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Development of Educational Video Teaching Materials on Covid-19 Issues by Prospective Teachers Using the STREAM Approach in Science Education

Sri Maryanti[1*], Sri Hartati[1], Dede Trie Kurniawan[2], Rendi Restiana Sukardi[2]
[1]Biology Education, Faculty of Education and Teacher Training, Universitas Islam Negeri Bandung, Indonesia; [2]Elementary School Teacher Education Study Program, Cibiru Campus, Universitas Pendidikan Indonesia
[*]Email: sri.maryanti@uinsgd.ac.id

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Abstract

News about Covid 19 spread simultaneously so students need to get scientific explanations from educators. This research aims to develop an educational video that is integrated with STREAM (Science Technology Religion Engineering Art and Mathematics) on Covid-19 issue. It is expected to increase students' and public's understanding on the current conditions of the pandemic. The research was mix method that applied ADDIE (Analysis-Design-Development-Implementation-Evaluation) development model. The research presented of how the process of making and assessing the feasibility of the video. The thirty-two educational videos on Covid 19 were made by prospective teachers at one of university in Bandung. They used stop motion animation software. The data were analyzed by involving judgement of expert. The results showed that the video based on the results of expert validation was declared feasible and effective to be used as an educational video. It also showed that the lecturing process with STREAM approach was able to guide students in making a good educational video.

Keywords: Covid-19 Education; Stop Motion Video; STEM; STREAM; Prospective teacher students

Introduction

As the cases of Covid-19 continue sharply across the nation, there is a focus about preventing the transmission of the viruses included in the school (Davies, 2013) (Kartal, 2021). Children are deserved getting the information about the viruses including the ways of prevention, treatment, and the complication. Those understanding is probably can increase the sustained attention on the spread or transmission on Covid 19 (Jun et al., 2021). Education has a vital role to inform, educate, and raise the person's awareness on the Covid-19. Education can do it well. Audio-visual media is believed giving the most massive effect on those understandings (Leung et al., 2020)(Gee et al., 2017), no exception for Covid 19 issue. Video as a part of audio-visual media can be used as the educational tool to deliver message, strengthen the understanding of concepts, and attract viewers to grasp the important information (Aba ET AL., 2020). Because of that, video or audio-visual media can be used to deliver the information on Covid 19 issue well.

Video is capable to disseminate the information on Covid 19 effectively because it widely used and considered the most dominant socialization in the digital life (Laster-Loftus, 2019). Video is used to connected to social media. It strengthens the position of video as an effective tool to disseminate information on Covid 19. Because of that, teachers, pre-service teachers, prospective teachers, and educators are welcomed to deliver the information on Covid-19 issue by using video or visual media. The video on Covid 19 should contain clear, correct, and informative points (Brava-

ta et al., 2021). Prospective teachers as one of the figures who have the responsibility need skills to create the video on Covid 19 issue. They absolutely need a lecturing process that provide them to build those skills.

Facts about the covid 19 virus as knowledge must be presented in an interesting way so that it is easy to understand. Prospective teachers not only have to delivered the content of science e.g. morphology and anatomy of viruses. They also have to deliver how viruses should be overcome. They need more knowledges and information. It means they need comprehensive the knowledges on science, technology, religion, engineering, art, and mathematics (STREAM) (Kurniawan, D.T et al., 2020). Because of that, it is believed that prospective teachers need a STREAM approach in their lecturing to produce good educational video. STREAM education provides opportunities for lecturers to show prospective teacher students some of the concepts, principles and techniques from science, technology, religion, engineering, art and mathematics used in an integrated manner in the development of products, processes, and systems used in their daily lives (Kurniawan, D.T. et al,. 2021)

STEM learning needs to emphasize several aspects in the learning process. Current learning trends need to follow the development of the 21stcentury, one of which is by integrating Science, Technology, Religion, Engineering, Art and Mathematics (STREAM) (Nuangchalerm, P. et al, 2020),(Sarmiento, C. P et al., 2020) Some of the benefits of the STREAM approach make students better able to solve problems, innovators, inventors, independent, logical thinkers, and technological literacy (Agustina et al., 2019). The advantage of this research for the development of science education is giving a reference for learning innovations for prospective science teachers in training technology integration skills and mastering science content in the form of videos.This can be used as the output of the learning process that meets the competencies of prospective science teachers which is in line with various research literatures (Tanil, 2021), (Thomas et al., 2020). The results of the research are expected to be one of alternative references in the development of STREAM method as the lecturing strategy for prospective teacher in Indonesia.

Methodology

This research is a type mix method with the ADDIE (*Analysis-Design- Development-Implementation-Evaluation*) development design.The development procedure that has been carried out in developing the STREAM lecture model for prospective science teacher especially biology.

Analysis

The analysisis the stage of analyzing the needs of the STREAM integrated lecture model required by prospective teacher. The analysis stage includes three parts, namely needs analysis, curriculum analysis, and character analysis of prospective teacher. These stages are carried out as follows:

Needs analysis

Needs analysis is conducted by analyzing the main learning resources available on college because learning resources is very important in the continuity of learning. At this stage the authors will determine the appropriate STREAM learning method to be used in the lecture process for prospective teacher.

Curriculum analysis

Curriculum analysis is conducted by analyzing the used curriculum by the college .This is done so that the development is carried out in accordance with the applicable curriculum in higher education institutions that produce professional teachers.

Design

The design stage begins with designing video of the STREAM lecture model for prospective teacher students which is a product design that is the result of the analysis from the previous stage. This design stage is carried out with the following steps: a. Product design creation (storyboard), Storyboard is a picture of an educational video that is integrated with STREAM about the Covid-19 issue which will be developed as a guide to simplify the manufacturing process b. Making a flow chart (flowchart), Flowchart serves to determine a video display to the next view. There are several activities that need to be carried out including considering the suitability of the material based on the KD and IPK to be achieved, typing the material, determining the image, determining the display background, determining the type of font, determining the design of an educational video that is integrated with STREAM on the Covid-19 issue and the use of additional applications

Development

The development stage is the stage of making a product. At this stage video of the STREAM lecture model for prospective teacher students is made based on the design that has been done previously. Then, Video of the STREAM lecture model for prospective teacher students who have been prepared will be validated by expert lecturers. The validation process is carried out based on the instruments that have been prepared in the previous stage. Validation is carried out aimed at assessing the content of the product. Validators are asked to provide an assessment of the STREAM lecture model for prospective teacher students developed based on assessment instruments, as well as provide suggestions regarding the STREAM lecture model for prospective teacher students which will later be used as a reference for revision of improvements in improving the STREAM lecture model for prospective teacher students, so that feasible to be implemented in lectures. At this stage, data analysis was also carried out on the results of the STREAM lecture model assessment for prospective teacher students obtained from the validator. This is done to get a valid value for the feasibility of the product.

Implementation

This stage is the stage of implementing the research. The product implementation is carried out at the college that has been chosen by the author. The STREAM lecture model for prospective teacher students that has been developed, is then implemented by the lecturer in distance lectures. The author only serves as an observer who records everything, regarding the implementation of the product that can be used as an improvement in the STREAM lecture model for prospective teacher students. After the lecture process is complete, students take a test using the questions provided by the author. The questions are arranged based on predetermined indicators which aim to see the effectiveness of the product. At this stage, the authors also distribute a response questionnaire for lecturers and students, which contains statements about the use of the STREAM lecture model for prospective teacher students. This is done with the aim of obtaining valid data related to the use of the STREAM lecture model for prospective teacher students. In addition, the author asks lecturers and prospective teacher students to provide criticism and suggestions as a reference for the second product revision in accordance with the responses of lecturers and students. After that the authors analyzed the data based on the results of the response questionnaire. This aims to determine the effectiveness of the STREAM lecture model for prospective teacher students. The effectiveness can be seen from the results of student learning tests.

Evalution

The evaluation stage is the last stage in the development of ADDIE. At the evaluation stage, the authors made a final revision of the STREAM lecture model for prospective teacher students that

had been developed based on the input received from the response questionnaire or notes written during product implementation. It is intended that the STREAM lecture model for prospective teacher students being developed can be of effective use for lectures in tertiary institutions. After the steps are known, the next step is testing the product. The stages in testing the product that need to be known are through the design of the trial, the subject of the test, the type of data. The trial design stage, in this study the product testing was shown by several steps, namely the product was tested on validation lecturers consisting of material, learning, media, and language experts. After receiving an assessment and suggestion, the product is revised; carry out product tests to students to obtain feasibility and effectiveness data obtained based on the results of the response questionnaire and the pretest and posttest scores. In addition, the lecturers also obtained an assessment based on a questionnaire that had been distributed. The test subjects in this study were students of preservice teacher at one of collage in Bandungwhere lectures were carried out with a no-face-to-face policy.

Table 1. Indicators of feasibility assessmentof educational video media stop motion animation covid – 19 (Maryanti et al., 2018)

Feasibility of Educational Video Media for Covid – 19	**Indicator**	**Sub Indicator**
	Functions and Benefits	Clarify and make it easier to deliver messages
		Generating student interest and motivation
		Generating student creativity
	Aspects of truth, breadth and depth of the material	The concept developed is in accordance with the material reference
		The concept of the video presented is easy to understand
		The terms used in the video exactly match the references
	Visual Aspects of the media	The beauty of colors, backgrounds, images and animations.
		Image size suitability
		Image clarity
		Lighting accuracy
		Image movement speed
	Audio Media Aspect	Rhythm of Sound
		Voice Clarity
		Music Compatibility
	Typographic Aspects	Text Type Selection
		Text size accuracy
	Aspects of language	Language accuracy
	Aspects of media programming	Duration of time

The types of data used in this study are qualitative data and quantitative data. Qualitative data is in the form of comments or suggestions given by material experts, learning experts, media experts, linguists, student responses, and lecturer responses. Quantitative data in the form of data from the validation test results of experts, teacher and student responses, lecturer pretest and posttest

scores. The data collection instrument used the STREAM lecture model assessment sheet for prospective teacher students aimed at media experts, material experts, learning experts, dose response questionnaires and student responses as well as learning outcome assessment questions. Quantitative data analysis is useful for processing data in the form of numbers obtained from expert validation tests of material, learning, media, language, lecturer and student response questionnaires, students' pre-test and post-test scores. The data obtained from the validation test and response questionnaires are data to analyze the feasibility of the media, while the pre-test and post-test data are the data used to analyze the data on the effectiveness of the media. The expert validation score that has been obtained then is to determine the value into percentage.

Information: P = eligibility score or media quality After obtaining the assessment score of each validator, then look for the average using the formula (Fraenkel et al,, 2012). Based on thecalculation categories, it can be seen that the STREAM lecture model product for prospective teacher students is declared feasible if it is in the feasibility score between 61 - 80, which is in the goodcategory. As for the criteria in assessing the feasibility of the covid-19 educational stop motion animation video made by prospective teacher students can be seen in Table 1.

Results and Discussion

Designing and making a STREAM lecture model for prospective teachers

The implementation of the STREAM lecture model for prospective teachers was carried out in the Biology Education study program, FTK UIN SGD Bandung in 2020 when the lecture from home policy was implemented. A total of 32 fourth semester prospective teacher students participated in this activity. The results obtained from this study are the design of lecture activities with the STREAM approach (Science Technology, Religion, Engineering, Arts and Mathematics) for prospective teachersin making educational video projects covid - 19 with *stop motion animation* techniques.

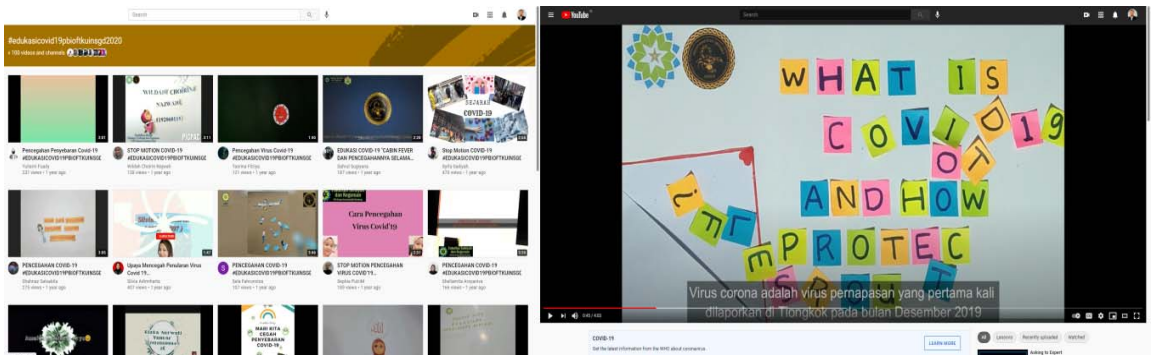

Figure 1. Covid-19 educational video products with Stopmotion Animation Techniques made by Biology Teacher Candidates for FTK UIN SGD Bandung Production Year 2020

The activities of each approach will be explained in more detail as follows:

a. Elements of Science

1. Students can recognize and understand the concept of viruses and body immunity.
2. Students can understand the process of contracting a disease due to the corona virus.
3. Students can understand the concept of prevention and transmission of diseases due to the corona virus.

b. Technological Elements

1. Students can understand the use of the internet in obtaining information about Covid - 19
2. Students can understand stop motion animation techniques through the selected application program in making educational videos

c. Element of Religion

1. Students can understand that the phenomenon of spreading disease caused by viruses is a sign of the greatness of Allah SWT. This is related to the study of the Qur'anic Verses and Hadith which explainthe phenomenon of disease outbreaks caused by viruses.

2. Students can practice and understand the procedures for worshiping during a disease outbreak during a pandemic based on religious regulations.

3. Students can understand what needs to be done in the event of a pandemic from a disease based on a review of religious beliefs.

d. Elements of Engineering

1. Students are able to make educational videos with narrative material needed to inform the public aboutthe transmission and prevention of covid-19.
2. Students are able to disseminate effectively and optimally so that their educational videos can be widely known by the public

e. Elements of Art

1. Students is able to make interesting animation for educational videos with stopmotion animationtechnique
2. Students are able to edit videos, make narratives and improve the sound quality of educational videos made.

f. Mathematical Elements

1. Students can understand the concept of time duration from the educational videos made.

Validation of the STREAM lecture model for student teacher candidates

Before the STREAM lecture model for prospective teachers was tested in lecture activities at higher education institutions, the STREAM Model was first assessed by four experts in the fields of media, materials, learning and language to ensure its feasibility for use in lecturing activities for student teacher candidates. Table 2 summarizes the results of expert validation on the STREAM learning model for student lectures for prospective teachers.

From Table 2 it can be seen that the STREAM lecture model for prospective teachers has a good design for lectures in prospective teachersnetworks (Fulton et al., 2011). Through this integrated STREAM design can form students who are able to reason and think creatively in presenting information through video animation media to the public (Pollard et al., 2018). It can be seen that the STREAM integration model developed is one of the learning approaches that are in accordance with the curriculum for prospective teacher students because it can facilitate professional, pedagogic, social and personality skills (Nadelson et al., 2012). Based on the description in the table above, it is estimated that problem based learning, project based learning, and cooperative learning can support the application of STREAM for student teacher candidates. STREAM application which is supported by problem based learning, project based learning, and cooperative learning intersects with scientific literacy and creativity (Sukardi et al., 2021),(Sumen et al., 2016). Several studies in Indonesia that have been conducted have shown that STEM learning can improve scientific literacy, creativity, and problem-solving skills for student teacher candidates.

Table 2. Recapitulation of Expert Validation Results against the STREAM lecture model for prospective teachers

Assessment Aspects	Assessment Indicators	Assessment Results
STREAM assessment	The existence of scientific elements in the model, the existence of technological elements in the model, the existence of technical elements in the model, the existence of religious elements in the model, the existence of art elements in the model and the existence of mathematical elements in the model, the relationship with life, the ability to think creatively and the ability to think critically.	The four validators stated that the stages in the STREAM learning model for prospective teacher students were fulfilled for higher education. However, it needs further affirmation and strengthening in the fields of mathematics and religion.
Design Validation	Order of presentation, Completeness of STREAM Information, Use of Fonts: Type and Size, Layout, Illustration, graphics and images, display design	The four validators state that illustrations, graphics and pictures provide sufficient and provide support for the lecture process for prospective teacher students with the STREAM model.
Content eligibility	Compliance with learning outcomes, material accuracy, suitability with student needs, conformity with teaching material needs, truth of learning material substance, benefits for adding insight and presentation	The four validators stated that the phenomena presented were related to the sharpening of knowledge integration through the STREAM model for student teacher candidates
Linguistic Validation	Readability, clarity of information, conformity to the rules of good and correct Indonesian and the use of language effectively and efficiently (clear and concise)	The four validators stated that the grammar used in the STREAM learning model for prospective teacher students was already in good criteria and could be used.

The skill of making videos for prospective teachers is an important thing to do. Delivery of learning content to students requires a good visualization effect so that the message and the meaning of content can be conveyed optimally to students (Zhang et al.,2020). Especially in conditions of learning from home that do not allow face-to-face conditions, this animated video becomes an option as an introduction to teaching materials that can be given to students (Kurniawan D T et al ., 2020), (Dogan et al., 2021). Not all prospective teachers can make animated videos with modern application programs. One way to make animated videos without an application program is to use stop motion animation techniques. Through this technique, prospective teachers will be trained in the integration of material delivery skills with video media with stop motion animation techniques. Prospective teachers are positioned as the content creators of learning materials according to the characteristics of students who like animated videos. Besides technology skills, students and

teachers are also trained in pedagogic skills in delivering teaching materials through video media channels. With the model of the project manager for making videos with stop motion animation, it is hoped that TPACK (Technological Pedagogical Content Knowledge) skills can be honed and their achievements increased.

Prospective teachers' idea on arranging the script of video is also a factor that influence the quality of the learning process. There also many videos on *Youtube* about Covid 19, but unfortunately, they do not work well in delivering the information that should be owned by students. Pedagogic, content, and technology are the three parts of important skills for prospective teacher(Sukardi et al., 2017), (Sopandi et al., 2018). Some researchers called them with TPACK. We can distinguish video made by prospective teachers with TPACK and teachers without TPACK by seeing some indicators. They are what we had discussed in the Table 1 and Table 2. The benefits of this research are felt to show that the lecture process with the STREAM approach is able to guide students in making good educational videos.

Conclusion

Based on the results of research and development of the STREAM lecture model for prospective teachers in the form of assessments from media experts, material experts, learning experts, linguists, lecturer responses, and students, as well as the results of the pretest and posttest, it can be concluded that the STREAM learning model is for prospective teacher students, are declared "feasible and effective" to be used in the learning process.

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