

A Guide to e-learning: Content Visualization Rubrics of E-learning Video

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ABSTRACT: *The rapid change in technology and internet has made a huge impact in education field. It has developed learning to the next point where anyone can learn anything from anyone else at any time. E-learning systems have become an important part of delivering the modern university curriculum. There are many shapes or forms of e-learning; one common form that everyone has known is a video-learning. Video is an effective medium to deliver knowledge or information to others because video-learning is able to present the information or knowledge in a consistent and attractive kind of way. However, not all video-learning succeed to deliver the information to students given the lack of knowledge educators have of which kind of video that brings students' interest more. This study focuses on how a video-learning can increase students' performance and what criteria of video should be applied in video-learning to acquire high students' engagement and to increase students' retention of the material. In this study, content visualization rubrics for e-learning video was created and tested. It's proven to increase students' performance by 61%.*

Keywords: E-Learning, E-Learning Evaluation, Student's Performance, Video-learning, Visualization

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1. Introduction

Technology and internet have developed learning to the point where anyone can learn anything from anyone else at any time [1]. It provides an environment where anyone, especially students, can flexibly learn across different locations and times, provides a modern learning alternative, and allow students to learn independently [2]. Deploying an online-learning improved the services' effectiveness and efficiency of the educators [3].

According to Rosenberg (2001), e-learning is a networked phenomenon which allows an instant distribution and revision. Standard internet technology is used to deliver e-learning. It goes beyond instruction and training to deliver the tools and information to improve performance [4]. Clark and Mayer [5] state that the 'e' on e-learning means the digital form of the course

will be later stored to be electronic form. While ‘learning’ means the content of the course will be able to help people to learn about certain course.

E-learning systems have become an important part of delivering the modern university curriculum [6]. It has become an alternative to the traditional learning, to help society to move toward a vision of on-demand and lifelong learning [7]. Based on the definition aforementioned, e-learning is the best platform for student to be able to learn and improve their performances amidst their business.

To know students’ opinion about the concept of e-learning, questionnaires about it have been distributed to 56 respondents. The questions are focused on the readiness, awareness, and needs of students on the concept of e-learning as a recognized method of learning.

E-Learning Needs

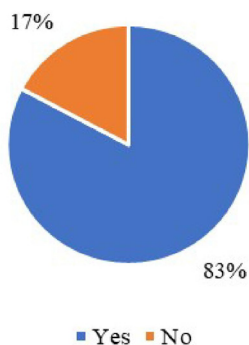


Figure 1. Questionnaire Result

Based on questionnaire results in Figure 1, as many as 83% respondents or 47 students agreed that e-learning is a need nowadays. They are open to the development of technology and willing to accept the newest way in learning and teaching method.

There are many types and forms of e-learning, it could be video, games, animation, etc. However, the courses in e-learning are delivered via digital devices such as computers and smartphones. The courses are delivered using words in two forms; spoken way or pictures and printed texts such as photos, illustrations, animation, or video [5].

Video is an effective medium of teaching and learning to be used in e-learning because it is able to present information or material in a consistent and attractive way [7]. Videos let us meet and experience people and places we can't see in person. Moreover, several advantages offered by visual images rather than verbal communication [8]. Visualization is something that can easily be accepted by a human's brain [9].

The advantages of video are video can provide more knowledge in a certain amount of time and space, illustrate some abstract language concept, simplify some complex concepts, present concept which is in motion and/or relates to one another, and able to get audience attention effectively and efficiently [8]. Thus, video is the best form for educators to give a lecture to students' in a more effective and efficient way.

However, not all videos are good and attractive to students. According to an article from elearningindustry.com written by [10], apparently video-learning is a bad idea if the video used talking-heads only, difficult to access, the lengths are long and not interactive enough to students. Yet, in another article from the same website written by [11], states that lengths of video could be longer as long as it has adequate interactions to engage the learner.

Given the advantages and disadvantages of video-learning aforementioned, thus based-criteria for video-learning is required to create a good one. This study focuses on how a video-learning can increase students' performance and what criteria of video

should be applied in video-learning in order to acquire high students' engagement and to increase students' retention of the material.

2. Literature Review

E-learning is a digital communication platform to construct and confirm knowledge. Associated communication technologies and internet are the technological foundation of e-learning. There are two primary applications that constitute e-learning, they are online and blended e-learning. E-learning is not an industrialized form of distance education. In a higher education, e-learning is the foremost which provides a quality education. E-learning has evolved from a different field of theory and practice [12].

In some definitions, e-learning is not just an online course. Oblinger and Hawkins (2005) stated that e-learning is not only an online course, but also using the technology in order to convey some parts or all of a course of permanent place and time [13].

There are many types and forms of e-learning, one common form that everyone knows is a video-learning. According to Hurtubise, et al., (2013) [8], the advantages of video-learning are:

- 1) Video can provide more knowledge in a certain amount of time and space
- 2) Illustrate some abstract language concept
- 3) Simplify some complex concepts
- 4) Present concept which is in motion and/or relates to one another
- 5) Able to get audience attention effectively and efficiently.

The effectiveness of video as a tool for learning still has many pros and cons. As the pros are already been mentioned, some cons about video-learning also occurs in education field. Hyla (2015) [10] in elearningindustry.com stated that:

- 1) The size of videos is much heavier than content based on text, pictures, and flash animation
- 2) The cost of development is much more expensive than the development of another e-learning content
- 3) More difficult to make updates to dynamic content (animation, video, simulation) than to static one (text, pictures)
- 4) The usability is lower than other e-learning content, it is not flexible to skim and search material in video-based learning
- 5) The accessibility is hard to keep up due to the visual and audio that should be in control.

Even so, video-learning should be prepared with proper engagement from all perspectives such as subject matter, instructional design, duration, voice, etc. so that students will find it interesting to learn using video-learning and will resulting high engagement to video-learning.

3. Methodology

The methodology of this study shown in Figure 2. First, writers create the video rubrics or criteria based on the findings on others' research. Video rubrics will be explained in Table I. After that, writers create a storyboard for each video or sub-chapter. Then, writers develop video prototype based on the rubrics that have been created. After the prototype is already being examined, then writers develop that prototype to be the actual video-learning. The videos then are being uploaded to Youtube platform.

Data collection will be divided into two parts, the first part is participants will be given a pre-test before they watch the videos, and then they will be given a post-test after they watch the videos. When the data is already being collected, then we analyze the data using the Kolmogorov-Smirnov Test to check whether the data is normally distributed or not. If the data is already normally distributed, we continue to do the paired sample t-test to compare the data between pre-test score and post-test score, and we can make a conclusion of this study. The flowchart of this methodology is shown in Figure 2.

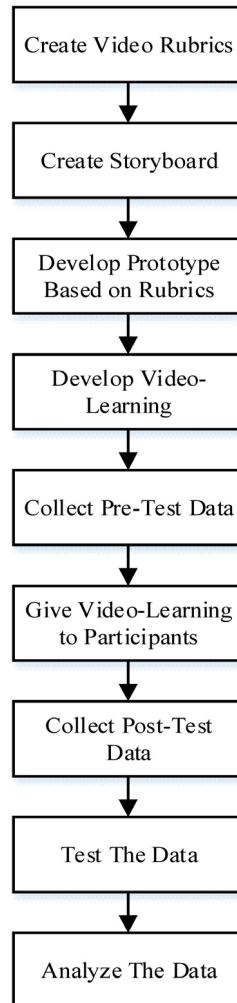


Figure 2. Methodology

3.1. Participants

Telkom University's Industrial Engineering Students batch 2016, 2017, and 2018 served as participants of this study. They were chosen because writers needed respondents who have not taken Project Management course yet due to the accuracy of the research. According to Cohen, et al. (2007) [14], the minimum number of respondents needed should be at least 30 persons or more.

3.2. Subject

We used Project Management course as the subject of this study because Project Management course is one of the mandatory courses for 7th-semester students in Industrial Engineering Major of Faculty of Industrial and System Engineering, Telkom University, Indonesia. Project Management course is a course with 3 credits. In Telkom University, a 3 credits course has only 14 meetings within one semester. Yet, Project Management course has too many materials to explain.

3.3. Tasks

Participants were given a web address to open the assessment media. First thing participants must do is to fill their identities such as name, student's number, and their batch. Then, participants have given a pre-test consists of 10 questions related to Project Management course introduction. The purpose of pre-test is to find out the initial scores before the subjects are given the videolearning. After subjects filled out the pre-test question, they will be given 7 video-learnings about Project Management course introduction and after watched the videos, subjects were instructed to answer post-test consists of 10 questions related to the videos. The questions of pre-test and post-test are the same thus writers will be able to compare the results before and

after subjects were given the video-learning.

3.4. Video Elements

E-learning video used in this study is related to Project Management course introduction. The introduction material is divided into 7 sub-materials thus there are 7 videos used in this study. The duration of each video is no more than minutes long. Each video used animations and pictures to present the material while the explanation was being given by the narrator by sound. The background of the video is white and there is cheerful audio as background sound. There is a talking head at the beginning of each video as video opening.

The content of video learning shows in Table 1 below.

No.	Video Content	Description	Reference
1	Number of videos	One chapter divided into several videos (aligned to the learning outcomes) for each sub-topic, therefore, the lengths of video will not be too long.	Guo, Kim & Rubin (2014) [15]
2	Duration	The duration of each video is shorter than 6 minutes.	Guo, Kim & Rubin (2014) [15]
3	Visual	The videos used words and graphics rather than words alone.	Clark & Mayer (2016) [5]
4	Color combination	The variation of colors is not excessive. Avoid the use of both blue and red color at the same time.	Jones (2003) [16] Tse & Mohamad, (2013) [17]
5	Voice	Using a conversational style, polite wording, human voice, and using background sound, also instructors speak with high enthusiasm and fairly fast.	Clark & Mayer (2016) [5] Guo, Kim & Rubin (2014) [15]
6	Opening	Video-learning which is using an instructor's talking-head is more engaging.	Guo, Kim & Rubin (2014) [15]

Table 1. Rubrics of Video Content

3.5. Treatment

The setting of this study was an online course for Project Management course at Telkom University, Indonesia. Project Management course consisted of 10 knowledge areas and 14 chapters, but this study will only focus on Project Management chapter introduction. The videos are uploaded in Youtube platform and participants can access the video using their own devices as long as their device is connected to the internet.

3.6. Data Processing

IBM SPSS Statistics 23 will be used for processing the data in this study. the quantitative data will be analyzed with basic descriptive statistics and paired sample t-test [18]. Before the data was being processed using paired sample t-test method, data normality test must be carried out. Data normality test has the objective of making sure the data we have is already normally distributed thus we can proceed to paired sample t-test [19]. A paired sample t-test was used to compare the result before participants given the e-learning course and after participants watch the e-learning videos. Because the data was collected from the same participants, thus a paired sample t-test is suitable to be used for analysing the data of this study [20].

4. Result and Discussion

Data were collected with the number of participants of 33 person consists of Industrial Engineering, Telkom University Student's

batch 2016 and 2017. Introduction of Project Management used as the topic for this e-learning video. At first, participants have given a pre-test consists of 10 questions regarding Project Management Introduction before participants given the video. Then, we served 7 videos of Project Management Introduction to participants and after participants watched the videos, participants were given a post-test with the same questions as the pre-test.

Table 2 shows the duration of each video which based on the rubrics of video content.

No	Name of Video	Duration
1	Project	2 minutes 47 seconds
2	Project vs Operational	2 minutes 15 seconds
3	PM	2 minutes 31 seconds
4	Project Life Cycle	1 minute 57 seconds
5	10 Knowledge	2 minutes 44 seconds
6	3P	3 minutes 21 seconds
7	Triple Constraints	2 minutes 49 seconds

Table 2. Duration of Video

Guo, Kim & Rubin (2014) [15] stated that duration of each video of e-learning should not exceed 6 minutes because the users are more likely to lose their engagement to the video after 6 minutes.

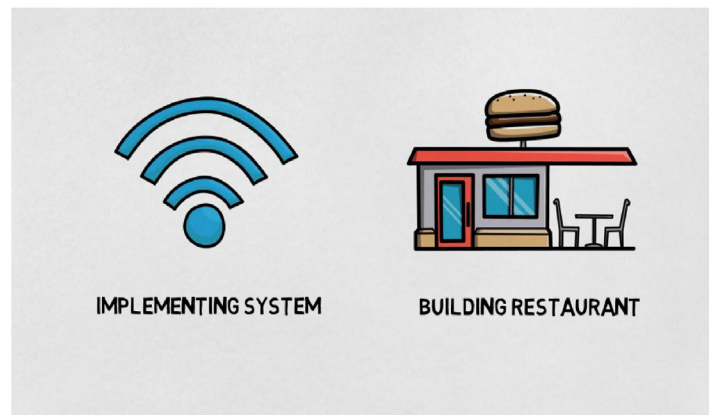


Figure 3. The Video Used Graphics and Words

There are words as in printed text in video and the graphic used is drawings animation. Words and graphics are needed because when users or students can engage in active learning, they are more possible to understand the material if they can contribute in active learning – active learning means they participate in some cognitive processing such as multimedia presentations where the material are presented in words and in pictures [5].

The talking head can increase the engagement of users because when users saw a human face in the video, they will have the feeling of “intimate and personal” feel [15]. Thus, the writer put the talking-head in the video to increase users’ engagement.

The combination of color used in the video is not excessive. As shown in Figure 5, the blue color dominated the frame and there is no other dominant color that competes the blue. Also, there are no blue and red color at the same frame as written in the rubric criteria.



Figure 4. The Talking Head



Figure 5. Color Combination

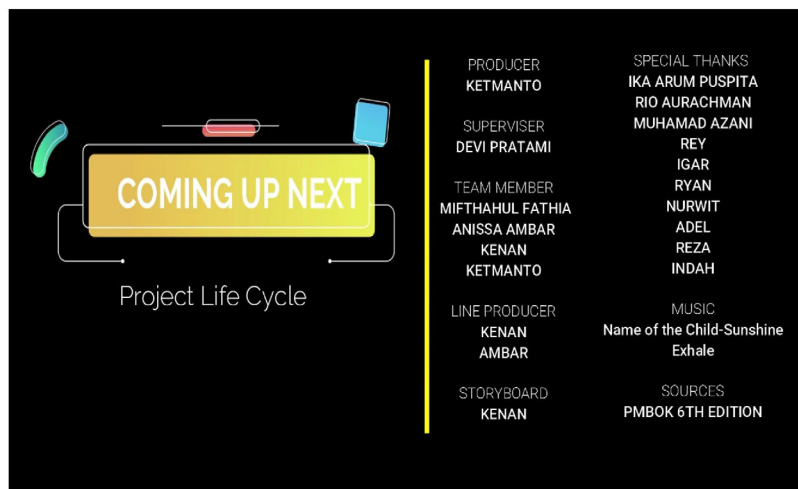


Figure 6. Closing of The Video

Figures 3 to 5 shown the examples of visualization of the video regarding the rubrics on table 1. Rubrics of video content was being used in order to increase the retention rate and the engagement of participants which will be examined using paired sample t-test and participants average score of pre-test and post-test.

4.1. Analysis of Average Test Score

The average score of pre-test and post-test are generated. From the histogram in Figure 6, it can be seen that there is an increase between the average score of pre-test and the average score of posttest. The average of pre-test score is 54,55 and post-test is 87,88 to be exact.

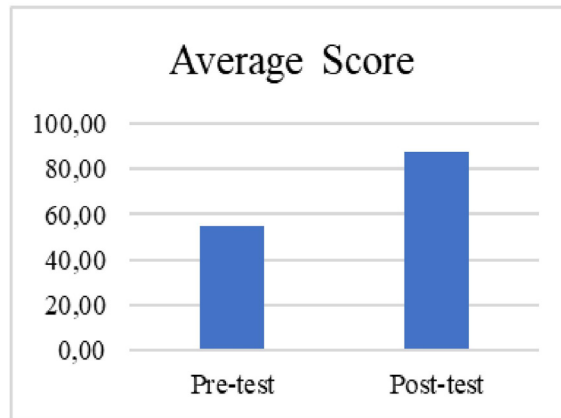


Figure 7. Average Score Result

An increase in between pre-test and post-test score proved that the video-learning succeed to deliver the knowledge to participants in a more efficient way than the conventional one where the lecturers come to class by class to teach the course each week.

4.2. Analysis of Kolmogorov-Smirnov Test

Kolmogorov-Smirnov Test is held to test the normality of the data [21]. Data normality test must be carried out to test whether the data is normally distributed or not because we can only use paired sample t-test when the data is normally distributed [19].

H_0 = Data of pre-test and post-test is normally distributed.

H_1 = Data of pre-test and post-test is not normally distributed.

The signification number (p) is 0.05 and if research signification $< p$, then H_0 is declined.

Type of Score	N	M	St	p
Pre-test	33	54.55	18.216	.135
Post-test	33	87.88	11.661	.209

Table 3. Kolmogorov-Smirnov Test Result

Based the table above, it is found that the research signification is 0.135 and 0.209 (higher than 0.05) and we can conclude that the data is normally distributed thus we can continue the research using paired sample t-test.

4.3. Analysis of Paired Sample T-Test

Paired Sample T-Test was conducted to prove the hypothesis about whether there is a difference between the score of participants' pre-test and participants' post-test. The Paired Sample TTest can be used to compare two samples means where there is a one-

to-one correspondence (or pairing) between the samples [19].

H0 = The average score of pre-test and post-test is the same.

H1 = The average score of pre-test and post-test is not the same.

The signification number (p) is 0.05 and if research signification $< p$, then $H0$ is declined.

Type of Score	N	St	t	p
Paired Pre-test –Post-test	33	19.148	-10.00	.000

Table 4. Paired Sample T-Test Result

From Table 4, we can see that the research signification is 0.000 which is less than p , thus we can tell that the average score of pretest and post-test is not the same or there is a difference between the score of pre-test and the score of post-test.

5. Conclusion

Technology and internet are able to support the learning method nowadays. Video-learning is proven to be as effective and more efficient as conventional learning where the lecturers come to class by class to teach the course each week. Using video-learning, lecturers do not need to repeat the same material to be taught in different classes, it can simply be accessed anytime in any condition using any device as long as the device is connected to the internet.

This study is conducted to find the suitable visualization and audio to video-learning. This study proved that the rule of divided one chapter into several videos per sub-topic, duration of each video is no longer than 6 minutes, the visualization uses words and graphics, the audio narrator uses human voice with polite wording, and put in talking-head of the instructor in the video is more engaging to users.

From the evaluation score of pre-test and post-test which increased by 61%, it can be concluded that the video-learning succeed to deliver the knowledge to participants. Thus, the criteria of video-learning aforementioned are suitable to be applied in learning videos.

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