JIPF (JURNAL ILMU PENDIDIKAN FISIKA)
p-ISSN: 2477-5959 | e-ISSN: 2477-8451 *Vol. 8 No. 2, May 2023, Page 154-167*

Validity and Practicality of the STEM-Critical Thinking Video in Science Education: Hydraulic Lift

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Received: September 25th, 2022. Revised: December 27th, 2022. Accepted: January 31st, 2023

Keywords **:**
Learning Media; STEM Activity; Science Education

ABSTRACT
This study aims to determine the validity, practicality and students' responses to video experiments oriented towards STEM activities and critical thinking. The research problem is that the implementation of experimental activities in schools is still very rarely used because, limited learning time and the learning that is carried out has not been able to train students' critical thinking skills. The research method used is Research and Development, the research design uses the Plomp model which consists of three stages, namely the preliminary stage, the prototyping stage and ends with the assessment stage, but this research is limited to the prototyping stage. The instruments used to collect data were validity sheets (26 questions), practicality sheets (18 questions) and interview sheets (5 questions). VHL was analyzed descriptively and quantitatively based on the results of validity tests, practicality tests and interviews. The results of the validity test from the three expert reviewers showed that VHL obtained a score of 0.92 with a very high validity category. In terms of practicality, the VHL scores 98% (very practical). In terms of students' responses to VHL, the majority of students stated that they were happy, interested and enthusiastic about learning to use VHL. Therefore, VHL with the theme "Hydraulic Lift" is categorized as feasible and practical to help grade 8 students in practicing critical thinking skills on the concept of material pressure.

INTRODUCTION

One of the important roles of human resource development is the quality of education, education is a life process that allows each individual to grow and develop [1]. Currently the world has entered the 21st century, known as the industrial revolution 4.0, making the world an era of openness or globalization [2]. The era of globalization has had many impacts on many aspects of life, including the requirements of education management, developing human resources in education can create comprehensive skills called 21st century skills [3].

In the 21st century, the existence of information and communication technology at life contributes to development of the world. Technology can turn a world into a geofence, making it easier for us to know what is happening in the world today [4]. All aspects of life are associated with technology to make life easier, but not all aspects can run well, such as the education aspect of the Indonesian state that has not utilized technology. The quality of training is still low and performance is still below average, another problem is a learning approach is still dominant by the role of the teacher (teacher orientation) [5].

Science and technology are experiencing rapid development today, so to keep up with world developments, we must consider critical thinking skills [6]. Based on the results of the TIMSS (International Research Trends in Mathematics and Science) and PISA (International Student Assessment Program) studies, it shows that Indonesia's ability to compete internationally in mathematics, studies, science, and reading comprehension as well as skills to solve real-world problems is still low [7]. The problem of critical thinking skills is of particular concern in education, because the low level of ability to think critically of students makes the learning process less effective, interests, talents, and potential of students cannot develop [8].

Curriculum 2013 in particular Permendikbud No. 22 regulates the Education Standard Procedure on graduation criteria. With respect to No. 23 Permendikbud 2016 namely the standard of assessment, the learning process must cover 3 aspects, namely "attitudes, knowledge and skills". In accordance with these rules, the assessment of student achievement must include "attitudes, knowledge and skills" carried out in a balanced manner.

Science based on natural phenomena is science [9]. Science is all knowledge about objects and phenomena from nature that is obtained through research and experimentation, through the application of mathematical reasoning and data analysis on natural phenomena. Learning is used based on concepts, principles and facts, from scientifically verified observations and data. Supporting activities in science learning are very much needed, for the science learning process in schools [10]. Science practicums and experiments in the laboratory can be carried out as a support for science learning, because science learning is carried out scientifically. Integrated science subjects, especially physics, are not the same as other subjects, physics requires more practice and experimental activities [11]. Practical activities in the laboratory can be carried out in the science learning method because, it is more effective in providing scientific knowledge and research, especially physics, in obtaining technical skills in observing these activities can increase students' creativity and scientific attitude [9].

Substance pressure material is the main material taught in SMP science subjects. This material is taught at the junior high school level in class VIII semester II (two). This material contains concepts that are taught theoretically and experimentally. However, based on the results of observations of students at SMP Negeri 2 Enam Lingkung, it shows that students still have difficulty understanding the substance pressure material because they think the material is difficult. The factors that make the material difficult are because it uses many formulas, uses mathematical equations, does many questions, and is limited in time during the Covid-19 learning process [12]. besides that in this material there are also calculations and practical activities so that, students must understand and practice a lot in order to achieve learning objectives, according to the demands of the 2013 curriculum [13].

One of the keys to success in the learning process is through the use of science and technology [14]. The substance pressure material has practical activities but, judging from the ideal conditions found by researchers, practicum activities are still rarely carried out like the problems described above. The STEM learning model is an integration “science, technology, engineering and mathematics” that has been proposed in the 2013 curriculum by following 21st century education. STEM learning can educate students to apply knowledge, solve problems related to the environment and technology [15].

The use of interactive and interesting learning media can maximize learning [16]. Using learning media, making lessons attractive to the attention of students, teaching materials are more meaningful so that students can better understand the material, helping students in mastering and achieving the goals of the learning process [17]. Learning media in the form of a science experiment video included STEM-Critical Thinking with the material pressure of substances can be used as one of the solutions in overcoming problems that occur in schools. The developed video can provide assistance for students in improving their ability to think critically, helping students in science lessons, especially practical activities. So that using STEM-Critical Thinking oriented science experimental videos can help students in the learning process and have the ability to think critically.

Based on the results of observations at SMP Negeri 2 Enam Lingkung, it was found that the results were still dominant from students who failed in the science learning process. In the science learning process, the teacher does not train the ability to think critically from the students. In everyday life, teachers usually use demonstration and discussion methods. The implementation of science practicum in schools, especially for substance pressure material, rarely carries out practicum activities and practicum activities do not take place properly and effectively which causes the results achieved are not in accordance with the actual concept. The experimental video developed is expected to provide convenience for students, as well as learn independently and train students to think critically. Based on the problems that have arisen, research was conducted to test the validity, practicality test and student responses to VHL to see whether the VHL produced was valid, practical and feasible to use.

METHOD

The type of research used is research and development (R&D) which has the aim of developing a product which is then carried out by testing validity, practicality testing and interviews. The research model used is the Plomp model which was developed by Tjeerd Plomp Plomp which includes 3 stages, namely "preliminary research, prototyping stage and assessment phase" [18].

The STEM-Critical Thinking Video with Hydraulic Lift theme (VHL) development used a validity questionnaire and a practicality questionnaire which were assessed by three expert reviewers and eighth grade students of SMP Negeri 2 Enam Lingkung. The validity sheet is used to assess the experimental video developed by looking at the assessed aspects such as message clarity, clear video articulation, easy-to-understand language, statements of stand-alone components according to indicators, user friendly components according to indicators, visualization through media according to indicators, content representation components according to indicators, can be used classically or individually, have critical thinking aspects and STEM components according to indicators. The procedure and design for developing a science experiment VHL can be seen in Figure 1.

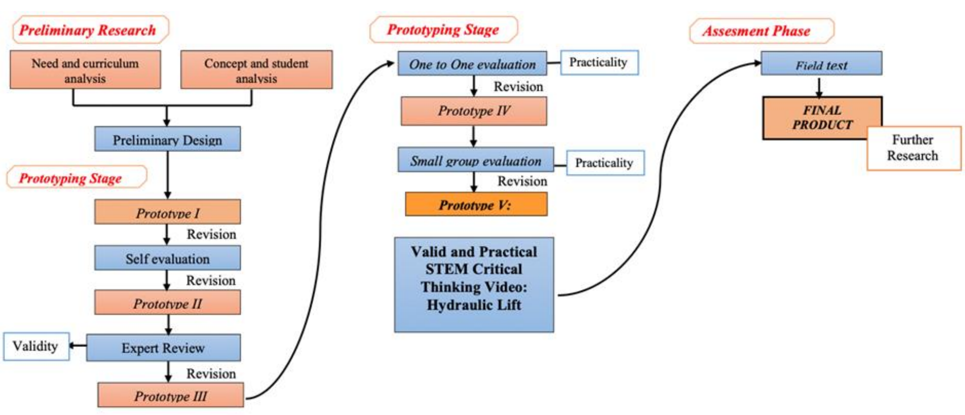


Fig 1. *Research Procedure Chart*

DOI: 10.26737/jipf.v8i2.3680

Figure 1 demonstrates three stages of developing the VHL: preliminary research, prototyping stage, and assessment phase. Based on the preliminary research stage, the design results at this stage will produce a prototype I (VHL). Self-evaluation is the stage for self-checking, revising and correcting errors found in prototype I. VHL revision were carried out, aiming to look back at the components on VHL. Then, the results of the self-evaluation stage were analyzed and then revised if there were errors so that the results of the self-evaluation were called prototype II. Next, expert review, conducting construct validation on prototype II with the assessment stage carried out by several validators. The assessment was carried out using a validity questionnaire instrument. After that, then prototype III was produced and continues to the next stage. One to one evaluation was carried out to get input from the products that have been produced, using a student questionnaire instrument conducted by students who have different abilities (high, medium, low) to examine the practicality of the product that produced prototype IV. Small group evaluation was conducted after the prototype IV was formed, which were carried out on science teachers and a group of students using a practical questionnaires. Small group evaluation aims to identify the shortcomings of prototype IV. If there are suggestions and input on the video being developed, a revision is made, the results of the revision of prototype IV produced prototype V.

The data analysis technique was carried out using the Kappa Cohen formula below and the categories of validity and practicality based on Kappa Moments are presented in Table 1.

$$\text{Moment kappa } (k) = \frac{Po - Pe}{1 - Pe} \quad (1)$$

Table 1. Category of Validity and Practicality [19]

Interval	Category
0,81 – 1,00	Very high
0,61 – 0,80	High
0,40 – 0,60	Currently
0,21 – 0,40	Low
0,01 – 0,20	Very low
0,00	Invalid

RESULTS AND DISCUSSIONS

The research carried out resulted in VHL. The research was carried out through 3 stages, namely "preliminary research, prototype stage and assessment phase". The research carried out is limited to the stage of forming a prototype: "prototype I, prototype II, prototype III, prototype IV, prototype V" (as mentioned in method).

The initial design is the VHL which was developed designed with an integrated STEM approach that will make the display more attractive, and there are critical thinking questions that can encourage the ability to think critically of students. The activities carried out include analysis of needs, analysis of curriculum, analysis of students and analysis of concepts. Based on the stages of the initial investigation (preliminary research) the results of the design at this stage will produce prototype I of science experimental video development.

At this stage, observations and interviews were carried out to find out the difficulties and obstacles faced by educators and students when carrying out the procedures for studying the material pressure of substances and their application in daily life. Needs analysis is carried out to see the situation and conditions and determine the basic problems that occur in the field related to the learning process in schools. Students have direct practicum activities, but the amount of time allocated for the learning process is not sufficient, while the material that needs to be distributed is very broad so that most of the practical activities and practicum activities do not take place.

Curriculum analysis has the aim of carrying out a review of the curriculum used by schools. This analysis has the aim of learning about the scope of the material, basic competencies and learning process activities carried out which are used as the basis for developing science experiment videos. The analysis of the students was carried out to identify the target of the learning process, namely the students. Concept analysis has the aim of identifying the basic concepts that will be taught to students who can help with students to train critical thinking.

Based on the analysis that has been described, VHL can be used as a medium for teaching science in practical activities at school. The experimental video developed is a STEM-Critical Thinking Video "Hydraulic Lift" on pressure of substances and its application in everyday life topic. VHL in this study will show the Hydraulic Lift experimental activity that has never been done in school and the video is presented with an attractive and interactive display that makes students have the attraction to pay attention to the video.

The learning process using the STEM approach is used in the development of VHL so that students are able to apply problem-based learning, become logical thinkers, master technology and relate daily activities to the learning process, especially substance stress material and its application in everyday life. Learning using the STEM approach is developed by raising daily issues in the learning process so that students are interested in the learning process and produce an interactive and enjoyable learning process for students. The STEM approach in this study is shown in Table 2.

Table 2. STEM Aspect

No	STEM Aspect	Application to Video
1	Science	Substance pressure material is used as a supporting material for experimental videos in the Hydraulic Lift experiment
2	Technology	For introduction, students will be given a video via cellphone from the Youtube
3	Engineering	Designing a simple hydraulic machine
4	Mathematics	- Calculate the amount of pressure - Proof of Pascal's law formula

Critical Thinking is used in research to stimulate the ability of students' critical thinking, which are presented in the form of critical thinking questions that appeared in the experimental video. This research applies critical thinking skills according to Ennis. Critical thinking questions related to VHL are presented in Table 3.

Table 3. Critical Thinking Aspect

No	Critical Thinking Aspect	Application to Video
1	Elementary clarification	Based on the experiments that have been observed, why does the elevator move when pushed by the syringe/injection?
2	Basic Support	Does the concept of pressure only exist in hydraulic lifts?
3	Inference	How to apply the concept of pressure in relation to Pascal's law in hydraulic lifts? Is it the same application with other objects?
4	Advanced Clarification	Is the working principle of a hydraulic lift the same as a lift (elevator)?
5	Strategy and Tactics	If there is a problem in the operation of the Hydraulic lift media, what error might occur?

Hydraulic Lift is a type of machine that uses a driving power source from hydraulic equipment such as water, oil, and gas to lift or move objects using the force created when pressure is applied to the fluid on the piston. Hydraulic lifts usually use a hydraulic cylinder (syringe) to raise or lower a working platform, or other lifting device. Hydraulic Lift is one of the teaching aids with a simple experimental form that works based on Pascal's law. The researcher chose this experiment because, in the experiment, there were problem-based activities, experiences, and could develop students' knowledge despite the limitations of tools and materials in the laboratory. The development of the Hydraulic Lift experiment has a relationship with life and has something to do with KD 3.8 material pressure and its application in everyday life. In the matter of substance pressure, students still rarely do practicum and consider the material of substance pressure difficult. By using the Hydraulic Lift practicum, students will be helped because the practicum is very easy and very fun. By carrying out the Hydraulic Lift practicum, students will easily understand the material pressure of substances.

The results of the analysis at the preliminary research stage (initial investigation stage) were compiled with a VHL development plan. The Prototyping Stage was carried out for the formation of four prototypes before the final prototype was formed. Prototype I is a prototype generated from the design of the initial research (preliminary research). In prototype I, a video is produced using the Adobe Premiere Pro 2022 editing application. The application has uses that support the creation of prototype I. Making products to make it look attractive to students by providing backgrounds, back sound images sourced from YouTube and Google accompanied by explanatory text of the contents video and video display quality with a high resolution of 1080p so that the video looks clear. In the video there are 10 components, namely: opening video, introduction to material, objectives of the practicum, tools and materials, sketches of work procedures, practicum activities, and tables from observing the answers to questions, conclusions, and thanks.

Self-evaluation is a stage to check, revise and correct errors contained in prototype I. VHL is repaired, aiming to review the components in the VHL that will be developed. Then the results of the self-evaluation stage are analyzed and then revised if there are errors so that the results of the self-evaluation are called prototype II. In prototype II the author made a small revision of the product being developed, namely improvements to self-identity and appearance of the experimental objectives, tools and materials, work procedures, the table from the results of observing the VHL has the main components, namely:

Video opening

At the opening of this experimental video, there is the identity of the video maker which includes the name of the university, departement and the video maker, which serves to provide information on who the practitioner plays a role in the video to the video audience. There is a video title that serves to provide information to users to increase interest and interest and make students understand about the learning that will be given. The introductory display of the material on the video can be seen in Figure 2.

Fig 2. *Video Opening*

Introductory Material

The introductory material is used to explain the basic concepts according to the title of each experimental video. This has the intention of conveying understanding to students about the basic concepts that will be explored first before watching videos of experimental activities. The introductory display of the material is shown in Figure 3.

Fig 3. *Introductory Material*

Experimental Purpose

Experimental objectives contain the goals achieved by students after watching the experimental video. The purpose of the experiment is for students to find a description of the purpose of the experiment in the video. The display of the experimental objectives is shown in Figure 4.

Fig 4. *Experiment Purpose*

Tools and Materials

Tools and materials aim to show students the form of tools and materials that used to build the hydraulic lift model. The display of tools and materials in the video can be seen in Figure 5.

Fig 5. *Tools and Materials*

Work Procedure Sketch

The work procedure aims to make it easier to find out the instructions for the experimental work to be carried out. The working procedure display on the video can be seen in Figure 6.

Fig 6. *Work Procedure Sketch*

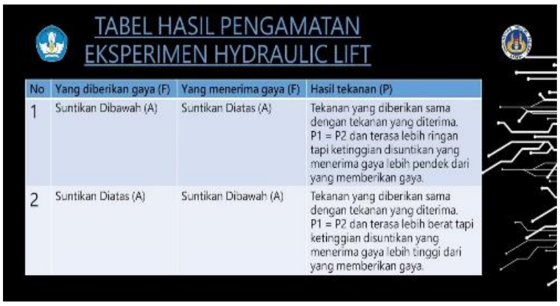
Experimental Activities

This experimental activity component contains the stages of the experimental workflow demonstrated by the practitioner so that students can see well the stages of the practicum activity which can be reviewed in Figure 7.

Fig 7. *Experimental Activities*

Observation Results Table

Contains the components of the summary results that have been carried out by the practitioner. The view of the observation table can be seen in Figure 8.



TABEL HASIL PENGAMATAN EKSPERIMEN HYDRAULIC LIFT

No	Yang diberikan gaya (F)	Yang menerima gaya (F)	Hasil tekanan (P)
1	Suntikan Dibawah (A)	Suntikan Diatas (A)	Tekanan yang diberikan sama dengan tekanan yang diterima. P1 = P2 dan terasa lebih ringan tapi ketinggian disuntikan yang menerima gaya lebih pendek dari yang memberikan gaya.
2	Suntikan Diatas (A)	Suntikan Dibawah (A)	Tekanan yang diberikan sama dengan tekanan yang diterima. P1 = P2 dan terasa lebih berat tapi ketinggian disuntikan yang menerima gaya lebih tinggi dari yang memberikan gaya.

Fig 8. *Table of Observation Results*

Answers to critical thinking questions

Answers to critical thinking questions are useful to justify the concept of answers that have been previously answered or already in the minds of students. The answer to the question can be seen in Figure 9.

Fig 9. *Answers to Questions*

Conclusion

Contains a summary sentence of the practicum activities carried out. It is in Figure 10.

Fig 10. *Conclusion*

Acknowledgments
At the end of the video, acknowledgments to the names who have been involved in making the experimental video which can be seen in Figure 11.

Fig 11. *Acknowledgments*

Expert review is to conduct a construct validation of the prototype II with the stage of assessment carried out by several valid Assessment is done by using the validity questionnaire instrument. If the validation is carried out indicating valid and feasible without revisions, the prototype III generated and continue to the next stage. Table 4 the results of the data validation data analysis of experimental video. The results of video validation by expert reviewers can be seen in Table 4.

Table 4. Results of the Validation by Expert Reviewers

No	Rated aspect	Average (K)	Category validity
1	Clarity of Massage	0.95	Very High
2	Stand Alone	0.79	Height
3	User Friendly	0.91	Very High
4	Content Representation	0.91	Very High
5	Visualization with Media	0.91	Very High
6	Using High Resolution Quality	1.00	Very High
7	Can Be Used Classically or Individually	0.95	Very High
8	Aspects of Critical Thinking	0.96	Very High
9	STEM	0.92	Very High
	Average	0.92	Very High

Based on Table 4, the results of the validation data analysis on VHL obtained an average kappa moment of 0.92 in the very high category. The product created is valid and feasible to proceed to the one-to-one evaluation stage, namely the practicality test through being carried out by students who have different abilities (high, medium, low) to see the practicality produced. The trial stage one the one evaluation creates a product that is better and in accordance with the wishes of students and users. The result is called prototype IV. The results of the one-to-one evaluation data analysis are available in Table 5 below.

Table 5. Results of Practical Data Analysis One to One Evaluation

No	Rated aspect	Average (K)	Category practicality
1	Ease of use	0.97	Very High
2	Attractiveness	1.00	Very High
3	Usefulness	0.96	Very High
	Average	0.98	Very High

The science experiment video produces results from the practicality data analysis that has been assessed by students. One to one evaluation obtained an average kappa moment of 0.98 in the high category. Furthermore, the formation of prototype V or valid and practical video is carried out by small group evaluation of the prototype IV that has been produced. This stage is carried out by students in the form of small groups that include 6 students who are taken randomly. The small group evaluation given to students can be reviewed in Table 6.

Table 6. Results of Practical Data Analysis Small group evaluation.

No	Rated aspect	Average (K)	Category practicality
1	Ease of use	0.97	Very High
2	Attractiveness	1.00	Very High
3	Usefulness	0.96	Very High
	Average	0.98	Very High

Based on the results of the practicality data analysis, the one to one evaluation trial and the Small group evaluation were found to be very valid. Practical data can be reviewed in Table 7.

Table 7. Average Overall Practicality Score

	Average (K)	Category practicality
One to one evaluation	0.98	Very High
Small group evaluation	0.99	Very High
Average	0.98%	Very High

After analyzing the validity and practicality of the data, three students were interviewed to see the students' responses to the VHL that had been developed. The results of the interviews can be reviewed in Table 8.

Table 8. Results of Student Interviews with VHL

No	Question	Indicators	Student Response to VHL		
			X1	X2	X3
1	After you watched VHL how did you feel? Does observing HVL make lessons more fun?	Feeling happy	“I feel happy to see HVL because the videos shown are interesting”	HVL makes me happy to learn science”	“By using HVL learning becomes fun”
2	In VHL there are questions that train critical thinking skills, can you answer the questions presented?	Student engagement	“The questions given can make me think critically”	“I can answer the questions presented because the questions are related to HVL”	"The questions given are not too difficult for me, so I can train critical thinking by using VHL"

3	Did your child become interested in learning, after using VHL?	Student interest	“Yes, because VHL is interesting, so it makes me eager to learn”	"I'm very interested, because VHL is interesting, and I've never seen it"	“Yes, because using HVL makes me interested in learning because VHL is interesting and good”
4	Can using VHL increase your child's desire to learn?	Diligent in studying and doing assignments	"Yes, because the content of the material presented is easy to understand, thus increasing my desire to learn"	“VHL is so good that it makes me want to keep learning	“Yes, because VHL can increase my desire to learn”
5	Can VHL make your child more diligent and disciplined in learning?	Diligent and disciplined in learning	"Yes, because VHL is a learning medium that I can use anywhere so that it makes me disciplined in learning"	"Yes, by using HVL I become more diligent and disciplined in studying"	“Yes, because HVL is more efficient, can be used anywhere and is interesting so that it makes me diligent and disciplined in studying”

The science experiment video was validated using an instrument in the form of an assessment questionnaire that had been validated by 3 expert reviewers who were science education lecturers at the Faculty of Mathematics and Natural Sciences UNP. The measuring instrument used in making measurements must be precise and valid [20]. Product validation can be carried out by several experts or experienced professionals in assessing the advantages and disadvantages of the created product [21]

The clarity of message assessment is an assessment of the product developed based on the ease of understanding information from the experimental video after watching the clarity of message aspect, the experimental video has a very high validity through a kappa moment score with a magnitude of 0.95, because VHL has clear messages such as the narrator's voice is heard with clear articulation, the text provided has clarified the content of the video, and the instructions for implementing the practicum are clear so that students will easily understand the information on VHL.

A stand-alone assessment is an assessment carried out to show that the product developed can stand alone, meaning that it does not depend on other sources of teaching materials. The experimental video has high validity through a kappa moment score with a magnitude of 0.79. Shows where the VHL that is being developed is in accordance with the achievement index of the aspects that have been formulated.

User friendly assessment is an assessment of the product developed which refers to the use of simple language so that students can easily understand it. VHL has a very high validity with a kappa moment score of 0.91, because VHL uses words according to students' understanding and the language used is communicative.

Content representation assessment is an assessment of the product developed by referring to the accuracy of the material presented. The content representation aspect relates to the material that is in accordance with the practicum objectives that have been formulated in the VHL and the description of the material presented is logical and coherent in accordance with the learning needs of students. VHL has a very high validity through a kappa moment score of 0.91.

Visualization assessment through the media is an assessment of the product being developed which refers to the packaging of the product from a visual point of view (sight). VHL has a very high validity through a kappa moment score with a magnitude of 0.91, because the developed VHL has been quite interesting, the videos shown can provide practice for students to think critically, and the animations displayed add enough clarity to the video.

Assessment using high resolution quality is an assessment of products developed based on digital engineering technology with high resolution. Learning videos have very high validity through a kappa moment score of 1.00, because the Science Experiment Video developed has good video quality with high resolution so that the video looks clear and clean by students.

Aspects can be used classically or individually regarding the use of VHL which was developed to be used by students individually or collectively (classically) so that VHL can be used by students for independent study at home and at school. VHL has a very high validity through a kappa moment score of 0.95.

Assessment of critical thinking aspects is an assessment of the product developed, namely VHL which can provide simple explanations, build basic skills, make conclusions, provide further explanations and make arrangements for strategies and tactics that enable students to sharpen their ability to think logically. Critical. VHL has a very high validity through a kappa moment score of 0.96. The STEM assessment is carried out to show where the product being developed, namely VHL, has science, technology, engineering, and mathematics. Based on data analysis shows that the STEM value has a very high validity through a kappa moment score of 0.92.

The practicality test by students on VHL was carried out through two stages, namely "one to one evaluation and small group evaluation". In a one-on-one trial, it is carried out on products in the form of prototype II that have passed self-evaluation. The results of data analysis obtained categories of very high practicality through an average kappa moment score of 0.98.

The practicality of HVL in the form of prototype II in a one-on-one trial produced was very high, there were no improvements that required researchers to crack videos or re-edit. The results of the improvement on the validity of expert judgment and the practicality of the one-on-one trial obtained prototype III. The implementation of a one-to-one test (one to one evaluation) of the product in the form of a prototype III that has passed an expert review. One-on-one trials are carried out by students who have varying abilities "high, medium, low", the one-on-one trial stage produces prototype IV.

The small group evaluation was carried out by 6 students from class VIII students of SMP Negeri 2 Enam Lingkung. The results of the VHL practicality data analysis referring to the student instrument sheet in the small group test obtained very high practicality through the average value of the kappa moment with a score of 0.99. The data obtained shows where the video in the form of a prototype IV is practical to use. In prototype IV there are no improvements that require researchers to crack videos or re-edit so that they can produce prototype V.

The first aspect that is assessed is the aspect of ease of use of VHL, in terms of usability it is very practical. Shows where the VHL being developed presents in the form of practical video instructions easy to gain understanding, the content of the material is presented in a way that is fully understood by students, the animated images and text provided provide clarity to the video, the video can be reused, and the video can be used anywhere course [22].

The second aspect of the assessment is that the attractiveness of VHL has a very high practicality category. This is in accordance with the results of the questionnaire obtained from students in terms of attractiveness, students can learn using VHL because the video is presented with an attractive appearance, and the animation displayed in the experimental video is relevant to the material. By using video in learning, it makes the learning process more conveyed and the learning atmosphere is not monotonous, making it easier for students to understand the teaching material [23].

The third aspect of the assessment is the aspect of the benefits of using VHL on the aspect of the benefits of using which are in the very high practicality category. VHL was developed to be able to understand the material through the questions presented in the VHL, learning videos can increase curiosity and can train critical thinking in learning, and videos are displayed attractively so that students are happy and enthusiastic in learning. Learning that uses interesting experimental videos can provide information and entertainment that makes students understand the learning process faster and makes practicum activities more directed [24].

Based on the results of the practicality values obtained, it can be concluded that the VHL developed is in the very high practicality category, this is because VHL can be used by students from its ease of use, video attractiveness, and benefits. From the results of the validity test that the VHL obtained is in a very high category, so the VHL prototype has been said to be the final prototype of the STEM-Critical Thinking Oriented Science Experiment Video of Hydraulic Lift on the material pressure of substances and its application in everyday life is valid and practical.

After the validity and practicality tests were carried out, interviews were conducted to see how the students responded to the VHL that had been developed. On the aspect of feeling happy, students revealed that the VHL displayed was interesting, so learning with VHL became more fun. The involvement of students shows that VHL can train critical thinking skills. VHL can create enthusiasm for science learning because VHL can be used anywhere without time constraints, thus making students more diligent and disciplined in learning. The developed VHL has advantages over other learning videos, because VHL contains STEM and critical thinking questions that can train students' critical thinking skills which are developed as attractively as possible to make students enthusiastic about learning. because, learning videos can increase curiosity and can train critical thinking in learning, and videos are displayed attractively so that students are happy and enthusiastic in learning [25]. Based on the students' responses, it shows that VHL is feasible to be used as an alternative in the teaching and learning process.

CONCLUSION AND SUGGESTION

STEM-Critical Thinking Video in Science Education: Hydraulic Lift (VHL) is expected to be used as a supplementary teaching material on the substance pressure material and its application to daily life topic in secondary science classroom. VHL that has been produced has a very high validity and practicality value and student responses are very good. It can be concluded that the video developed is valid, practical, and feasible to use. Besides, students also have a good impression toward VHL, and it is expected to enhance the students’ motivation to learn science and improve their learning outcomes of physics.

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