

Developing Tutorial Video for Enhancing Elementary School Students' Process Skills in Science

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Abstract

The purpose of this research is to prove the improvement and effectiveness of video tutorials media as a result of development. The model in this study is applied to the research and development model of Borg & Gall. The procedure of this study included 9 steps, namely a) preliminary research and collecting initial information; b) planning; c) developing product drafts; d) conducting an initial trial; e) revising the results of limited trials; f) conducting field trials; g) making product improvements resulting from field trials; h) conducting operational field trials; and i) making improvements to the final product. The product testing was carried out on the fifth grade elementary school students in South Aceh. Data collection techniques used observation. The observation sheet was used to measure students' process skills. The feasibility of media was analyzed by the score conversion using a scale of 5. The media effectiveness was analyzed by gain score, and t-test. The results of this study were video tutorials on media products on style material that are feasible to science learning on student process skills.

Keywords: video tutorial; processing competence

Abstrak

Tujuan dari penelitian ini adalah untuk membuktikan peningkatan dan efektivitas media video tutorial hasil pengembangan. Model dalam penelitian ini menerapkan model riset dan pengembangan Borg & Gall. Prosedur penelitian ini meliputi 9 langkah, yaitu a) riset pendahuluan dan mengumpulkan informasi awal; b) melakukan perencanaan; c) melakukan pengembangan draft produk; d) melakukan uji coba awal; e) melakukan revisi hasil uji coba terbatas; f) melakukan uji coba lapangan; g) melakukan penyempurnaan produk hasil uji coba lapangan; h) melakukan uji coba lapangan operasional; dan i) melakukan penyempurnaan terhadap produk akhir. Uji coba produk dilakukan pada siswa kelas V SD Aceh Selatan. Teknik pengambilan data menggunakan observasi. Lembar observasi digunakan untuk mengukur keterampilan proses siswa. Kelayakan

media dianalisis dengan konversi skor menggunakan skala 5. Efektivitas media dianalisis dengan gain score, dan uji-t. Hasil penelitian ini berupa produk media video tutorial pada materi gaya yang layak diterapkan pada pembelajaran IPA terhadap keterampilan proses siswa.

Kata Kunci: Video Tutorial, keterampilan proses

Introduction

Education is the main basis for reaching and towards an independent, creative and critical future. It can form a society that is able to build their country, then to achieve this, it is very necessary to make improvements in improving the quality of education.

According to the National Education System contained in Law Number 20 of 2003, the function of national education is to establish and develop dignified character in order to educate the life of the nation, and aims to develop the potential of students to become believers, devoted to God Supreme, noble, healthy, knowledgeable, capable, creative, independent, and a citizen of a democratic and responsible country.

There are many ways that can be done to improve the quality of human resources, and one of the ways is to develop the quality of education. Improving the quality of education can be achieved if the teacher applies a creative and student-centered learning process of all subjects¹, including science.

In educational activities of science, the teachers are the main key in increasing students' understanding² of science materials and increasing learning motivation in solving

science problems³. This is, in fact, an indicator of success in the process of implementing learning activities. Besides, the quality of education can be improved through curriculum development, improvement of facilities and infrastructure, and teacher competence.

Science education is not only a process of understanding facts, concepts, or principles, but also being a process of knowing things related to nature as a process of discovery and systematically. The students are not only required to understand the material but they must also be able to explain the meaning of the material so that they can lead to the level of applying the materials that have been studied.⁴

The science learning process is expected to emphasize actions that lead to direct experience, develop competence, explore experiment, and study the surrounding environment so that the application of science learning in elementary schools can improve the quality of cognitive, affective and psychomotor students. The main focus of the science learning process is to observe activities with students, classify with students, predict, design, and carry out experiments.

A good learning process is not just memorizing the concept of science, but a

¹ Maria Angeles Dano-hinosolongo and Amparo Vedula-dinagsao, 'The Impact of Learner-Centered Teaching on Students' Learning Skills and Strategies', *International Journal for Cross-Disciplinary Subjects in Education (IJCDSE)*, 5.4 (2014), 1813–17.

² Mahlianurrahman, 'Peningkatan Motivasi Belajar IPA Melalui Implementasi Metode Inquiry Kelas V Sekolah Dasar', *Jurnal Ilmiah Sekolah Dasar*, 1.4 (2017), 252–59.

³ Arubayi D O, 'The Role of the Teacher and Methods of Teaching Science in Secondary Schools in Nigeria', *AASCIT Journal of Education Nigeria. AASCIT Journal of Education*, 1.1 (2015), 1–6 <<http://www.aascit.org/journal/education>>.

⁴ Mahlianurrahman, 'Pengembangan Perangkat Pembelajaran Untuk Meningkatkan Kemampuan Berpikir Kreatif Siswa Sekolah Dasar', *AR-RIAYAH: Jurnal Pendidikan Dasar*, 1.1 (2017), 87 <<https://doi.org/10.29240/jpd.v1i1.219>>.

process that links concepts to find complex concepts. As a result, the students are not easily forgotten and can be applied in daily life⁵. Therefore, in science subject, process skills are among the most basic skills. These skills are thinking skills using scientific processes and approaches.⁶

A growing number of studies on science process skills have been previously conducted. To make some examples, science process skills are taught by Safaah et.al by implementing the 5-stage learning style to junior high school students.⁷ The other researcher studied the impact of hand experiments on science process skills.⁸

Based on the results of interviews conducted on the learning process of elementary schools in South Aceh district, various problems were found which showed that the science learning process was more teacher-centered⁹. As a consequence, the students were less able to describe an object based on their observations in detail, teachers gave students more material and less involved students actively in the learning process. This caused the students' skills process skills low, and students had lack the opportunity to develop process skills so that

students' self-potential to understand science facts and concepts is low, the media used in the science learning process was less varied, making the students rarely pay attention to teachers. When they were explaining material, the students only use textbooks to obtain information about the material being studied.

The science test scores of the fifth grades of elementary school in South Aceh Regency can be seen in the following table.

Table 1. Students' Science Score

TA	Lowest score	Highest score	Average
15/16	54	92	68
16/17	48	96	72

Based on the results of observations and further interviews with elementary school teachers, it was known that students were more often assigned to write so that they were playing and telling their own stories with their peers. The teacher has not used learning media like tutorial videos; instead they only lectures which made the students feel bored, showing lack of enthusiasm for learning and lack of interest in learning material. In addition, the material described was not related to students' daily lives. The material did not directly explore student experience and lack of activities to conduct experiments. Thus, these gave impact to the students' process skills.

The right solution to the ability of student process skills is to apply appropriate learning media to the abilities of students' process skills, one of which is tutorial video media.

Table 2. Needs Analysis Data

Type of information	Teacher's answer	
	Yes	Not
The teacher hasn't used the video tutorial media	68%	32%
The media used is less varied	54%	46%
Teacher-centered learning	68%	32%

⁵ Mahlianurrahman, 'Pengembangan Perangkat Pembelajaran SETS Untuk Meningkatkan Pemahaman Konsep Dan Sikap Peduli Lingkungan Siswa Sekolah Dasar', *Premiere Educandum : Jurnal Pendidikan Dasar Dan Pembelajaran*, 7.01 (2017), 58 <<https://doi.org/10.25273/pe.v7i01.1305>>.

⁶ R.J Rezba, C & Sprague, and R Fiel, *Learning and Assessing: Science Process Skills* (Iowa: Kendall/Hunt Publishing Company, 2002).

⁷ E. S. Safaah, M. Muslim, and W. Liliawati, 'Teaching Science Process Skills by Using the 5-Stage Learning Cycle in Junior High School', *Journal of Physics: Conference Series*, 895.1 (2017), 1-6 <<https://doi.org/10.1088/1742-6596/895/1/012106>>.

⁸ Necati Hirça, 'The Influence of Hands on Physics Experiments on Scientific Process Skills According to Prospective Teachers' Experiences', *European J of Physics Education*, 4.1 (2013), 1-9.

⁹ Tracey Garrett, 'Student-Centered and Teacher-Centered Classroom Management: A Case Study of Three Elementary Teachers', *Journal of Classroom Interaction*, 43.2004 (2008), 34-47.

Students are not facilitated by the media in gaining knowledge 60% 40%

Based on the problems described above, various efforts are needed in the learning process especially for elementary students. Media Video Development in learning will help teachers improve the process skills of elementary school students in South Aceh District.

Method

Types of research

This type of research is development research or often explained by the type of research and development (R & D) research. The development model referred to is the R & D model according to Borg and Gall (1983)¹⁰.

Research procedure

The procedures carried out in this study are: a) conducting a preliminary study, b) carrying out the planning, c) developing the initial product draft, d) making the first revision, e) conducting the preliminary field trial, f) making the second revision, g) conduct main field trials, h) final product revisions, and i) conduct dissemination. Preliminary field trials using *one-group pretest-posttest design* and the main field trials using *pretest-posttest control group design*.

Time and Place of Research

The time of the study was between February and September 2018 in South Aceh.

Research subject

The preliminary field research subjects were the fifth grade students of State Elementary School 1 Paya Dapur, State Elementary School 1 Kampung Alai, and State Elementary School 2 Paya Dapur.

Research Instrument

The research instrument applied in this study is an assessment of the test of students' skills in creative thinking. Data before conducting research in the form of interviews, observations, and literature studies as a needs analysis (*need analysis*) of media development.

Data analysis technique

The data analysis technique carried out during the preliminary field test and the main field test is the *gain score*, and the t-test.

Results and Discussion

The research process of data collection and initial preliminary research is carried out through library research activities and needs analysis (*need analysis*). Activities *This need analysis* is carried out to collect various information related to needs in the field. The stages of initial information collection are done through teacher and student interviews, observations, analysis of learning media, and literature studies.

Data and information obtained from the results of preliminary studies are used as the basis for product development planning. Planning begins with formulating development objectives that focus on the development of instructional media in accordance with the material science in an effort m Enhancing the ability of students' process skills. While the learning process and assessment are in accordance with the approach in the KTSP curriculum, namely *inquiry*.

Development of initial product draft

1. Product Development

Learning media development activities involve several people, namely the author himself as a script writer and two validators. Activities at the product development stage

¹⁰ W.R. Borg and M.D. Gall, *Educational Research: An Introduction* (New York: Longman, 1983).

are the preparation of research instrument grids, product design determination to be developed, and compilation of media components as initial drafts.

a. Grid of assessment instruments

Based on instrument was arranged based on objectives development of learning media.

b. Determination of product design developed

The instructional media developed in this study is a tutorial video and researchers conduct a study of the material to be described in the media in accordance with the fifth grade elementary syllabus. The material obtained from the books and reliable websites. Learning media components include: (a) Title of media; (b) Introduction to media; (c) Instructions for using media; (d) Basic Competencies, Indicators; (e) Learning objectives; (f) Learning activities; (g) Learning material; (h) Student worksheets; (i) Evaluation sheet (*post-test*); (j) Answer key to the evaluation sheet.

Selection of learning in a media format adapted to the development of process skills and inquiry capabilities stage.

c. Compilation of media components

Based on the draft design of a product, then all the material recorded by using DSLR camera and edited with AVS Video Editor Software. Media product development is reviewed according to several indicators, namely: a) Feasibility of content, b) Language, c) Integrity, and d) Presentation according to needs.

2. Validation by experts

a. Validation of Research Instruments

The instrument validation was carried out to determine the validity and instruments used before the study was conducted. The instrument validation process is carried out by the recommended instrument validator. The validation of the research instruments included interview guideline validation, validation of observation guidelines, and validation of product assessment by media experts and material experts, question validation, teacher response scale validation, validation of student response scale.

Based on the results and validation of the instrument, the researchers conducted correction and revision of research instruments in accordance with the criticisms, suggestions, and feedback from the instrument validator. Then the researcher consulted until the research instrument became worthy of being used in research.

b. Product Validation by Experts

The data obtained in the development research is the data of the product feasibility evaluation conducted by media experts and material experts. Data on product feasibility evaluation results in the form of assessment, evaluation, and input regarding aspects of language, content feasibility, graphics, and presentation. The assessment data in the form of scores were summed, then calculated averages. Then it was converted into a scale value of five, namely the category of very good,

good, good enough, not good, and very poor.

c. Data on Product Assessment Results by Material Experts

The evaluation results are in the form of a score for the assessment of learning media style material by material experts and aspects of the feasibility of the content, language, and completeness of components. The following is a summary of the results of product evaluations by material experts.

Table 3. Product Assessment Results

Aspect	Score	Average	Category
Content Feasibility	62	4	Well
Linguistics	45	4	Well
Completeness of Components	67	4	Well
Total Score	174	4	Well

Based on the table above, the material expert validator assessed that learning media products were declared worthy of use. Material experts provided some inputs and comments and linguistic aspects, namely looking at typographical errors, the number of words in the sentence 3-5 syllables, the number of words in one line 6-7 words.

d. Results of Product Evaluation by Media Expert

The evaluation results are in the form of a score for learning media assessment. The following is a summary of the results of product evaluations by media experts.

Table 4. Product Assessment Results

Aspect	Score	Average	Category
Presentation	21	4	Well
Graphics	36	4	Well
Total Score	57	4	Well

Based on these assessments, learning media products as a result

of development if viewed from the aspect of the media were declared feasible with revisions.

Product Test Results

1. Initial Test

The initial test was conducted to obtain data related to the learning media developed. Initial trial subjects were seven students. The selection of the initial trial subjects was conducted randomly by taking into account the differences in students' abilities based on high abilities as many as 3 students, moderate ability 2 students, and low ability of 2 students.

The aim of the initial trial was to obtain information as an ingredient to improve product development. The results obtained in the initial test are in the form of data regarding teacher responses and student responses to learning media through filling the teacher's response scale and student response scale.

a. Teachers' Response

The results of the assessment of the scale of the teacher's response to learning media are summed and then averaged. Then the average calculation results are converted to a scale value of five. Below is the summary of the results data on the scale of the teacher's response to the learning media developed.

Table 5. Results of Teacher Response

Aspect	Score	Average	Category
Material / Content	14	4	Well
Linguistics	9	4	Well
Graphics	9	4	Well
Presentation	15	4	Well
Total Score	47	4	Well

The results of the scale of the teacher's response to the media in the initial trial showed a good response seen from the acquisition of a score

of 47 with the value in the category "Good".

b. Students' Response to Learning Media

Data on the students' responses include material aspects, language, graphics, and presentation. The results of student responses were summed and then calculated on average for each aspect.

Table 6. Students' Response on Media

Aspect	Score	Average	Category
Material / Content	63	4	Well
Linguistics	87	4	Well
Integrity	82	4	Well
Presentation	72	4	Well
Total Score	304	4	Well

Data on the scale of student responses to learning media showed a good response seen from the acquisition of a score of 304, an average of 4 with a value of B in the category "Good". This shows that learning media got good responses from students.

2. The Main Field Trial

The implementation of the main field trials involved the trial subjects as many as 13 class V students. The selection of the trial subjects was conducted randomly with regard to differences in student abilities. Students' abilities are grouped into high, medium, and low with the following classifications: 4 high-ability students, 4 moderate-capable students, and 5 low-ability students. The purpose of conducting field trials is to obtain information that can be used as material for product evaluation and refinement in subsequent revisions. Data analysis in the main field trials is as follows.

a. Teachers' Response to Learning Media

The scale of teacher response is given to find out the teacher's response to the learning media. Similar to the initial trial, the scale of the teacher's response was based on four aspects, namely material, linguistic, graphic, and presentation. The scale of teacher response data to learning media is added up, and then calculated on average for each aspect.

Meanwhile, the summary of the results data on the scale of the teacher's response to the learning media.

Table 7. Teachers' response of the Field Trial

Aspect	Score	Average	Category
Material / Content	16	4	Well
Linguistics	10	4	Well
Integrity	12	4	Well
Presentation	14	4	Well
Total Score	52	4	Well

The results of the scale of the teachers' response to the media in the field trials above show a "Good" response with a score of 52, an average of 4 with a value of B. Based on the results of field trials, it can be concluded that this learning media can be used to test operational fields by revising some sections suggested by the teacher and determined during the field trial.

b. Students' responses toward Learning Media

The score data from the results of student responses are calculated by the number and average of each aspect, then converted into a scale of five. The following in summary the scale of student responses to field trials can be seen in the following table.

Table 8. Students' Response to Media in Field Trials

Aspect	Score	Average	Category
Material / Content	137	4.31	Well
Linguistics	182	4.45	Well
Integrity	166	4.23	Well
Presentation	143	4.03	Well
Total Score	52	4.25	Well

Based on these data, it can be seen that based on the average student response to learning media was good with the acquisition of an average score of 4.25 with a B value included in the "Good" category. Based on these results, it shows that learning media get good responses from students.

3. Operational Field Test

Test the operational field was carried out in Va class students as many as 24 students as the experimental class and 21 Vb grade students as the control class. The selection of the experimental class and the control class was done randomly with lottery techniques. Both of these classes had the same initial abilities. In the operational trials, the control class and experimental class had different roles. The control class had a role as a comparison class, meaning that it is used to determine whether there were differences between classes that were not treated with the class given treatment. Before being given treatment, students work on the pretest to know students' initial abilities. The students learnt independently by using video tutorial media both individually and in groups.

The purpose of the operational field test is to implement the revised and evaluation products based on the results and field trials and obtain information as an evaluation and refinement of the final product. In addition, to determine the effectiveness of products developed in improving the ability of process skills.

4. Effectiveness Test Data Analysis

The control class was not treated and studied the differences in results between control class students who used conventional media and experimental class students who used the developed media, to determine the increase and difference in the ability of students' process skills in the control class and experimental class used t-test. Before conducting the t-test, analysis prerequisites are needed, namely in the form of normality and homogeneity tests. The normality test was carried out using the *Kolmogrov Smirnov* test with the help of the SPSS version 17.0 program. Based on the calculation, it is known that the *Asymp.sig (2- tailed)* value is as follows:

Table 9. Summary of Normality Test

Data	Sig (p)		Condition
	KK	TO	
After	0.482	0.320	p> 0.05
Before	0.510	0.211	p> 0.05

It appears that the significant skills of the process control class and the experimental class are greater than 0.05 (Sig (p)> 0.05). Thus Ho is accepted.

Homogeneity test was carried out with the help of SPSS version 17.0. Based on the calculation, it is known that the *Asymp.sig (2- tailed)* value is as follows.

Table 10. Test Summary

Data	Sig (p)	Condition
Skills After	0.710	p> 0.05
process Before	0,250	p> 0.05

Based on the table above, it appears that the significant skills of the process control class and the experimental class are greater than 0.05 (Sig (p)> 0.05). Thus Ho is accepted or the data is homogeneous.

a. Skills Enhancement Analysis Before and After Experiments

The summary data from the *paired sample t-test* for the ability of process skills is:

Table 11. T-Test Calculation Results

Data	Mean	Value t	Sig (p)	Condition
Before	24.5	-14.01	0,000	p> 0.05
After	28.72			p> 0.05

The table above shows the results of the calculation that the acquisition of the sig value. (*2-tailed*) process skill ability of 0,000 (p: 0,000 <sig. 0.05) with a t-value of -14.01 means that H_0 is rejected.

Based on these calculations, it can be concluded that there is a significant increase in the ability of process skills in students before and after using media video tutorials.

b. Data on Process Skill Ability Differences between the Control and Experimental Classes

The free *sample t-test (Independent Sample t-test)* was calculated using the SPSS version 17.0 program. The results of the difference analysis are described as follows:

Data Type	Ex	Value t	Sig	Category
Before	KK	0.422	-0,317	p> 0.05 be accepted
	TO			
After	KK	0,000	-1,150	p <0.05 rejected
	TO			

It can be seen from the results of calculations that the ability of process skills in the two classes was different.

Discussion

The purpose of this research and development was to produce products in the form of tutorial videos that are suitable for use in science learning for the fifth grade students of elementary school. This is in line with what Kahrman unveiled that video

may be benefitted as an effective media to teach children' skills.¹¹ Based on the results of the product assessment by the material experts, the learning media which were developed received a "good" assessment of the aspects of the content, linguistic, and completeness of the media components. These components of media were considered important in multimedia for learning¹². The assessment of learning media products by media experts included aspects of graphics and presentation of getting a "good" rating. This shows that learning media products are worthy of being used in trials.

The learning media developed have included all the components in each learning to organize the material so that it is easily understood by students. In the beginning, the objectives of media development were presented. The material described, learning activities, and assignments in the media have a level of accuracy and compatibility with the material style and characteristics of students. At the beginning of each lesson in the media, the learning objectives that students must achieve. The learning objectives were explained at the beginning of learning so that it was easier for the students to understand the competencies that students must master after learning to use the media. Furthermore, the learning strategy used is adjusted to the KTSP curriculum, namely using the *inquiry* approach. Regarding the development of material and content in the media reviewed from several reference sources both books and the internet.

¹¹ Carol R Kahrman, 'Efficacy of Math Video Tutorials on Student Perception and Achievement', 2016.

¹² Henyusdiyanti and others, 'The Development of Fun Learning Media , Educative And Innovative Based on E-Learning Multimedia To Increase Teacher Competency In Teaching of Entrepreneurship In School At Malang Raya', *IOSR Journal Of Humanities And Social Science (IOSR-JHSS)*, 23.2 (2018), 78–83 <<https://doi.org/10.9790/0837-2302117883>>.

The media was designed for fulfilling the students' needs in independent learning process to achieve the learning objectives. It contained material and activities that integrate the skills of students' process skills. Also, the attractiveness of learning media may significantly grow the students' motivation in learning.¹³

Activities in the media trigger direct experience, interviews, demonstrations, group discussions, experiments, and work on practice questions in student worksheets and evaluation questions. Therefore, learning media can improve the ability of students' process skills in learning. This happens because students are more interested in learning because learning should always be based on the students' real world and the environment around the student.

Conclusions and Suggestions

Based on the results of the research and discussion, it can be concluded that:

1. The procedure for developing instructional media for video tutorials on science lessons is (1) Analysis of potential and problems, (2) Data collection, (3) Product design, (4) Design validation, (5) Design revision, (6) Product testing, (7) Product revisions, (8) Usage trials, (9) Product revisions, so that learning media are produced.
2. From the results of the assessment from the material expert for the learning media that was made, the average score was 4 in the good category. The results of the assessment from media experts for instructional

media made get a mean score of 4 in the good category.

3. The video tutorial video learning videos are included in the very effective category. It is evident that the results of the *paired sample t-test* calculated that the sig value was obtained. (2-tailed) process skills and creative thinking skills of 0,000 ($p: 0,000 < \text{sign} 0,05$) means that H_0 is rejected ..

Based on the results of the research and development of the video tutorial learning media, there are some suggestions that can be conveyed that the tutorial video learning media can be used by students to study independently, so that material that has not been understood can be repeated.

For schools that have the same curriculum, learning video tutorial media can be used as a medium of learning in schools. The results of the development of video tutorial learning media have a positive impact on the learning process, so that the learning media of tutorial videos can be utilized in learning more broadly.

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¹³ Agostinho Dos Santos Gonçalves and others, 'Utilizing Audiovisual Media and Learning Motivation on Student Achievement of Social Department Grade VIII Student Fatumeta, Dili', *International Research-Based Education Journal*, 1.1 (2017), 5-14.

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