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Development of instruments to measuring feasibility of context-based videos of sound

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Abstract. This study was aim to produce a valid instrument that can measure the quality of the context-based video of the sound. Instruments that had been developed include: physics learning expert validation instrument, physicist validation instruments, linguist validation instruments, teacher practicality instruments, student practicality instruments, critical thinking skills instruments, creative thinking skills instruments, collaboration skills instruments, and communication skills instruments both oral and writing. This research uses the ADDIE development model which consists of five stages. Data analysis for validity refers to the Aiken's V coefficient where the instrument is valid if it is validity coefficient ≥ 0.6 . The validation coefficient given by the expert for each instrument is as follows: the learning physics instrument 0.90, the physicist validation instrument was 0.91, the linguist validation instrument was 0.77, the teacher practicality instrument was 0.97, the student practicality instrument was 0.87, instruments of critical thinking skills of 0.91, instruments of creative thinking skills of 0.93, instruments of collaboration skills of 0.99, instruments of oral communication skills of 0.98, and instruments of written communication skills of 0.90. All of instruments are valid, so the instrument can be used to measure the quality of the instructional video of sound.

1. Introduction

Valuation a product, for good and quality, begins with product validation then testing the use of the product developed using valid instruments [1]. The instrument has a very important role, because it can see the quality of the research [2]. In order to obtain accurate data, a quality instrument is needed [3]. Validity is something that must be considered in making development research instruments [4]. A good instrument has validity requirements [5]. An instrument is said to be valid if the instrument can be used to measure what should be measured [6, 7]. An instrument is said to have the validity of each of these instruments in a precise or valid way to reveal or measure what should be disclosed or measured [8].

The arrangement of data collection instruments must go through validation so that the instruments used can reveal the aspects that the researcher wants [9]. Validity is carried out by several experts or practitioners who are experts about learning media using validation sheets [10]. The purpose of instrument validation is to determine whether the instrument is feasible or not suitable for use [11] and to reduce variations in the potential for instrument-making errors and increase the probability of obtaining a construct validity index in a further study [12].



A set of research instruments has been developed to measure the quality of contextual-based physics instructional videos for sound material. The instrument developed was used to measure the validity, practicality, and effectiveness of the instructional videos that had been developed. This article was written to convey the results of the validation of the instrument.

2. Method

This study aims to produce a research instrument to measure the feasibility of instructional videos based on CTL. A product has quality if the product developed is in accordance with predetermined quality standards [13]. The quality of the product development was assessed by its validity, practicality and effectiveness [14, 15].

Product validity was seen from four things, namely: content validity, construct validity, concurrent validity, and predictive validity [16]. The instrument for measuring the validity developed in this study consisted of validation instruments for physicists & physics learning experts. The validation instrument developed has four components of content feasibility, including compliance with the presentation curriculum, language feasibility and effective use of language, and graphics [17].

Practicality relates to the level of use of the product that being developed. The practical aspect is seen in terms of users which can be used in normal conditions by teachers and students [17]. Practicality was seen from ease of use, efficiency of learning time, attractiveness of students' interest in learning, easy to interpret by other expert teachers / teachers, can be used as a substitute and the cost is relatively cheap [18].

Effectiveness was a condition that shows the level of success of the product that being developed. Product success rate was seen from the suitability of the results obtained with the expected goals. The level of achievement was seen from the results obtained based on the expected criteria [19]. In accordance with the objectives of the development carried out, the instrument of effectiveness developed consists of instruments of critical thinking skills and creative thinking skills.

The validity value provided by the expert on the developing instrument can be an indicator of the feasibility of the instrument. Validity was the main thing that characterizes the measuring instrument [20]. The appropriateness or validity of the instrument was determined by three things; namely conformity with the problems and objectives, the fulfillment of the assessment criteria, and the fulfillment of the performance criteria [11, 21]. These three elements of feasibility were used to measure the validity of all instruments developed.

To achieve this goal, a design development research method, ADDIE, was applied with several stages such as analysis, design, develop, and evaluation. The instrument validation data were collected using the instrument validation sheet, which consists of three aspects of the assessment; namely conformity with problems and objectives, fulfillment of assessment criteria, and fulfillment of performance criteria. All instruments have five rating levels which refer to the Likert scale. The Likert scale used is (1) very poor, (2) less, (3) sufficient, and (4) good, and 5) very good.

The validity category is based on Aiken's V coefficient.

$$V = \frac{\sum S}{[n(c - 1)]} \quad (1)$$

$$S = r - lo \quad (2)$$

Annotation:

- lo = the lowest number of validity assessments
- c = the highest number of validity assessments
- r = the number given by the validator
- n = number of validators

The validity category of the product developed according to [22], can be seen in the Table 1.

Table 1. Validity category.

Score	Criteria
$\geq 0,6$	Valid
$< 0,6$	Not Valid

For this study, it is expected that the results of instrument validation are in the valid category, ≥ 0.6 .

3. Result and Discussion

3.1. Analysis

Initial analysis has been carried out to determine the need for instruments to measure the validity, practicality and effectiveness of the video. In accordance with the research objectives, the instruments needed include: (1) physics learning expert validation instruments, (2) physicist validation instruments, (3) teacher practicality instruments, (4) students practicality instruments, (5) critical thinking skills instruments, (6) creative thinking skills instruments, (7) collaboration skills instruments, (8) oral communication skills instruments, and (9) written communication skills instrument. Besides that, an instrument is also needed to measure the validity of all these instruments. In accordance with the function of the instrument, all instruments, including the nine instruments developed, as well as instruments for measuring the validation of the instrument, are in the form of a questionnaire. Each instrument contains a number of statements to solicit expert opinion. Experts can score by selecting one of five categories: very good, good, moderate, lacking, and very poor.

3.2. Design

At this stage, the nine instruments have been determined and the instrument grids are used to measure the validity of each instrument. The results of research at this stage are presented in the following tables:

Table 2. expert validation instrument grid.

Aspect	Statement Number	Aspect	Statement Number
Presentation	1-14	Content eligibility	1-12
Language	15-18	Language	13
Graphics	19-26	Graphics	17-24

Table 3. Practice instrument grid.

Teacher Perception		Student Perception	
Aspect	Statement Number	Aspect	Statement Number
Convenience	1-5	Convenience	1-7
Effectiveness	6-7		
Usefulness	8-15	Usefulness	8-10
Attractiveness	16-18	Attractiveness	11-13

Table 4. Grid of instrument for validation instrument.

Aspect	Statement Number
Conformity with purpose	1
Requirement for assessment criteria	2-6
Fulfilment of display criteria	7-13

Table 5. Effectiveness instrument grid.

Student Skills	Aspect	Statement Number
Critical thinking	Give explanation	1-2
	Reference of resource	3
	Conclusion	4
	Provide further explanation	5
Creative thinking	Smoothness	1
	Originality	2
	Elaboration	3
Collaboration Skills	Cooperate	1-2
	Flexibility	3
	Responsible	4
	Compromise	5
Oral Communication Skills	Organization	1
	Eye contact	2
	Delivery	3-4
	Conclusion	5
	Responsive	6-7
Written Communication Skills	Document organization	1
	Sentence structure	2
	Language structure	3

3.3. Developed

At this stage, instrument items were developed referring to the grid that has been made. Furthermore, it was validated by learning experts who are competent to assess the instrument. The validation data consisted of two groups, namely suggestions for instrument improvement from the expert and instrument assessment data. The summary of validator suggestions for physics learning expert instruments and physicist instruments can be seen in Table 6.

Table 6. Summary of expert's suggestions for the instruments.

Instrument	Before Revision	After Revision
Learning Expert Instrument	The learning expert validation instrument should contain a statement or component about the accuracy of the learning video in the presentation aspect. Add the word "presentation" to component number 2, "the validation instrument is able to measure the validity of the sound learning video", Correct the sentence in component number 12, "the measurement on the instrument can be read clearly"	Improve the learning expert validation instrument by providing a statement or component about the accuracy of the learning video in the presentation aspect. Improve component number 2 to become "a validation instrument capable of measuring the validity level of the sound context-based video presentation".
Physicist Instrument	Physicist validation instruments should contain statements or components regarding the accuracy of the video in terms of physics content or sound only.	Corrected sentence component number 12 to "readable size of the writing on the instrument".

Referring to expert advice above, improvements have been made to these instruments. This improved instrument was assessed for its validity by the expert. The results of the expert's assessment of each instrument are presented in the following tables.

3.3.1. Validation result of validity instrument

The results of expert judgment on the validity of the physics learning expert validation instrument and physicists are presented in the Table 7.

Table 7. Result of validation for validation instrument.

Aspect	Physics	Learning	Physicist Validation Instrument	
	Validation Score	Criteria	Validation Score	Criteria
Conformity with the problem to be solved and the goals to be achieved.	0.87	Valid	0.81	Valid
Clarity of competencies that must be met, clarity of instructions for using instruments, ease of instrument implementation, accuracy of instrument assessment, and clarity of instrument feedback.	0.87	Valid	0.95	Valid
Instrument readability, instrument display quality.	0.96	Valid	0.98	Valid
Average	0.90	valid	0.91	valid

Table 7 states that the learning expert validation instrument is valid, with an average value of 0.90. Therefore, the learning expert validation instrument can be used to validate the learning video that will be developed. The suggestions given by the validator for this instrument are that the learning expert validation instrument should contain a statement or component about the accuracy of the learning video in the presentation aspect, adding the word "presentation" in component number 2, namely "the validation instrument is able to measure the validity of the sound learning video", and fix the sentence in component number 12, namely "the measurement on the instrument can be read clearly".

Based on this result, seen that states of the physicist validation instrument was valid, with an average value of 0.91. Therefore, the physicist validation instrument can be used to validate the learning video that will be developed. The suggestions given by the validator for this instrument are that the physicist validation instrument should contain statements or components about the accuracy of the video in terms of content or physics sound only.

3.3.2. Practical Instrument

There are several suggestions given by the validator for this instrument. The summary of the validator's suggestions for teacher practicality instruments and student practicality instruments can be seen in Table 8.

Table 8. Summary of validator suggestions for teacher practicality instruments and student practicality instruments.

Instrument	Before Revision	After Revision
Teacher's Practical Instruments	There is no formulation of basic competencies in component number 4, "instruments to explain the formulation of basic competencies".	Component number 4 has been repaired so that the basic competency formulation appears.
Student Practicality Instruments	Write a statement about the convenience, benefit and attractiveness according to the features or part of the video.	A statement about convenience, benefit and attractiveness has been written in accordance with the features or parts of the video.

Based on the suggestions from the validator in Table 8, improvements have been made so that the teacher practicality instrument and student practicality instrument can be used to validate the learning

videos. The results of the validation of the teacher practical instruments carried out by two validators can be seen in Table 9.

Table 9 states that the teacher practicality instrument is valid, with an average value of 0.97. Therefore, the teacher practical instrument can be used to validate the context-based video that will be developed. The suggestions given by the validator for this instrument are to improve component number 4 so that the basic competency formulation appears.

Table 9. Result of expert validation for teacher practice instrument validation.

Aspect	Scores/ criteria			
	Teacher practice instrument		Student practice instrument	
	Score	Criteria	Score	Criteria
Conformity with the problem to be solved and the goals to be achieved.	1	Valid	1	Valid
Clarity of competencies that must be met, clarity of instructions for using instruments, ease of instrument implementation, accuracy of instrument assessment, and clarity of instrument feedback.	0.91	Valid	0.91	Valid
Instrument readability, instrument display quality.	1	Valid	1	Valid
Average	0.99	Valid	0.97	Valid

3.3.3. Effectiveness Instruments

The instrument of effectiveness consists of critical thinking, creative thinking, collaborative, oral communication, and written communication instrument. All of instruments have been validation. The result of validation can be seen in some table. Summary of the expert suggestion for effectiveness instrument write in Table 10.

Table 10. Summary of validator suggestions for effectiveness instrument.

Instrument	Before validation	After validation
Students critical thinking skills instrument	There is some overlapping item in the critical and creative thinking skills	All of overlapping are clear
Students creative thinking skills instrument		
Students collaboration skills instrument	The instrument measure the skills of group collaboration Instrument without scoring technic	The instrument measure the skills of personal of the student communication skills. The instrument has been complicated by scoring technic
Students oral communication instrument	Some of sentences in the instrument are not effective Some of item in the instrument not based on learning activity were design in the video.	All of sentences of instrument have been effective. All of item in the instrument have been write based on learning activity were design in the video.
Students written communication instrument	The name of object which write of the student will be measure are not explicit. The instrument measure the skills of group collaboration Instrument without scoring technic	The name of object which write of the student will be measure have been explicit. The instrument measure the skills of personal of the student written communication skills. The instrument has been complicated by scoring technic

The validation result for effectiveness instruments, served in Table 11.

Table 11. Result of expert validation for effectiveness instruments.

Aspect	Critical Thinking		Creative Thinking		Collaboration		Oral Communication		Written Communication	
	Score	Criteria	Score	Criteria	Score	Criteria	Score	Criteria	Score	Criteria
Conformity with the problem to be solved and the goals to be achieved.	0.88	Valid	0.88	Valid	1	Valid	1	Valid	0.83	Valid
Clarity of competencies that must be met, clarity of instructions for using instruments, ease of instrument implementation, accuracy of instrument assessment, and clarity of instrument feedback.	0.88	Valid	0.93	Valid	0.98	Valid	0.97	Valid	0.90	Valid
Instrument readability, instrument display quality.	1	Valid	1	Valid	1	Valid	1	Valid	1.00	Valid
Average	0.92	Valid	0.95	Valid	0.99	Valid	0.98	Valid	0.92	Valid

Based on result of expert validation for effectiveness instrument, can be conclude all of the effectiveness instrument are valid. No difference category of score have given by the expert or validator. Both of validator give the same category of score for all aspect in five instruments. It is indicator where the instruments are reliable too.

3.4. Implementation

After all the instruments are valid by the expert, then the instrument is used to measure the validity, practicality, and video rights. The results of the instrument use test showed that there was no significant difference between one expert and another. There is also no significant difference between the practicality assessment among the teachers who are respondents. The same thing happened to the use of student practicality instruments and effectiveness instruments. This finding is an indication that all instruments meet the reliability criteria.

3.5. Evaluation

Referring to the results that have been submitted, it can be concluded that the validity instruments of learning experts and physicists are proven valid and reliable. the practicality instrument developed was also tested valid and reliable. the results of the quality test of the effectiveness instrument also showed the same results. Thus, it can be concluded that all instruments that have been developed are proven to be valid and reliable.

4. Conclusion

Based on the results of the evaluation of the validity, practicality, and effectiveness instruments, it can be concluded that all instruments are valid and reliable. Therefore it can be concluded that all instruments are suitable for measuring the feasibility of contextual-based video-instructional.

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