e-ISSN 2963-2870
Vol 3 2022

LEARNING VIDEOS IN EDUCATIONAL STATISTICS

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Abstract

Online learning conducted during the pandemic requires teachers to use media and technology in learning. One of the flexible media and technology is learning video. Learning video can be studied by students when students want it and can be adjusted to the speed of each individual's learning so that it can help those who have difficulty in understanding the content of the material during online and offline learning. This study aims to develop a video-based learning media that is appropriate with the learning outcomes of the educational statistics course so that it can be used as a reference. The learning videos that are focused on in this research are statistics videos in chapter 1: introduction to statistics and chapter 2: data presentation. This Research and development is using the ADDIE Model (Analyze, Design, Develop, Implement, Evaluate). Product development in the form of learning videos was validated by material experts and learning media experts and tested in the early stages to students who used the video in statistical learning. The instruments used in this study include a validator questionnaire for educational statistics material experts, a validator questionnaire for learning media experts, and student questionnaires in the early stages of testing. The data analysis technique used is quantitative and qualitative descriptive data analysis techniques with the aim of interpreting quantitative data on the questionnaire scores and interpreting qualitative data in the form of suggestions and comments from the validator. The results obtained are learning videos introduction to statistics and data presentation that fulfilled the valid and practical categories.

Keywords: Learning Video, Educational Statistics, Media and Technology

1 INTRODUCTION

Online learning during the pandemic requires teachers to apply learning using media and technology. Various platforms learning media are used by teachers such as whatsapp, google classroom, zoom, Ms. team, and etc. In other words, the necessity of teachers in using learning media and technology in these days is unavoidable according to the importance of the role of learning media in supporting online learning to provide understanding and achieve learning goals. The rapid progress of science and technology in the field of education initiated the development of learning media that can motivate students to be involved in a learning process.

Students who have struggle in internet access when studying online will have difficulty following lecture materials using video conferencing such as Zoom or Ms. Teams. Online learning through video conference has weaknesses which are quota problem which requires high cost and also an unstable internet connection so that the access into video conference becomes intermittent. This factor is caused by differences in the location of students accessing Zoom (Naserly, 2020). The material obtained eventually becomes incomplete. This is not a good thing because it will have an impact on learning misconceptions.

Students can use references such as books that can be used as learning resources to get more complete information. Unfortunately, Indonesia's literacy interest in the low categories. Based on data from the national reading literacy activity index (*Alibaca* index), Indonesia is in the category of low literacy activity with an average of 37.32. 9 of 34 provinces in Indonesia are in the category of moderate literacy with index numbers between 40.01 – 60.00; 24 others provinces are classified as low with index values between 20.01 – 40.00; and 1 province is in the very low category with index numbers between 0 – 20.00 (Solihin et al., 2019). In the digital era, sources of knowledge do not only come from books. However, there are other forms of learning media that can help present information or material content in a more interesting way which is learning videos. Therefore, description of the problem above can be overcome using a supporting material through learning media in the form of video.

Learning videos are flexible, it means that students can study from the videos whenever they want and can be adjusted to the pace of each student's learning. This can help those who have difficulty grasping the material, which is usually explained too quickly by the lecturer at face-to-face learning (David Brecht, 2012). This is due to the characteristics of videos that can be paused and played repeatedly by students to improve their understanding of learning materials (Luhulima et al., 2016).

Statistics is a branch of mathematics that is useful in daily life and also supports various other disciplines. The use of statistics is studied and applied in various fields of science including education, social, health, economics, agriculture and other fields of study (Rusydi & Fadhli, 2018). The difference is only in its applicative use in their respective fields. In other words, the application of statistics is very broad. Therefore, the statistics course is a subject that must be taken by students with the aim of equipping students with statistical knowledge and skills, especially quantitative data.

This research is based on the statistics course at Universitas Terbuka which is educational statistics. However, it is not impossible to be studied by other students from various institutions. Because the material taught is also almost the same as the content of statistics courses in general. Therefore, the purpose of this study was to meet the student's need for references regarding Educational Statistics courses through learning videos especially chapter 1: introduction to statistics and chapter 2: data presentation. In addition, with the convenience of today's technology, the usefulness of learning videos can reach more students. The use of YouTube as a video sharing

platform can facilitate the dissemination of educational statistics learning videos so that they can be accessed by students in various regions.

Based on the description stated above, the output in this study is in the form of a video which is expected to be a reference for students in understanding Educational Statistics courses. Therefore, the author wishes to conduct a study with the title "Learning Videos in Educational Statistics".

2 METHODOLOGY

This study aims to develop learning media based on online learning videos that are in accordance with the learning outcomes of educational statistics courses so that they can be used as references in understanding educational statistics courses. Online learning videos in this article limited to chapter 1: introduction to statistics and chapter 2: data presentation. This research is using development research which the development research model chosen is the ADDIE model. ADDIE model consists of 5 development steps including stage 1: Analyze, stage 2: Design, stage 3: Develop, stage 4: Implement, and stage 5: Evaluate (Branch, 2009).

The analyze stage in this study is the stage where the researcher analyzes the needs. The result of analyze stage is based on the material that students need to learn in the Education statistics course and the character of the students, namely whether students who have studied basic statistics have the appropriate competencies. The material needs used are guided by the RAT of education statistics course in Universitas Terbuka. Meanwhile, in the design stage, researchers design concepts and materials that will be included in educational statistics learning videos. At this stage, the researcher also developed a questionnaire instrument to measure the validity of the material in the form of closed and open question. The closed questionnaire uses a likert scale from 1 – 5. While the open questionnaire is in the form of reccomendation and suggestion by material expert validators related to improving the content of the learning video material. Educational statistics concepts and materials that have been designed or called story line for chapter 1 and chapter 2 are then validated by an expert validator of educational statistics materials. The validity of the material on the story line aims to obtain input for researchers in perfecting the concepts and material of educational statistics before being made into video form. After the concept and material in the form of story line are valid, then continue to the next stage which is the develop stage. At this stage the researchers began to realize the concept design and educational statistics material in the form of videos. The videos that have been made are then validated by learning media experts. Similar to the questionnaire instrument for material expert validators, the instruments given to media expert validators were also in the form of closed questionnaires and open questionnaires.

e-ISSN 2963-2870
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At the implementation stage, videos that have been valid by learning materials and media experts, are then tested for practicality through an early stage trial (Preliminary Field Testing). Based on Borg and Gall (2003) an early-stage trial (Preliminary Field Testing) was conducted on 6 to 12 subjects. The instrument used in the form of a questionnaire. This research is limited to the initial trial stage and does not proceed to the field trial stage. This is because the field trials will be continued in the next research related to the effectiveness of online learning video-based learning media on educational statistics. The last stage of the ADDIE development model is the evaluation stage. The feedback obtained from the early-stage trial was evaluated. If the results of the student response questionnaire are in the good category, a revision will be made according to the questionnaire items to meet the needs of the developed learning video. At the end of the study, the online learning videos developed in this study can be concluded to be valid and practical.

Data analysis was carried out on data from the questionnaire instrument validator of educational statistics material experts, the instrument validator of the learning media expert questionnaire, and the student questionnaire instrument at the initial trial stage. Therefore, the data analysis technique used is descriptive data analysis technique with the aim of converting the data in the questionnaire into scores and interpreted. The percentage results obtained are interpreted using the PAP classification of achievement levels with a scale of 5 according to Agung (2011) which can be seen in the following table.

Table 1. Interpretation of achievement percentage

Achievement Level	Criteria	Conclusion
90% –100%	Very Good	No Need to Revised
80% – 89%	Good	No Need to Revised
65% – 79%	Cukup	Revised
55% – 64%	Kurang	Revised
0% – 54%	Sangat Kurang	Revised

3 FINDINGS AND DISCUSSION

This research consists of five development stages which are 1) Analyze, 2) Design, 3) Develop, 4) Implement, and 5) Evaluate

3.1 Needs analysis

The first step in this research is conducting needs analysis. Needs analysis aims to determine the material to be included in the learning videos. In this step, researcher analyzed the students needs by doing interview and distributing questionnaire. This needs analysis is based on the material needs and characteristics of students. Based on the questionnaire to the 30 students who have studied educational statistics, it is known that several things are follows. Most of the students agreed that audio-visual media as the preferred type of learning media is 66.67% compared to audio or visual. 53.33% of students said important and 20% of students said very important that the educational statistics need to be equipped with learning video. 40% of students stated often and 30% of students stated very often that learning is equipped with videos make students more motivated to study educational statistics. students find that easy to understand the material if it is presented in the form of learning videos with frequent answer choices of 46.67% and very frequent answer choices of 43.33%. 40% of students stated the effective duration for a learning video with a range of 10-15 minutes. 40% of students expected that the learning video contain material equipped with example.

In addition, researcher also conducted interview to the lecturer of educational statistics. Based on the interview, we conclude the content of educational statistics as shown in the following table.

Table 2. The content of educational statistics

Learning Outcomes	Topic	Sub Topic
Students are able to explain the difference between statistics and statistic	Introduction to Statistics	Definitions of Statistics and Statistic
Students are able to mention the benefits of studying statistics		Benefits of statistics
Students are able to explain the types of statistics		Types of Statistics
Students are able to explain various measurement scales and classify data according to the types		Levels of Measurement
Students are able to explain the definition of population and sample.		Population and Sampel

Students are able to explain the the definition of frequency distribution table and its purpose.	Data Presentation	frequency distribution table
Students are able to explain terms related to frequency distribution tables.		
Students are able to present raw data in a frequency distribution table.		
Students are able to differentiate between "less than cumulative frequency distribution table" and "more than cumulative frequency distribution table".		
Students are able to draw a histogram graph based on data in a frequency distribution table.		Histogram, frequency polygon, and ogive
Students are able to draw and describe frequency polygon based on histogram.		
Students are able to draw and describe ogive based on table cumulative frequency distribution, either absolute frequency or relative frequency.		

3.2 The Design of Learning Videos

In this step, researcher designed the learning videos by making storyline. The design of the storyline referred to in this study is a comprehensive description of the video content that includes visual aspects, narration, and the time duration of each part. Moreover, this storyline was also made in the form of power point which will facilitate editor to develop, to edit, and to display sequence of each scene on the learning video. The video framework developed in the storyline consists of an introduction, a learning video core, and a closing. An introduction scene in the video is needed to provide information about the identity of the video and the topic or material to be discussed. The introduction scene features the researcher, material reviewers, media reviewers, greetings, and discussion titles/topics. The core of the learning video contains an explanation that describes the material and can be completed with example questions, and working procedures. The closing contains a short message after listening to the video and is equipped with information on the topic/material in the next video and also the references used. Here are one of the storyline as shown in the figure 1.

SKENARIO MEDIA PEMBELAJARAN | VIDEO PEMBELAJARAN

STATISTIKA DASAR PENDAHULUAN STATISTIK
Penulis Naskah : Azizah Mujahidah Annisa, Iin Ariyanti
Sasaran: Mahasiswa Semester 4
Durasi: 15 Menit
Format Sajian: Video Pembelajaran
Sumber Materi:

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Minium, E. W., King, B. M., & Bear, G. (1993). *Statistical Reasoning in Psychology and Education*. Canada: John Wiley & Sons, Inc.

Nurhasanah, S. (2019). *Statistika Pendidikan: Teori, Aplikasi, dan Kasus*. Jakarta Selatan: Salemba Humanika.

Sudijono, A. (2008). *Pengantar Statistik Pendidikan*. Depok: RajaGrafindo Persada.

Sinopsis / Deskripsi
Pendahuluan statistika mencakup pengertian statistika dan statistic, manfaat statistika, jenis-jenis statistika, ragam skala pengukuran, serta populasi dan sampel

Cut (Slide)	Storyline (Alur Cerita)	Aset Visual (Gambar)	Narasi (Voice Over) dan Musik Ilustrasi	Perkiraan Durasi
1.	Opening Title	Teks : Video pembukaan dengan tulisan "Statistika Pendidikan" Oleh: Azizah Mujahidah Annisa, S.Pd., M.Pd. Iin Ariyanti, S.Pd., M.Pd. Dra. Puryati, M.Pd.	Backsound: Musik instrumental	20 – 25 detik

Figure 1. Storyline of learning video

The resulting storyline is then validated by educational statistics material experts. The material experts gave assessments related to content/material validity, construct validity, and face validity. Here are the results of material experts assesment.

Table 3. The results of the material experts asessment

Components/Aspects	Material Experts Validation Results	
	Video 1: Introduction to statistics	Video 2: Data Presentation
Contents Validity		
The material presented is in accordance with the learning outcome.	5	5
Concept explained properly.	5	5
The material presented is easy to understand	5	5
The depth of learning material	3	3
The item evaluation questions contain sufficient information	3	3
The level of difficulty of the questions presented is appropriate	3	3
Average Percentage (%)	**70**	**70**
Components/Aspects	Material Experts Validation Results	
Construct Validity		
Materials are developed in accordance with learning outcomes	4	4

The example is in accordance with the objectives of learning achievement	4	4
the order of the material is appropriate and systematic	4	4
Accuracy of time allocation in accordance with the content of the material at each stage	4	4
Average Percentage (%)	**80**	**80**
Face Validity		
The image displayed is clear	4	5
The language used is communicative	3	3
Sentences in the script can be understood well	3	3
the sentence does not cause double interpretation or misunderstanding	3	3
The language used does not offend SARA and others	5	5
The language used is clear, easy to understand, and correct according to EYD	4	4
Average Percentage (%)	**73**	**76**
Average of Total Percentage (%)	**74 (Revised)**	**75 (Revised)**

According to the material expert, the storyline meets the criteria for validity and deserves to be continued to the learning video development stage with minor revisions. There are several components that need to be revised and are given by experts directly on the storyline. Based on comments and suggestions given by material expert validators, the researcher made corrections to the contents of storyline. Furthermore, the storyline can be continued to the stage of developing learning videos.

3.3 The Development of Learning Videos

The next stage is the stage of developing learning videos. The development of the learning video is conducted after the material design in the form of a storyline is declared valid by the material expert and can be proceed to video making. The flow of the video development stage consists of taking video recording according to the contents of the stroyline that has been made previously, editing video, then compiling a series of video contents from the opening, the learning video core, and the closing. Below are some scenes in the learning videos as shown in the figure 2 and figure 3.

e-ISSN 2963-2870
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Figure 2. The scene of an introduction in the learning videos

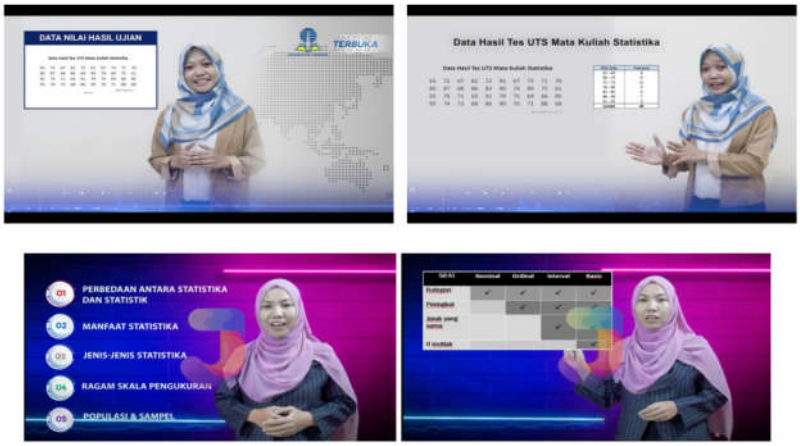

Figure 2. The scene of a learning video core in the learning videos

In the next step, the learning videos are consulted to the learning media experts for validation. Similar to the material experts, learning videos meets the criteria for validity by learning media experts but minor revisions are needed. Here are the results of material experts assessment as shown in table 4.

Table 4. The results of learning media experts

Components/Aspects	Material Experts Validation Results (%)		Criteria
	Video 1: Introduction to statistics	Video 2: Data Presentation	
Contents Validity	90	90	Valid and very good criteria
Construct Validity	95	95	
Face Validity	84	88	
Format and Audio Aspect	90	97.5	

3.4 Implementation and Evaluation of Learning Video

Implementation stage referred in this study are just early-stage trial (Preliminary Field Testing) which aims to test the practicality of the learning videos. The researcher uploaded the learning videos chapter 1 and chapter 2 via youtube. This is intended to make the video more accessible for students. Then, researcher did early-stage trial (Preliminary Field Testing) on 14 students for video chapter 1 and on 17 students for video chapter 2 by distributing preliminary field testing questionnaire. The students who get questionnaire were the students who have watched the learning video and studied educational statistics course. Here are the results of preliminary field testing as shown in table 5.

Table 5. The results of preliminary field testing

Statement	Preliminary Field Testing Results (%)	
	Video 1: Introduction to statistics	Video 2: Data Presentation
The material presented is in accordance with the Education Statistics Course	100	98
The title corresponds to the material presented	100	98
The explanation of the concept is stated correctly	98	97
The material presented in this learning video is easy to understand	98	95
The material presented includes the achievements of the Educational Statistics Course	100	97
The learning video contains example that can test your understanding of educational statistics material.	94	95
The learning video design is attractive.	94	95
Selection of background, text, color and writing looks clear and easy to read.	91	97
The quality of the sound in the learning video sounds clear.	98	96
The definitions, symbols and mathematical formulas presented are clear and precise	98	94

Selection of images according to the material described	98	95
The sound matches with the displayed image	97	97
The background music in the video is appropriate	94	96
The language used corrects according to Indonesian.	95	98
The language used does not contain SARA	98	97
The learning video is interesting to watch	98	98
The learning video supports you to understand the material.	98	95
The learning video can provide motivation to study educational statistics material	100	98
Average of Total Percentage (%)	**97 (No Need to Revised with very good criteria)**	**96 (No Need to Revised with very good criteria)**

Based on the table 5, it can be seen from preliminary field testing, all aspects is classified as very good without needing to be revised. Overall, based on the the results of material experts, learning media experts, and preliminary field testing can be concluded that learning videos of introduction to statistics and data presentation fulfilled the valid and practical categories. Link youtube of learning media chapter 1 is https://youtu.be/97k4I4r2yoA and chapter 2 is https://youtu.be/FGzpbYY1-1w

4 CONCLUSION

This research results in learning video in the educational statistics course. The learning videos that are focused on in this research are statistics videos in chapter 1: introduction to statistics and chapter 2: data presentation. It was developed through development research using ADDIE model which includes 5 stages (Analyze, Design, Develop, Implement and Evaluate). In the need analysis stage, researcher got the arrangement of material according to the needs of the course, duration video with intervals of 10-15 minutes, and the contents contain material material equipped with example. Next, in the design stage, researcher designed the learning videos by making storyline and validated to the material experts which resulted in a score 74 (the chapter 1 video) and 75 (the chapter 2 video). The storyline meets the criteria for validity and need to be revised based on comments and suggestions given by material expert validators. In the

development stage, researcher develop learning video based on the story line. Then, the learning videos are consulted to the learning media experts for validation which resulted in a score 97 (the chapter 1 video) and 96 (the chapter 2 video) with very good criteria. In the last stage which are implementation and evaluation stage, researcher did early-stage trial (Preliminary Field Testing) on 14 students for video chapter 1 and on 17 students for video chapter 2 by distributing preliminary field testing questionnaire. Based on preliminary field testing resulted in a score 97 (the chapter 1 video) and 96 (the chapter 2 video) which means all aspects is classified as very good without needing to be revised. Overall, it can be concluded that the learning videos which are the chapter 1 and the chapter 2 videos that are developed meet the valid and practical criteria.

ACKNOWLEDGEMENTS

This paper was successfully completed with the contribution of parties. Authors would like to thank to LPPM Universitas Terbuka that give opportunities, supports, and financial so that researchers can obtain research grant and publication.

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Pengembangan Kementerian Pendidikan dan Kebudayaan.

e-ISSN 2963-2870
Vol 3 2022