The Effectiveness of Screencast for Understanding Computer Command Interfaces

Yerry Soepriyanto [1,*] Muhammad Banurohman[1], Sulthoni Sulthoni [1]

[1] Department of Educational Technology, Faculty of Education, Universitas Negeri Malang, Malang, Indonesia
*Corresponding author. Email: yerry.soepriyanto.fip@um.ac.id

ABSTRACT
This article presents the findings of a study driven by the desire to improve learning outcomes for understanding the concept of command interfaces Disk Operating System (DOS) commands. This is important because during classroom learning with teacher-centered demonstration mode, students have difficulty understanding the concept of DOS commands. In addition, it can provide empirical evidence of the use of screencasts in learning the concept of computer commands. The research method used is quasi-experimental with post-test only as the experimental design. The results of the analysis show that there is a difference in the results of learning DOS commands by participating in a demonstration in class compared to learning through a screencast independently accompanied by an assignment sheet. Students who study through screencasts independently have better learning outcomes than students who take part in demonstrations in class. The findings show that learning DOS commands by using screencasts is proven to be effective.

Keywords: screencasting, computer, instruction, Disk Operating System, learning outcome.

1. INTRODUCTION

The world of education has experienced many innovations along with technological developments. This also affects learning which has also experienced a lot of development, both methods, learning media, and learning processes. One of the technological developments applied in the world of education is E-Learning. E-Learning is the use of computer and electronic systems to support learning

E-Learning contributes greatly to the innovation of the learning process, where students not only listen to material explanations from lecturers but also carry out other activities such as demonstrating, observing, and others. Learning materials can be delivered in various formats or forms that are more dynamic and interactive. Through these learning activities, students can be motivated to participate in learning. One of the implementations of technology in education is media to facilitate learning.

The screencast is a digital recording in the form of computer screen output (monitor), in other terms also called screen capture video, which contains audio narration. While screencasting is a tool, technique or media used to record activities on a computer screen to be displayed again. The screencast is Udell's term in introducing and explaining it in a blog entry, while screencasting is about tools, techniques (techniques), and media (medium) [1].

The screencast is believed to be able to play a role in facilitating learning [2]. The screencast is a multimedia-based learning media because it involves multimodal sensory namely eyes and ears [3]. Meanwhile, other experiences have proven that screencasts are used as a tool to record students' expressions and creativity in operating dynamic mathematical software [4]. Wikipedia equates the term with a screencast by defining it as a digital recording of a computer monitor screen output also known as a video screen capture which often contains audio narration.

There are many choices of the application software used in screencast activities, ranging from paid to free. Of course, there are better features when the software is paid for than free. A free product that can be used to screencast Jing, Free Screencast, Screencastify. Some

of the paid products include Camtasia, Screencast-O-Matic, JingPro. Even for the same function, some websites provide applications for screen recording such as screencastify, Apowersoft, ShareX, and so on. All of this application software generally function to record all teaching materials or materials that are displayed on the monitor and recorded into a video so that students feel as if they are in a lecture room doing the learning. The results of the screencast recording are used as learning videos which can then be shared through various media such as on YouTube or blogs. There are several other reasons that make screencasts can be used as an alternative means of optimizing the learning process, including flexibility in learning time, web 2.0 support, can be changed at any time, lecturers and students can take the time and place to access anytime and anywhere through e-learning. screencast to avoid non-interactivity between students.

Screencast has been widely used in the field of education, from the lowest level to tertiary education [5], [6]. Effective computer-based work procedures are explained using screencasts, especially certain software application features [7], [8]. Through screencasts, students can see how to complete certain procedures and can observe what it looks like on the screen in completing certain operations. This shows that procedural knowledge presented with moving pictures can improve students' cognitive [9]. A screencasting value, one of which is a tutorial that guides us step by step in doing something related to software [10].

There are many tutorials on using an application program software on YouTube, ranging from office applications to graphic design. In general, the tutorial presents the movement of the mouse and the execution of an icon to carry out certain functions. One example is a screencast to create 3D animation using software [11], [12]. the screencast was created not only to facilitate the use of an application software but also to make it easier for someone to access the features on the website and support the implementation of a job [13].

Command interfaces are one of the three basic styles of human-computer interaction. Computer communication with users through command interfaces formal language typed with a specific syntax. Therefore, the user needs to learn and memorize the commands and sequences required for an operation. This is done to avoid errors that occur due to the confusion of the syntax of the language with English, inconsistency in the language, arbitrary syntax, errors made when typing the commands, and mismatch between the user's intention in the task domain with the computer concepts or syntax [14]. An example of these command interfaces is the MS-DOS product that was built by Microsoft from the very beginning of the operating system.

Learning command interfaces such as MS-DOS is important because computers generally use the operating system produced by Microsoft. This is also done to minimize errors that occur. Screencasting has another value, namely visualizing complex information such as command interfaces in MS-DOS [10].

Regarding the use of screencasts to explain computer-based work procedures, there have been many previous studies. These findings clearly show that screencasts have a positive impact on their users, both teachers and students [5], [6], [8], [15]–[21]. There is little empirical evidence that shows that screencasts are effective for learning programming and command interfaces, and there are even contradictions. Thus, this study contributes in the form of empirical evidence of the effectiveness of screencasts for understanding command interfaces. The hypothesis that we propose in this article is that there are differences in student outcomes between those who study using screencasts independently and demonstrations in class.

The purpose of this study was to investigate the effect of screencasts on student learning outcomes in understanding command interfaces in operating system courses and application programs. In particular, this study explores whether there is a significant difference between the average learning outcomes of groups using screencasts in command interface learning and those taught through classroom demonstrations.

2. METHOD

This study uses a quantitative-experimental method that aims to determine the effect of a treatment, as well as to prove the hypothesis. The variables used are: Experimental variables are variables that cause a change in the dependent variable. In this case, learning using screencast media becomes an experimental variable. The dependent variable is the influencing variable of treatment or the result of treatment in this study, namely the learning outcome of learning DOS commands.

The participants of this study were second-year educational technology students at the State University of Malang in the course of operating systems and application programs. The research sample was selected by random sampling, namely

students who have registered in their respective offerings. namely the experimental class is offering A (N=35) and the control class is offering B (N=33).

The stages of research carried out include the preparation stage (making test instruments in the form of multiple-choice questions and testing them on students who have taken courses in operating systems and application programs, testing the validity and reliability of questions that have been tested; making a Lecture Program Unit, teaching materials and student worksheets), implementation stage (implementing lectures using screencast media in the experimental class and then direct learning in the control class; giving Posttest in offering A or experimental class as well as in offering B or control class), completion stage (collecting test result data from each -each class, processing and analyzing the data results, the data from the analysis are interpreted and then concluded based on the hypothesis and problem formulation). The data that has been obtained is processed by calculating the test results to test the normality of the data distribution. After that, a homogeneity test was conducted to determine the variance of the data. To test the difference between the experimental class and the control class, the independent sample t-test was used. All analyzes were carried out using SPSS 20 application software.

3. RESULT

Before the further analysis is carried out, assumption tests are needed to determine further tests. The tests are the normality test and homogeneity test. The results of this assumption test determine the use of parametric or non-parametric statistical analysis. The first assumption test is the normality test which is carried out on both groups using the Kolmogorov-Smirnov test. A test that is able to prove that the two groups are normally distributed. Based on the output of SPSS that sig = 0.064 for the experimental group while the control group is sig = 0.198. The results of the analysis showed that both groups were normally distributed because p> 0.05.

The next assumption test is the homogeneity test to determine the two classes have the same variance. Based on the output of SPSS the homogeneity of the variance obtained a significance of 0.152. because the significance value was greater than 0.05 (p>0.05), both groups had the same variance.

Based on the test results of these assumptions, the next step is testing with parametric statistics. The proposed hypothesis testing uses an independent sample t-test to compare the average posttest scores. The level of significance as a guide in making decisions is (p>0.5).

Table 1. Descriptive analysis and t-value for posttest

Post Test	Groups	N	M	SD	df	t-value	sig
Score	experimental	35	91.43	8.29	66	3.83	0.00
	control	33	84.24	5.94			

Table 1 shows that the mean score of the experimental group (M=91.43, SD=8.29) outperformed the control group (M=84.24, SD=5.94) at the posttest (df=66, t=3.83, p<0.05). this means that the hypothesis is accepted.

4. DISCUSSION

Student outcomes in this study were limited to learning outcomes in the cognitive domain as measured by tests. The screencast in question is a video recording of behavior that occurs on the monitor screen. The behavior is to enter and execute the interface commands that are responded to by the computer on the monitor screen according to their functions and uses. Not only the behavior of the computer is presented on the screencast but it is followed by an audio narration explaining the concept of the command and its function.

Quantitative analysis of posttest scores answers research questions Does screencast affect student learning outcomes? Comparison of the mean scores of the experimental group and the control group on the posttest showed a statistically significant difference in favor of the experimental group on the understanding of the interface commands. In other words, students learning command interfaces using screencasts are superior to demonstrations in class.

These results are the same as previous studies even though the research is screencasting or technical, procedures for producing products. Pal and Iyer's research shows that the language used for audio narration at the time of recording is the user's native language [22], [23]. Several recommendations suggested by researchers when creating screencasts have been well followed in this study.

The same finding in the research of Ghilay and Ghilay that the video clip provided for the computer course curriculum can have a significant effect compared to the text [24]. Screencasts can be a substitute for asynchronous lectures or a supplement to the entire computer course curriculum. Morris and Chikwa reported that screencasts had a significant impact on knowledge acquisition and found very positive perceptions of students in their attachment to resources. The article also states that to engage students, screencasts must be short, accessible, and downloadable on all devices. Screencasts should also capture lecture conclusions or explanations of difficult aspects and not replace all lectures [25].

Other research contributes empirical evidence to the use of screencasts in the form of developing positive attitudes towards learning C++ computer programming. The results show that students who have never received a formal lecture on programming have an increased positive attitude [26]. Screencasting techniques are offered in two modes, namely screencast and narration modes and screencast, text, and narration modes. The superior modes are screencast, text, and narration, as they present text at the bottom of the screen which aids the learning of new words and syntax and prevents ambiguity. Further research from Cheah and Leong also revealed that the difference in logic level between students did not affect the learning of C++ computer programming in the two treatment modes [27].

The findings in this study are not in line with previous studies by Lee, et al with the result that there is no significant difference in the effect of screencast [28]. Although the same as demonstrating writing program code step by step, they differ in the level of abstraction of knowledge. The author also tries to identify results that contradict his theoretical predictions regarding learning programming.

5. CONCLUSION

Learning command interfaces is necessary for computer maintenance or minor repairs. Students must always remember the commands and functions to master knowledge of computer-based work procedures. This study explores the effect of screencasts on student learning outcomes to learn command interfaces. The results show that there is a significant difference in the average posttest score between students who use screencasts and students who listen to demonstrations in front of the class. The advantage of the average score of students using the screencast is following the value of the screencast

itself, namely visualizing complex information like script command.

In the future, further research on retention and transfer is needed to learn command interfaces. This needs to be done to test the effectiveness of screencasts as a cognitive tool further. Screencast understanding to facilitate more complete learning from the perspective of educational technology.

REFERENCES

.[1] J. Udell, "More on screen videos and dynamic categories," Jan. 18, 2004. http://jonudell.net/udell/2004-01-18-more-on-screen-videos-and-dynamic-categories.html (accessed Apr. 04, 2021).

[2] Y. Soepriyanto, "Peran Screencast dalam Memfasilitasi Pembelajaran," Edcomtech: Jurnal Kajian Teknologi Pendidikan, vol. 4, no. 1, p. 7, 2019.

[3] M. R. Abdul Razak and A. Z. Mohamad Ali, "Instructional screencast: a research conceptual framework," Turkish Online Journal of Distance Education, vol. 0, no. 0, Apr. 2016, doi: 10.17718/tojde.21316.

[4] J. Lazarus and G. Roulet, "Creating a YouTube-Like Collaborative Environment in Mathematics: Integrating Animated GeoGebra Constructions and Student-Generated Screencast Videos," European Journal of Contemporary Education, vol. 4, no. 2, pp. 117–128, Jun. 2013, doi: 10.13187/ejced.2013.4.117.

[5] A. Fraser and P. Mclaren, "Patterns of instruction: Using screencasts in the teaching of Textile Design.," in Proceedings ascilite Wellington, Wellington, New Zealand, 2012, pp. 331–332.

[6] S. Winterbottom, "Virtual lecturing: Delivering lectures using screencasting and podcasting technology," Planet, vol. 18, no. 1, pp. 6–8, Jun. 2007, doi: 10.11120/plan.2007.00180006.

[7] A. Carr and P. Ly, "'More than words': screencasting as a reference tool," Reference Services Review, vol. 37, no. 4, pp. 408–420, Nov. 2009, doi: 10.1108/00907320911007010.

[8] S. A. Lloyd and C. L. Robertson, "Screencast Tutorials Enhance Student Learning of Statistics," Teaching of Psychology, vol. 39, no. 1, pp. 67–71, Jan. 2012, doi: 10.1177/0098628311430640.

[9] W. H. Allen, "Intellectual abilities and instructional media design," AV Communication Review, vol. 23, no. 2, pp. 139–170, 1975.

[10] I. Ozsvald, The Screencasting Handbook, 1st ed. 2010. Accessed: Apr. 05, 2021. [Online]. Available: https://thescreencastinghandbook.com/wp-content/uploads/The_Screencasting_Handbook_rel10_20100502_v6.pdf

[11] A. Andini, S. Sulton, and Y. Soepriyanto, "Pengembangan Screencast untuk Belajar Software Animasi 3D," JKTP, vol. 2, no. 4, pp. 297–305, Nov. 2019, doi: 10.17977/um038v2i42019p297.

[12] R. Ramli, A. S. Yunus, S. Z. Mohid, H. Abas, and H. Baharudin, "A Review On The Innovative Use of Screencast Technique For Learning 3D Animation Software," International Conference on Information Technology, p. 7, 2017.

[13] B. Putra, S. Sulton, and Y. Soepriyanto, "Pengembangan Screencast sebagai Electronic Performance Support System dalam Pemanfaatan Sipejar UM," JKTP, vol. 2, no. 4, pp. 252–260, Nov. 2019, doi: 10.17977/um038v2i42019p252.

[14] S. Margono and B. Shneiderman, "A Study of File Manipulation by Novices Using Commands vs. Direct Manipulation," in Sparks of Innovation in Human-computer Interaction, Westport,CT: Greenwood Publishing Group Inc, 1993, p. 400. Accessed: Nov. 13, 2019. [Online]. Available: https://drum.lib.umd.edu/bitstream/handle/1903/354/CS-TR-1775.pdf?sequence=2

[15] A. Z. M. Ali, K. Samsudin, M. Hassan, and S. F. Sidek, "Does screencast teaching software application needs narration for effective learning?," The Turkish Online Journal of Educational Technology, vol. 10, no. 3, p. 7, 2011.

[16] J. Bailey, "Informal screencasting- results of a customer-satisfaction survey with a convenience sample.pdf," New Library World, vol. 113, no. 1/2, pp. 7–26, 2012.

[17] D. Mullamphy, P. Higgins, S. Belward, and L. M. Ward, "To screencast or not to screencast," ANZIAM Journal, vol. 51, p. 446, Jun. 2010, doi: 10.21914/anziamj.v51i0.2657.

[18] J. A. Oehrli, J. Piacentine, A. Peters, and B. Nanamaker, "Do Screencasts Really Work? Assessing Student Learning through Instructional Screencasts," p. 18, 2011.

[19] E. Peterson, "Incorporating Screencasts In Online Teaching," The International Review of Research in Open and Distributed Learning, vol. 8, no. 3, Dec. 2007, doi: 10.19173/irrodl.v8i3.495.

[20] A. Rocha and C. P. Coutinho, "Screencast and Vodcast: An Experience in Secondary Education," in Proceedings of Society for Information Technology & Teacher Education International Conference, San Diego, USA, 2010, pp. 1043–1050.

[21] T. Pinder-Grover, J. M. Millunchick, and C. Bierwet, "Work in Progress - Using Screencasts to Enhance Student Learning in a Large Lecture Material Science and Engineering Course," Saratoga Springs, NY, 2008, pp. 13–14.

[22] Y. Pal and S. Iyer, "Classroom Versus Screencast for Native Language Learners: Effect of Medium of Instruction on Knowledge of Programming," in Proceedings of the 2015 ACM Conference on Innovation and Technology in Computer Science Education - ITiCSE '15, Vilnius, Lithuania, 2015, pp. 290–295. doi: 10.1145/2729094.2742618.

[23] Y. Pal and S. Iyer, "Effect of Medium of Instruction on Programming Ability Acquired through Screencast," in 2015 International Conference on Learning and Teaching in Computing and Engineering, Taipei, Taiwan, Apr. 2015, pp. 17–21. doi: 10.1109/LaTiCE.2015.38.

[24] Y. Ghilay and R. Ghilay, "Computer Courses in Higher-Education: Improving Learning by Screencast Technology," JET, vol. 11, no. 4, pp. 15–26, Mar. 2015, doi: 10.26634/jet.11.4.3148.

[25] C. Morris and G. Chikwa, "Screencasts: How effective are they and how do students engage with them?," Active Learning in Higher Education, vol. 15, no. 1, pp. 25–37, Mar. 2014, doi: 10.1177/1469787413514654.

[26] C.-S. Cheah, "Screencasting: how effective is it in developing positive attitude towards the learning of C++ computer programming," Journal of Educational Sciences & Psychology, vol. 9, no. 2, pp. 65–72, 2019.

[27] C. Chin Soon and L.-M. Leong, "The moderating effect of logic in the learning of C++ computer programming using screencasting," MOJET, vol.

7, no. 2, pp. 88–96, Apr. 2019, doi: 10.17220/mojet.2019.02.006.

[28] M. J. W. Lee, S. Pradhan, and B. Dalgarno, "The Effectiveness of Screencasts and Cognitive Tools as Scaffolding for Novice Object-Oriented Programmers," Journal of Information Technology Education: Research, vol. 7, pp. 061–080, 2008, doi: 10.28945/179.