methods by teachers because they rely too much on learning methods that still tend to be informative so that physics teaching becomes less effective because students acquire physics knowledge that is more nominal than functional. In fact, with the use of sensors, students based on student experience, will be able to more easily understand abstract concepts and manipulate symbols, think logically, and others.

The use of learning through the five senses can be done with a SETS-based learning model. SETS, which stands for *Science Environment Technology Society,* will further direct students to interact directly with the environment, technology, and society. With the SETS learning approach that relates 4 (four) elements of SETS, namely science, environment, technology and society in a learning material and does not forget to relate it to daily life.

## 2. Research Methods

This research is a development research or called *Research and Development* (R&D) which means producing a certain product by testing the effectiveness/feasibility of the product. The product that will be produced in this study is in the form of interactive physics learning videos based on *Science Environment Tecnology Society* at the high school/MA level. This research uses **the Alessi & trollip** model which consists of 3 (three) steps, namely planning, design and development.

## 3. Results and Discussion

### *3.1 Research Results*

**a. Development Design of Science Environment Based Learning Videos *Tecnology Society***

The result of this learning video development research is an interactive physics learning video product based on *Science Environment Technology Society* at the high school/MA level, which aims to make it easier for students to understand abstract learning materials and is also expected to be able to understand well in visualizing the form of interactive physics learning videos based on *Science Environment Technology Society* (SETS) in daily life. The development of this learning video uses the Alessi and Trollip development model which has 3 stages, namely: The first is the Planning stage, then there is the Design stage, and the last is the Development stage.

The design of this interactive physics learning video based on the Science Environment Technology Society was carried out in three stages, namely the planning stage, the design stage, at this stage there is the creation of the necessary description in the learning video to be used. The animation in this learning video uses the Zepeto application and then to remove the green background from the Zepeto application, the researcher used Web Remove Background, then to created background in the video and input the animation that has been made, the researcher uses the Canva application, and the last one at the development stage, at this stage the researcher moves the material used in word form so that it is not damaged when copied to the Canva application, then after recording the sound using a mobile phone and the image is made into a video form, then the researcher combines audio and video using the application CapCut and at the end add a backsound with the CapCut application so that this learning video does not make students feel bored while watching the learning video.

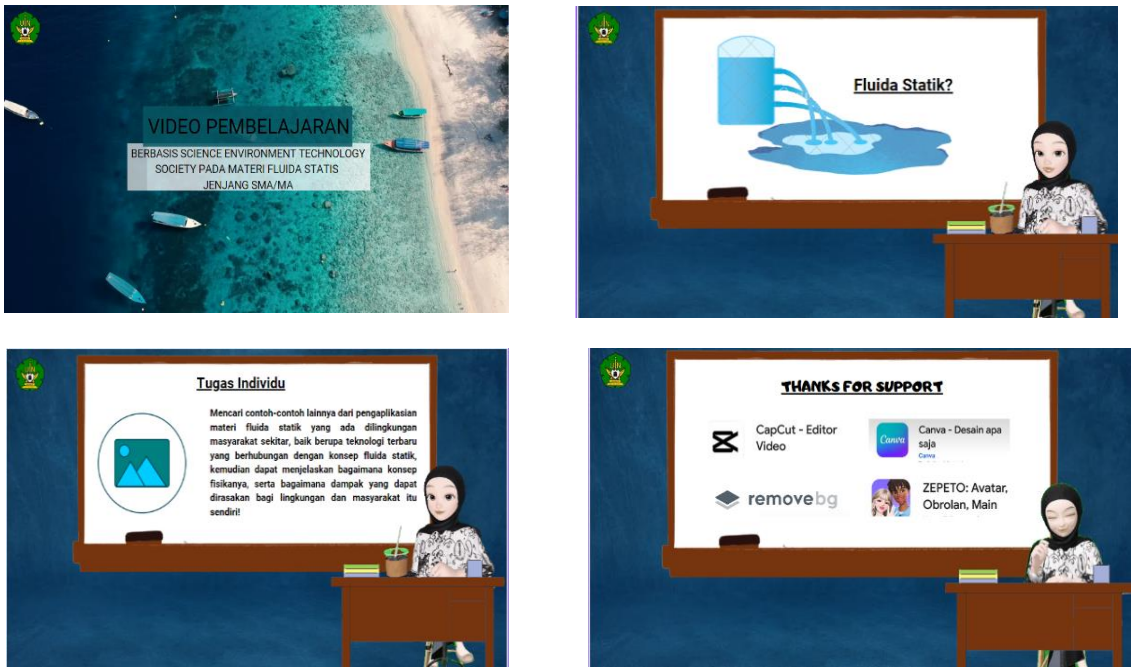


**Figure 1.** Video Product Overview

**b. Feasibility of Science Environment Technology *Society-Based Interactive Physics Learning Video Products***

The product feasibility of this learning video can be determined based on the results of alpha testing and beta testing. Validation of the product feasibility test developed to 3 media experts, 4 material experts, and 10 students. This Product Validation aims to get a feasibility assessment and advice from experts in their fields, so that the learning videos developed have good quality and are suitable for use in the future.

**1) Uji Alfa (alpha test)**

**a) Feasibility of Science Environment Technology Society-Based Interactive Physics Learning Video Products by Media Experts**

Based on the data from the validation results of media experts, the learning video media as a whole received a score of 90.4% with very feasible eligibility criteria. So that the learning videos based on the Science Environment Technology Society that are developed can be used as a physics learning medium in schools. If viewed from the aspect of assessment, the highest percentage of feasibility is found in the aspect of assessing the quality of engineering with a score of 93.2% with very feasible criteria, then in the aspect of assessing the feasibility of the design gets a lower percentage of technical quality with a score of 90% with very feasible criteria.

**b) Feasibility of Interactive Physics Learning Videos Based on Science Environment Technology Society by Material Experts**

The assessment by material experts aims to determine the feasibility of learning videos in terms of material and language. The subject matter experts consisted of three lecturers and one physics teacher, namely: (1) CRM, (2) FA, and (3) Z, who is a lecturer in Physics Education, Faculty of Tarbiyah and Teacher Training, Ar-raniry State Islamic University, (4) BT,. who is a teacher of Physics at SMA N Keuluang.

Based on the data from the assessment results of the subject matter experts, it was found that the learning videos based on *the Science Environment Technology Society* as a whole from the aspects that were assessed received very feasible criteria with a score of 91.2%. Thus, the Science Environment Technology Society-based learning videos developed can be used by users (teachers and students) in the learning process. Of all aspects of assessment, the feasibility aspect of the content has the highest validity with a score of 93.2% classified as a very feasible criterion. Furthermore, in the aspect of assessing the depth of concept, the criteria are very feasible with a lower score of 91%. Then the last is the aspect of assessment free from conceptual errors, getting very feasible criteria with a score lower than the depth of concept aspect, which is 88.6%. Based on the results of expert validation, learning video materials based on *the Science Environment Technology Society* can be used with some suggestions and revisions first.

**Table 1.** Data on the Percentage of Validators of Media Experts and Material Experts

| It | Validator | Percentage | Criterion |
|---|---|---|---|
| 1 | Ahli Media | 90,4% | Highly Worthy |
| 2 | Material Expert | 91,2% | Highly Worthy |
| | Average Total Score | 91% | Highly Worthy |

**2) Feasibility of Science Environment Technology Society-based *interactive physics learning videos* by Users in the Beta Test stage**

The beta test is carried out after the revision stage is completed, this beta test stage is the second stage of testing carried out to find out the response from users to the practicality of the product developed. The product users in question at this stage are 10 students of class X1 Science 2 at Keuluang State High School. Based on the results of the validation data by the user, the following results can be obtained:

**Table 2**. User Percentage Data

| No | Statement | Validator | | | | | | | | | | Score Total | Σ per Aspect | Rata-rata | Percentage | Eligibility Criteria |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | | | | |
| 1 | Learning videos can help students in understanding static fluid materials | 4 | 4 | 5 | 4 | 5 | 4 | 5 | 5 | 4 | 4 | 44 | 280 | 4,66 | 93,2% | Highly Worthy |
| 2 | Materials that delivered in accordance with daily life | 5 | 4 | 5 | 4 | 5 | 5 | 5 | 5 | 4 | 5 | 47 | | | | |
| 3 | The narration in the video is able to explain the concept of static fluids | 5 | 5 | 4 | 4 | 5 | 5 | 4 | 5 | 4 | 4 | 45 | | | | |
| 4 | Engaging learning videos | 5 | 4 | 5 | 5 | 5 | 4 | 5 | 5 | 5 | 5 | 48 | | | | |
| 5 | The animations and videos presented are able to convey concepts that abstract become real | 4 | 5 | 5 | 5 | 4 | 5 | 5 | 4 | 5 | 5 | 47 | | | | |
| 6 | Learning videos can be used as learning media in addition to printed books | 5 | 5 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 49 | | | | |
| **Total Score** | | **28** | **27** | **28** | **27** | **29** | **28** | **29** | **29** | **27** | **28** | **280** | **280** | **4,66** | **93,2%** | **Highly Worthy** |
| **Sum Average of all scores** | | | | | | | | | | | | | | | | |

The results of the assessment by students of the Science Environment Technology *Society-based learning video product* obtained an average score of 4.66 with a percentage of 93.2% (very feasible). With the existence of Science *Environment Technology Society-based* learning videos on abstract static fluid physics material, it can be visualized so that students can see directly through the video, not only imagining the teacher's explanation, so that the learning process will attract more students' attention and will reduce boredom and monotony in the learning process in the classroom. So that with the existence of Interactive physics learning videos based on *the Science Environment Technology Society* can make an abstract concept concrete because it is displayed in detail so that it is easy for students to observe.

### *3.2 Research Discussion*

The development of interactive physics learning videos based on *the Science Environment Technology Society* was developed using the Alessi and Trollip development model. This development model consists of three stages, namely: (1) Planning, (2) Design, and (3) Development. From all these stages, a final product is produced in the form of an interactive physics learning video based on *the Science Environment Technology Society*.

**a) Planning stage**

At this stage, the researcher plans and determines the goals and directions for the development of learning videos based on *the Science Environment Technology Society*. The steps that must be taken at this planning stage are: **(1) Define *the scope***, namely determining the initial observation point at SMA N Keuluang, conducting observations, interviews, and distributing a needs analysis questionnaire to students and physics teachers, to find out the material that is difficult for students to understand, so that from these results it produces a conclusion from all The activities that have been carried out are about the obstacles faced by students in the teaching and learning process and the teaching materials that will be developed by the researcher. **(2). Identify *learner characteristics***, regarding the media to be developed has advantages over other media when used by students, because at the time of observation students use the media provided by the teacher in the form of student worksheets (LKPD), recording material from physics printed books, and a set of practice questions that train students in answering questions. From this characteristic, it is in accordance with the response caused to students so that to be able to facilitate the learning process that takes place and can achieve a learning goal, students choose video media as an additional media in the learning process. Video-based media is a media that can convey material with audio and visual elements that contain concepts and procedures to help understand a learning material.

As for the last stage, namely **(3) Determine and collect *resources***, it is an activity to collect learning resources that students use in the learning process as a material reference in media development. From the results of discussions with students and physics teachers, it aims to get solutions and be able to solve problems from the results of interviews that have been conducted, thus encouraging the emergence of ideas and the development of learning video products based on *the Science Environment Technology Society*, namely on static fluids.

**b) Design stage**

The design stage is carried out in stages based on the development process. This step begins with **(1) Developing *initial content ideas*,** which includes the formulation of basic competencies, indicators of competency achievement, learning objectives, formulating materials, sample questions, designing the initial form of media and compiling media feasibility assessment instruments, materials, and student response questionnaires. The initial design of the media is carried out gradually and systematically adjusted to the components that have been prepared at the planning stage. At this design stage, the researcher also determined what software would

be used to develop *the Science Environment Technology Society-based* learning video product , such as the Canva application used to design materials related to shapes, CapCut, Zepeto and Web Remove Background.

The next step is (**2) Conduct task and concept analysis,** the goal is to make the description of the material contained in the learning video developed systematically so that it is easy for students to understand. The presentation of neat and structured material will make it easier for students to understand the material well, especially about concepts. Then the last stage with **(3) Create flowchart *and* storyboards,** so that when this learning video is made it can be more structured, starting from which one first, then what the content of the video is, and where the end of this learning video is going.

**c) Stages of Product Development**

The development stage is the last stage in the process of making a product in the form of a learning video. At the development stage, implementation is carried out from the design stage. In the development stage carried out by the researcher, namely the process of making learning videos based on *the Science Environment Technology Society*, video creation is carried out using the Canva supporting application which is used to design material related to shapes, the CapCut application to combine videos, then the Zepeto application to create animations and Web Remove Background which is used to remove the green background on the animation created from the previous Zepeto app.

### *3.3 Feasibility Test of Science Environment Technology Society-Based Interactive Physics Learning Video Products*

The feasibility assessment of the learning video product was carried out by six lecturers of UIN Ar-Raniry Banda Aceh and one physics teacher of Keuluang State High School and 10 students of class XI Science 2 of Keuluang State High School. The data from the assessment results is in the form of scores which are then converted into 5 criteria, namely: Very feasible, feasible, Moderately feasible, less feasible and not feasible. The value obtained is also processed as a percentage of the eligibility criteria. Media experts assess the development of learning videos in two aspects, namely video display and video packaging. For material experts, they assess the development of learning videos in 3 aspects, namely the feasibility of content or material, the feasibility of presentation, and the feasibility of language.

The results of the assessment obtained from media experts on several aspects of the learning video are shown in the graph below:

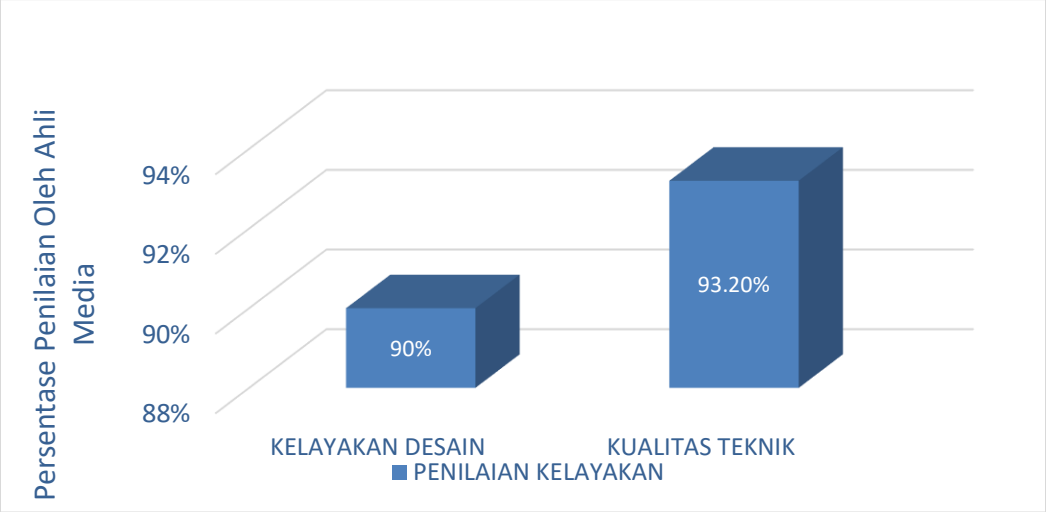


**Figure 2.** Rating graph by media experts

Analysis of data obtained from media experts shows that in the feasibility of the design obtained an average score of 4.5 and got a feasibility percentage of 90% and in the technical quality got an average score of 4.66 and got a feasibility percentage of 93.20%. The feasibility level of this learning video that is developed as a whole is included in the category of very feasible. Thus, the assessment of media experts on the feasibility of videos based on the Science Environment Technology Society developed by the researcher shows that the media produced gets an overall percentage of 90.54% and can be used as a learning medium that can support the teaching and learning process.

The analysis is in line with the research that has been conducted by Nabila Amalia Dewi, Hadi Nasbey, and umiyatin with the title "Development of I-Sets-based learning videos assisted by Powtoon on thermodynamics material class XI" which received a feasibility percentage value of 93.33% which is included in the very feasible criteria. The results of the percentage assessment by material experts on the development of learning video media based on *the Science Environment Technology Society* can be seen in the following graph:

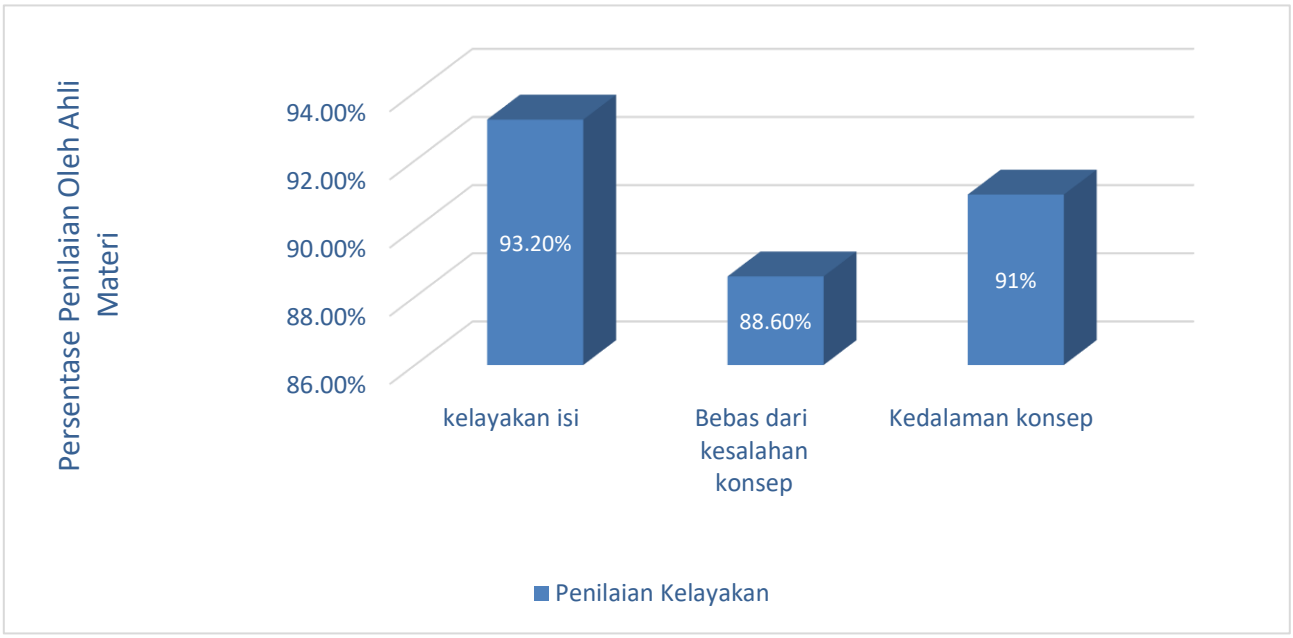


**Figure 3.** Assessment charts by material experts

The graph above shows that the data generated from the material experts shows that in the feasibility of the content gets an average score of 4.66 and gets a feasibility percentage of 93.20% classified as very feasible, while in the Free from Concept Error aspect gets an average score of 4.43 and gets a feasibility percentage of 88.60 %t and is classified as very feasible, and in the Depth of concept got an average score of 4.55 and got a feasibility percentage of 91% and was classified as very feasible. The feasibility level of the learning videos developed as a whole is included in the category of very worthy of an overall percentage of 91.2% and classified as a very feasible category. With this assessment Material experts on the feasibility of the video developed by the researcher indicated that the resulting media can be used as a learning medium.

### *3.4 Feasibility of Science Environment Technology Society-based interactive physics learning videos by Users at the Beta Test stage*

The results of the assessment by students of the Science Environment Technology *Society-based learning video products* can be seen in the graph in Table 4.6. Based on the analysis of the data on the results of student validation, an average score of 4.66 was obtained with a percentage of 93.2% (very feasible). With the existence of *Science Environment Technology Society-based* learning videos on abstract static fluid physics material, it can be visualized so that students can see directly through the video, not only imagining the teacher's explanation, so that the learning process will attract more students' attention and will reduce boredom and monotony in the learning process in the classroom. So that with the existence of interactive physics learning videos based on *the Science Environment Technology Society*, an abstract concept can be made concrete because it is displayed in detail so that it is easy for students to observe.

### *3.5 Practicality of Interactive Physics Learning Videos based on Science Environment Technology Society*

The results of the practical tests that have been carried out produce data obtained through the percentage of student practicality questionnaire assessments. The percentage of the rating can be seen in the following graphic image:

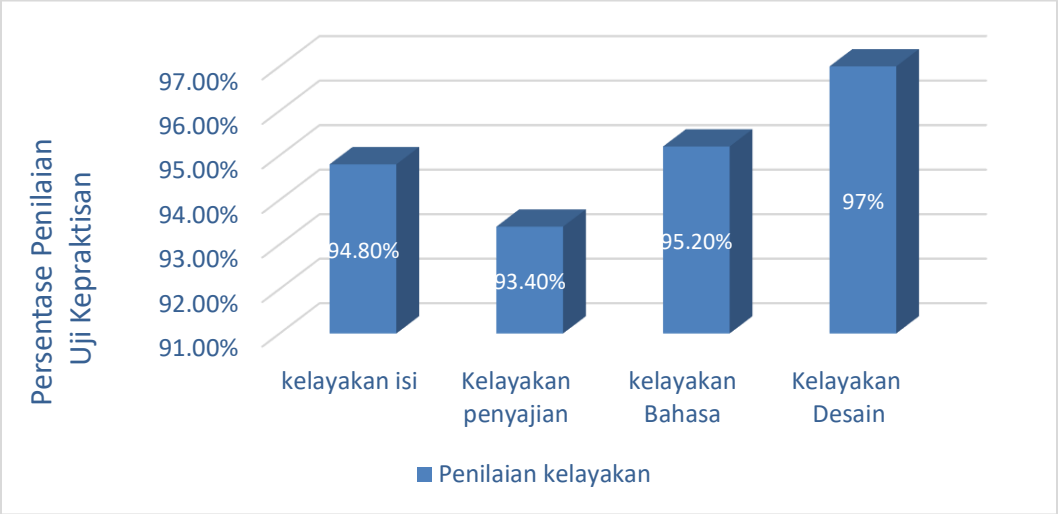


**Figure 4.** User Practicality Test Assessment Graph

From the graph above, it shows that the data obtained from the practicality test for students on the feasibility of the content shows a feasibility percentage of 94.80%, this percentage shows that it is very feasible, while for the feasibility of presentation it gets a percentage of 93.40%, this percentage also shows a very decent percentage, while in the feasibility of language it shows a percentage of 95.20% and gets a percentage of very feasible and on the feasibility of design it gets a percentage of 97% classified as a very decent percentage. For this percentage, it can be interpreted that the videos produced in this development can be used for students in the learning process.

This research is in line with the previous research that has been conducted by Anggi Angelia. With the title "Development of Physics Module with *a Science Environment, Technology, And Society* (SETS) Approach for class viii junior high school motion and style material". From the results of the practicality test, the results were obtained that the physics module with the SETS approach by students with a practicality score of 92.6 with the category of very practical, then practical by educators obtained a result of 97.14 with the category of very practical. The physics module with the SETS approach of motion and style materials for grade VIII students is in demand by students and is practically used by educators. This shows that interactive physics learning videos based on *the Science Environment Technology Society* can be categorized as being able to be used to help students in the learning process.

## 4. Conclusion

Based on the results of the development of learning videos based on *the Science Environment Technology Society*, it can be concluded that:

1. The design of interactive physics learning videos based on *the Science Environment Technology Society* is carried out in three stages, namely **the planning stage**, **the design stage**, at this stage there is the creation of the necessary images in the learning video to be used. The animation in this learning video uses the Zepeto application then to remove the green background from the Zepeto application using Web Remove Background, then to create a background and insert the animation that has been made, the researcher uses the Canva application, and finally **the development** stage, at this stage the researcher moves the material used in word form so that it is not damaged when copied to the Canva application, then after recording the sound using a mobile phone and the image is made into a video form, then the researcher combines audio and video using the CapCut application and at the end adds backsound with the CapCut application so that this learning video does not make students feel bored while watching the video learning.
2. The assessment of the feasibility of video products in learning videos based on *the Science Environment Technology Society* according to the results obtained by media experts received a percentage of 90.4%, with a very feasible category and then material experts received a percentage of 91.2% with a very feasible category. And for user validation at the beta test stage, it got a percentage of 93.2% with a very decent category. According to media experts, material experts, and users of learning videos are worth using.

The practicality test that has been carried out on students at SMA N Keuluang, Aceh Jaya shows that the percentage result of 95% is classified as very practical and can be used as a learning medium

## Thank You

Thank you to the supervisor Mrs. Misbahul Jannah P.hD, M,Pd. And Mr.: Rusydi, S.T., M.Pd. And all parties who have helped in completing this article.

## Author Engagement

CRJ made the research design and data collection, MJ and R revised the things that were considered inappropriate in the study.

## Bibliography

Abdul Azis., et al. 2020. *Physics of Static Fluid Module.* (Surabaya: PPG Physics batch 2 Catholic University

Alessi & Trollip, 2001. Multimedia for Learning: Methods and Development. (Massachussets: A Person Education), h. 407-413.

Anggi Angelia. 2017. *Development of Physics Module with Science Environment, Technology, And Society (SETS) Approach for Class VIII Junior High School Motion and Force Materials.* (Padang UIN Imam Bonjol) p. 19

I Gusti Putu Sudiarta and I Wayan Sadra, 2016. "*The Effect of the Blende Learning Model Assisted by Animated Videos on Students' Problem-Solving Skills and Concept Understanding*". Journal of Education and Teaching. Vol. 49, No. 2, p. 53.

Ismalik Perwira Admadja and Eko Marpanaji, 2016. "*Multimedia Development of Individual Practice Learning Basic Instruments for Vocational School Students in the Field of Karawitan Expertise*". Journal of Vocational Education. Vol. 6, No. 2, p. 176

Nabila Amalia Dewi, Hadi Nasbey. 2023. *"Development of learning videos based on I-Sets assisted by Powtoon on class XI thermodynamics material". Proceedings of the National Seminar on Physics (E-Journal),* Vol XI. h 330

Nabila Amalia Dewi, Hadi Nasbey. 2023. "Development of learning videos based on I-Sets assisted by Powtoon on class XI thermodynamics material". Proceedings of the National Seminar on Physics (E-Journal), Vol XI. H 330

Syarifah Hafizah, 2020. "*The Use and Development of Videos in Physics Learning*", Journal of Physics Education, Vol. VIII. No.2. September. H. 226

Wisnu Ady Prasetya, Ignatius I Wayan Suwatra and Luh Putu Putrini Mahadewi, 2021. "*Animation Video Development Learning in Mathematics Subjects*". *Journal of Educational Development Research,* Vol. 5, No. 1, p.61.