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Design a Screencast Video for Software Learning in Higher Education
(Case Study: Tutorial Video for Digital Illustration Course)

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In Indonesian higher-education, the lecturer usually teaches software learning to students through a face-to-face practicum at a computer laboratory. However, in some conditions, these learning methods may not be carried out and must be done by online learning methods. Therefore, appropriate learning media are needed to accommodate them. One of the most suitable alternative media is using video with screencasting. A screencast is recordings that show the activity of mouse, tablet, or stylus and the computer screen. Instructional and demonstration videos that must show computer screen activity commonly use screencast technology. This research study the design process and the validation of the use of educational screencast for learning software in higher education. The case study is a screencast video for the Digital Illustration course in the Design of Visual Communication major at Trilogi University. The design methods for developing screencast videos uses the multimedia development model assisted by four-step screen capture processes. After that, the students enrolled in the Digital Illustration course watch the published video, and then the questionnaire was given to them to see the result of the research. The finding of this research produces some recommendations on how to design a screencast video. Based on the overall of the results, the screencast is a suitable medium to help students in understanding the subject of the course, attracting student interest in the subject of the course, providing motivation to learn more about the subject, helping students to learn independently. Some recommendation for design a screencast video are break the topic of the material into several sub topics to make videos shorter, use visual cues to highlight important information, balance the complexity of the content with the ideal duration of the video, and consider using subtitles.

Keywords – Screencast, Screencasting, Digital Illustration, Video, Online Learning

I. INTRODUCTION

Software is a program or operating system that is run on a computer to complete a variety of tasks. Various kinds of software now have an essential role, from business to daily life tasks. Therefore, software education at higher education is necessary, especially in this era of digital.

In Indonesian higher-education, the lecturer usually teaches software learning to students through a face-to-face practicum at a computer laboratory. The lecturer demonstrates how to use software step by step, and then the student follows the process effectively right away at the same lab. Although there have been several lecturers that practice software learning by online methods, most still choose to teach conventionally. However, in 2020 there is a worldwide pandemic of corona virus diseases, which causes all sectors of education in Indonesia replaced entirely by online learning methods. As a result, the software learning process cannot be through by face-to-face practicum as usual in a computer laboratory. This condition makes lecturers consider alternative learning media that can replace the effectiveness of learning software by face to face.

Video has long been used as an alternative learning media to support online learning. Hansch et al. define 18 of video production styles for education based on different affordances of learning. These production styles are; talking head, presentation slides with voice over, picture-in-picture, text-overlay, khan-style tablet capture, udacity style tablet capture, actual paper/whiteboard, screencast, animation, classroom lecture, recorded seminar, interview, conversation, live video, webcam capture, demonstration, on location, green screen [1]. This division of production style does not always mean stand-alone, but it can combine in various forms. Zac Woolfitt analyzes this video production style further to distinguishing qualities and their use in higher education [2]. Based on his overview, the most suitable video production style for learning software is a screencast. It is the most common video production style for instructional and demonstration videos that must show mouse and computer screen activity.

A screencast is recordings that show the activity of mouse or graphic tablet and computer screen. Nowadays, there are several alternative software that can be used for screencasting or screen recording. Some options of free software for screencasting are Screencast-o-Matic, Hypercam, or Cam Studio, while some paid options are Camtasia, Adobe captive, or Filmora.

This article will examine strategy on how to design video tutorials for learning software using screencasting to support online learning in higher education. Case studies taken are digital illustration courses at Trilogi University. The aim of the digital illustration course is to teach students how to make illustrations digitally using

computer technology. In contrast to illustration created manually by hand and paint, digital illustrations utilize computer hardware and software. In digital illustration courses, students generally learn how to use Adobe Photoshop, Corel Draw, or Adobe Illustrator software assisted with a mouse or graphic tablet.

II.   REVIEW OF LITERATURE

Cyntia J Brame proposes practical recommendations for educational videos by considering three elements, namely cognitive load, student engagement, and active learning, as shown in Table I [3]. This recommendation can maximize the effectiveness of an educational video for learning media. Therefore, the research will use this recommendation to design a tutorial video using screencast.

Table 1. Recommendations to maximize the use of educational video

Element to consider	Recommendation
Cognitive Load	Use signaling to highlight important information.
	Use segmenting chunk of information
	Use weeding to eliminate
	Match modality by using auditory and visual channels to convey complementary information
Student Engagement	Keep each video brief
	Use conversational language
	Speak relatively quickly and with enthusiasm
	Create and/or package videos to emphasize relevance to the course in which they are used
Active learning	Packaging video with interactive questions
	Use interactive features that give student control
	Use guiding questions
	Make video part of a larger homework assignment

Several numbers of research have proved the advantage and effectiveness of using screencast for an educational video. Sullivan et al. examined the effectiveness of using screencast at System Information Major in higher education for Data Mining Courses. The study revealed an increase in both theoretical concept learning and practical learning skills in Data Mining Courses when using educational screencast with Screen-o-Matic [4]. Andini et al. use questionnaire responses of respondents to see validation of using screencast as a learning aid in the 3D Media Development Course for University Education Technology Majors at State University of Malang, Indonesia. Concluded of the research is a screencast technology valid to use for learning aid [5]. These previous studies are the basis of using screencast tutorial video for a Digital Illustration Course.   Same as those, this research will use a questionnaire to evaluate if the screencast video suitable for the chosen course.

On both his research, Gillay recommended lecturer to adopt screencast technology for learning media in higher education as long as the video is comprehensive, good quality. Thus, he proposed that institutes of higher education should facilitate a training programs to lecturer about screencasting principles, practices, and pedagogies. [6], [7]. The design process in this research will simulate how the screencasting principle and pedagogies practices in making the tutorial video, so it can be a recommendation for other video design using screencasting.

III.   RESEARCH METHODS

This research uses the multimedia development model by William W. Lee & Diana L. Owens.   The model consists of several stages, namely: (1) Assessment or Analysis, (2) Design, (3) Development, (4) Implementation, and (5) Evaluation.   This model used to evaluate the validation of using screencast for an educational video[8].   For the detail on how to design, develop, and implement screencast video, the research use Damien Rattery four-step screen capture process, which has the detail on how to develop a screencast video. The detailed step divided into four, namely: (1) Prepare, (2) Capture, (3) produce, and (4) publish [9].   Therefore, in general, this research uses the multimedia development model assisted by four-step screen capture processes, as shown in Figure 1.
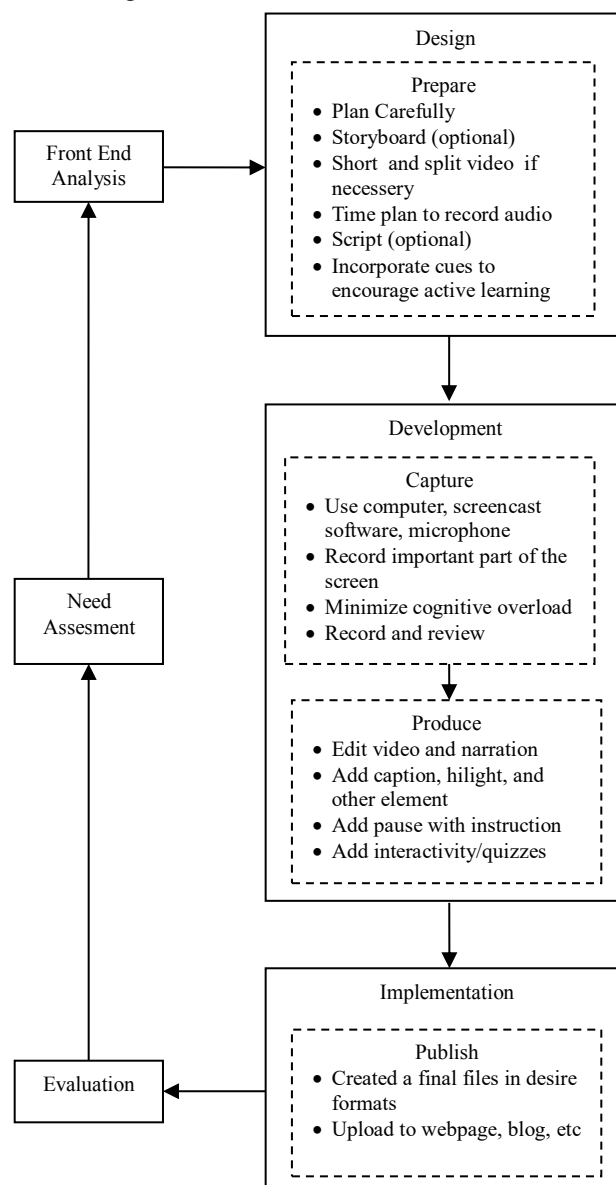

Figure 1. Research methods

This research case study is a tutorial video for Digital Illustration Courses at Trilogi University.   The target audience is 47 students enrolled in Digital Illustration Courses, which divide into two classes.   They will watch

the tutorial video and answer the questionnaire that examined students' perceptions of the end product.

The instruments to collect evaluation data are validation questionnaires, consisting of an assessment and input or comments from respondents. This instrument evaluates whether screencast video is suitable to be used for an educational video. Assessment questionnaires will use the Likert scale, which consists of four categories of value based on answers, as shown in table 2.

Table 2. Category answer of assesment quistionnaire

Answer	Value
Strongly Agree	4
Agree	3
Disagree	2
Strongly Disagree	1

The formula below used to calculate the average values to reach the result of validation.

$$P = \frac{\sum X}{\sum X_I} \times 100\% \qquad (1)$$

P = Percentage
$\sum X$ = The total value of respondent answer
$\sum X_I$ = The total value of ideal respondent answer
100% = A constant

After calculation, the percentage will be categorized based on Arikunto categorize as shown in Table 3 [10].

Table 3. Criteria of Validation

Persentage	Validation Criteria	Summary
76%-100%	Valid	The media is suitable for use
51%-75%	Sufficiently Valid	The media is sufficiently suitable for use and need minor revision
26%-50%	Less Valid	The media need a significant revision and not recommended for use
0%-25%	Not Valid	The media must be replaced and not recommended for use

IV. RESULTS AND DISCUSSION

A. Front End Annalysis

Based on preliminary observations, there are several findings in audience analysis, technology, situations, tasks, notable events, learning objectives, problems, media, and existing data. Some of these findings are specific characteristics of this case study. Therefore, some of the resolutions in this study will be specified based on the target audience in this case study and not general solutions.

The target audience is 4th-semester students and has taken Computer Graphics Courses in the previous semester. Therefore, this research assumed that students understand the basic tools and commands in Adobe Photoshop and Adobe Illustrator software. The Digital Illustration Courses learning will focus on how the students can using the software tools and command specifies for drawing. It will not explain in detail one by one all the tools that exist in Adobe Photoshop or Adobe Illustrator software.

All the students enrolled in a Digital Illustration Course have their internet access. This finding beneficial

because it means all students can access videos uploaded at websites or other online sites. However, not all of them have stable internet access. Therefore, this research will consider the video file's ideal size, so students do not have trouble downloading the material in full.

Students often repeat the videos to understand the material, particularly video tutorials. The repeating will get higher with more complex and challenging material. Therefore, videos download in online storage can save more quotas than download on video streaming sites that will continue to spend quota when it is re-streamed.

One of the students is deaf. Therefore, the use of full audio without the presence of subtitles is not suitable for this study. The video must be able to accommodate the needs of all students, including minorities.

The lecturer will give assignments to students with similar topics, as taught in a video. The assignment is a part of a broader assignment. It is divide into small tasks that process sequentially from beginning to end for one semester. Therefore, the order to teach every topic to the student must be sequential and must not be disorganized.

B. Design

Initial design plans begin with organizing the thaught topic and dividing it into subtopics. This division of topics is to avoid a lengthy video. Cynthia Brame recommended that each clip of video is short. Based on Guo et al. 's research, the students focussed for video tutorial is not affected by the length of the video. However, the video tutorial was the most often paused by students. In a video tutorial, This behavior happened because students must observe by following the discrete tutorial steps in the video[11]. Consequently, video tutorials must have a pause and skimming systems to accommodate this behavior. If not, it is better if the video has a short duration so that students can easily choose which part of the step they will watch. Meanwhile, according to Woolfit, the recommended length of an ideal video screencast is 10 minutes.

In Digital Illustration Course, there is two main thought topic. The first topic is a digital illustration with a cartoon style, and the second topic is a digital illustration with a realist style. These two main topics will be divided into subtopics based on the order they are made:
1. Digital illustrations with a cartoon-style are divided into five subtopics, namely: sketch, outline, basic color, shadow and light, and effects.
2. Digital illustrations with a realist style are divided into five subtopics, namely: sketches, rough colors, realistic rendering, and effects.

Each video will cover one subtopic and has a maximum duration of approximately 10 minutes following the recommended length of the ideal video screencast by Woolfitt. The chosen software for digital illustration is Adobe Photoshop.

After dividing the topic into several subtopics, the design follows up by making storyboards and narratives. In this video, the storyboard is more straightforward because the video heavily influences on natural digital illustration activities on a computer. However, before creating storyboards and narratives, the researcher creating a list of important techniques and software tools and commands in each of the tutorial stages. Thus, the
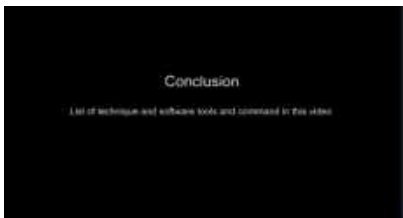
video tutorial consistently covers all the necessary knowledge in a digital illustration that students must know. An example of this list is as shown in table 4.

Table 4. Example list of knowledge software in subtopics

Subtopics	Activity	Software knowledge
Sketch	Optimize brush to sketch	Brush tools
	Erase or undo the sketch	Erase tools, Undo shortcut
	Organize between rough sketch and clean sketch	Layer properties and order
	Operate the image board	Zoom, Rotate, and Pan

Storyboards for each video generally have the same order of narration. So it has one general storyboard that will cover all of the video clips. The general storyboard for each video is as shown in table 5.

Table 5. General storyboard for all video

Screen visual	Naration, audio, transition
Screen 1- Introduction TOPIC SUBTOPIC	Naration: Title of topic and subtopic Audio: Same as naration Transition: Fade in fade out
Screen 2 - Practicum goal PRACTICUM GOALS List of practicum goals	Naration: Description of practicum objectives Audio: Same as naration Transition: Fade in fade out
Screen 3-? - Clip of screencast with recording software	Naration: Description of technique, software tools adn commands. Audio: Same as naration Transition: Fade in fade out
Last screen - Closing Conclusion List of technique and software tools and command in this video	Naration: Conclusion of the practicum Audio: Same as naration Transition: Fade in fade out

C. Development

Recording activity uses a computer with a specification of Windows 7 64 bit OS, intel core i5, eight gig ram, GeForce gtx 950. The assisted hardware is a graphic tablet for drawing digitally and a microphone for recording audio. The software used for recording or editing video is Filmora. Meanwhile, the software used for the process of making digital illustrations is Adobe Photoshop. The screencast will record the process of making digital illustrations at the size of 2479 px x 3508 px with graphic tablets.

The recording results of Filmora screencast within 15 minutes produce a file size of 150 Mb, while 1 hour produces a file size of 500 Mb. The lecturer must consider the time it will take to produce digital illustrations, because the longer the time used, the larger the files produced. In this stage, the researcher is never doing a non-stop recording for one subtopics. Researchers do it by dividing recording at 15-60 minutes duration until a material of the subtopic covered all. This strategy used because it is easier to edit the shorter video.

The duration to finish the realistic style of illustration digital is longer than the cartoon style. The duration is longer because the realistic style of digital illustration is more intricate and detail than cartoon style as shown in figure 2 and figure 3. The researcher makes a similar digital illustration work in the video to the standard digital illustration assignments students will make. To finish digital illustration assignments, students usually take hours or even days.

Figure 2. The cartoon style of digital illustration

Figure 3. The realistic style of digital illustration

The problem is that the benchmark duration of each sub-topic is 10 minutes. To overcome this, the authors use the feature to speed up video timings in the clip. The table 6 is the calculation simulation of the acceleration needed if the video compacted in the 10 minutes video.

Table 6. Simulation of video speed and duration

Topik	Subtopic	Real time duration (minutes)	Speed	Final duration (minutes)
Cartoon/ manga art style	Sketch	14	2x	7
	Line art	32	4x	8
	Basic color	21	3x	7
	Light and shadow	42	5x	8.5
	Background	73	8x	9.1
	Efect	12	2x	6
Realistic art style	Sketch	68	8x	9.7
	Rough color	56	6x	9.3
	Realistic rendering	410	41x	10
	Effect	46	5x	9.2

Based on the table, there are several subtopics with a long duration of time. If the duration video follows up the benchmark duration of the screencast video in 10 minutes, then some video clips must be accelerated at more than 5x times from the original speed. The speed will escalate, especially in the video clip of realistic rendering subtopics with 410 minutes duration. This video clip must be accelerated at 41x time in order for video clips compressed in under 10 minutes. Of course, this will affect students' cognition for understanding video. Therefore, for the final results of the video, the speed of the video will be adjusted according to needs and diminished the 10-minute duration rule.

There are several strategies to improve students' cognition. The first is to add the visual cues for captioning or highlighting important information to the video. Several visual cues are applied to the video to indicate important information on the clip, as shown in figures 4-7. The visual cue is (1) Color change on the part of the screen highlighting important elements, (2) Graphics on-screen highlighting important elements (3) Icon on the screen helping describe important information, (4) Zoom and pan on the part of the screen highlighting important software tools. The other strategy is to pause the video while the mouse is selecting software tools. An explanation of the name, function, and instructions for using the software tools are added while the screen paused.
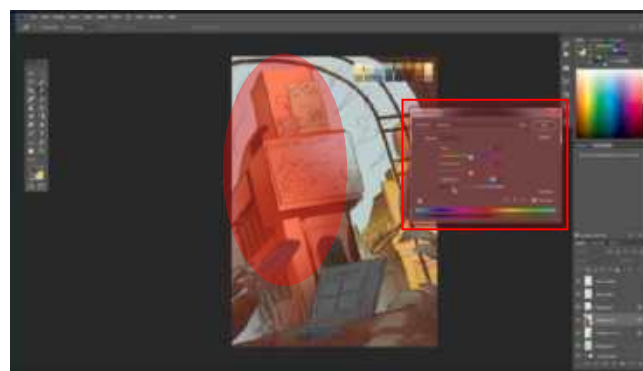.

Figure 4. Color change on the part of the screen highlighting important elements

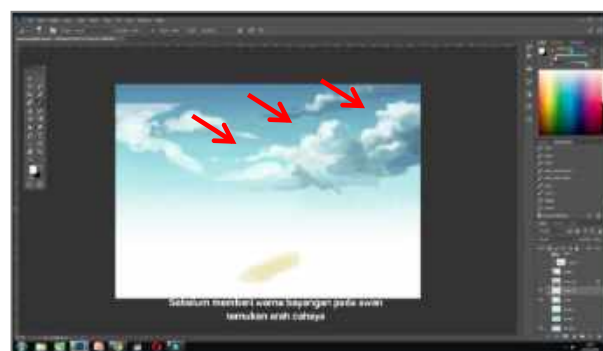Figure 5. Graphics on-screen highlighting important elements

Figure 6. Icon on the screen helping describe important information
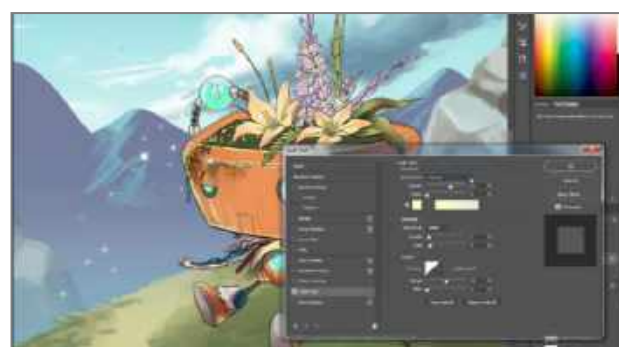

Figure 7. Zoom and pan on the part of the screen highlighting important software tools

In this video, all narrations are always follow up with subtitles. The subtitle is a necessity to accommodate students who are deaf. The text on the video uses the letter x type serif because it is clarity is excellent and easy to read on a computer screen. The subtitle uses a black bar behind the white text to emphasize the text on the screen. Audio recording is done simultaneously with video editing and adjusted to the timing of the edited video.

D. Implementation

Finished videos are saved in MP4 format with HD resolution (1920 x 1080). The Rendered video has the best setting so that the size of the video is not high but still good quality. Next, the video compressed using a codex to produce a smaller file size. Video sharing use Google Drive as online storage, then the link share on the online forum by adding information related to the video. This forum is also a medium for students to ask questions about materials that are still unclear in the tutorial video.

E. Evaluation

Based on the results of questionnaire assessment by 47 respondents, the screencast is a suitable media to help students in understanding the subject of the course (90.96%), attracting student interest in the subject of the course (85.11%), providing motivation to learn more about the subject (84.57%), helping students to learn independently (85.11%). Also, in line with previous research, the questionnaire concludes that students agree that narration is essential in video tutorials (97.87%) [12]. Most students choose narration in the form of audio accompanied by subtitles (78.7%). Brame proposed to avoid using music to avoid cognitive overload. Meanwhile, based on the results of this study, most students prefer there is music in the video (80.85%). This preferred might because there are many monotonous and repetitive activities in digital illustration tutorials (e.g., rendering image, making line art).

V. CONCLUSION

The screencast is a suitable medium to design tutorial videos for learning software in higher education. Some recommendations in design a screencast video for learning software are:

1. Break the topic of the material into several subtopics to make videos shorter and more manageable for students to download.
2. Use visual cues like graphics, color change, icon, or zoom screen, to highlight important information or elements on the screen.
3. Balance the complexity of the content with the ideal duration of the video to be delivered to students. The more complex the content, the longer the duration. In the case of digital illustration videos, a simpler image preferred, so the process of image drawing can finish in less than 1 hour.
4. Consider using subtitles to accompany audio narration to accommodate students who are deaf and to clarify unclear pronunciation in the audio.

Several problems from the results of this study need further research. There are must follow up research such as the effect of accelerated screencasting clips with students' cognitive abilities, the ideal duration specifically for video tutorials that use screencast, and the music requirements for videos that feature repetitive activity..

BIBLIOGRAPHY

[1] A. Hansch, L. Hillers, K. McConachie, C. Newman, T. Schildhauer, and J. P. Schmidt, "Video and Online Learning: Critical Reflections and Findings from the Field," *HIIG Discussion Paper Series*, no. 2015–02, 2015.

[2] Z. Woolfitt, "The effective use of video in higher education," *Lectoraat Teaching, Learning and Technology Inholland University of Applied Sciences*, 2015.

[3] C. J. Brame, "Effective educational videos: Principles and guidelines for maximizing student learning from video content," *CBE Life Sciences Education*, vol. 15, no. 4, p. es6, 2016.

[4] A. P. Sullivan, G. Alan Davis, and J. C. Stewart, "Edtech Effectiveness: Using Screencasts to Increase Learning Outcomes in Information Systems Curriculu," *Issues in Information Systems*, vol. 19, no. 1, pp. 210–217, 2018.

[5] A. Andini, S. Sulton, and Y. Soepriyanto, "Pengembangan Screencast untuk Belajar Software Animasi 3D," *JKTP: Jurnal Kajian Teknologi Pendidikan*, vol. 2, no. 4, pp. 297–305, 2019.

[6] Y. Ghilay and R. Ghilay, "Computer Courses in Higher-Education: Improving Learning by Screencast Technology," *i-manager's Journal of Educational Technology*, vol. 11, no. 4, pp. 15–26, 2015.

[7] Y. Ghilay, "Math Courses in Higher Education: Improving Learning by Screencast Technology," *Journal on Education*, vol. 4, no. 2, pp. 1–6, 2017.

[8] W. W. Lee and D. L. Owens, *Multimedia-Based Instructional Design: Computer-based Training, Web-based Training, Distance Broadcast Training, Performance-based Solutions*. 2004.

[9] D. Raftery, "Developing Educational Screencasts," in *Critical Design and Effective Tools for E-Learning in Higher Education*, USA: IGI Global: Engineering Science Reference, 2010, pp. 213–226.

[10] S. Arikunto, *Metode Penelitian*. Rineka Cipta, 2010.

[11] P. J. Guo, J. Kim, and R. Rubin, "How video production affects student engagement: An empirical study of MOOC videos," in *Proceedings of the first ACM conference on Learning@ scale conference*, 2014, pp. 41–50.

[12] A. Z. Mohamad Ali, K. Samsudin, M. Hassan, and S. F. Sidek, "Does screencast teaching software application needs narration for effective learning?," *Turkish Online Journal of Educational Technology*, vol. 10, no. 3, pp. 76–82, 2011.