Affective Domain in Online Learning Lecture Notes

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ABSTRACT

The development of information technology allows learning forms to be carried out in a way that is different from traditional face-to-face classroom. However, there are still many online learning materials that have not consideration of good design elements in the management of learning materials. The research method uses observation and literature studies especially in implementation of multimedia principles and previous research. This publication produces an experimental design and methodology that will be used to measure the effect of features on online learning notes. The aim at this research is to create an online learning model specifically in the affective domain materials.

Keywords: *online learning, affective domain, multimedia principles*

1. INTRODUCTION

The evolution of digital information technology affects all human aspects and creates a digital network society. Information technology also influences the education sector related to how the knowledge is developed, obtained and disseminated. Online learning is a learning method that use information packages based on digital information technology and communication for learning benefits that can be accessed by students anytime and anywhere. Online learning also can be combined with classroom learning that known as blended learning. The online learning implementation has an impact on learning culture transformation. The students' position is required to be more individual in online learning. The lecturer's (*pamong*) role that expressed by Ki Hajar Dewantara has shifted its function [1]. A lecturer cannot be directly involved in online learning. In online learning, teacher function more as mediators and facilitators than as knowledge guide. Transfer of values, intellectualism, ethics, responsibility, honesty, and reflective matters is not as easy as face-to-face classroom learning.

In online learning, the lecturer prepares lecture material, then uploads it to a Learning Management System (LMS). Usually lecture material content consists of lecture notes and video lectures. Lecture note content can be in the presentation slides, text documents, and another digital format. The lecture video material generally displays a lecturer that give teaching course. LMS also has a learning evaluation section to test student outcomes. Based on the 2019 Kemenristekdikti's assessment, it was classifying the number of the best Indonesian universities. Generally, the best state universities have implemented online learning. These universities are the Bandung Institute of Technology (*lecture.itb.ac.id*), Gadjah Mada University (*elisa.ugm.ac.id*), Bogor Agriculture Institute (*lms.ipb.ac.id*), the Sepuluh Nopember Institute of Technology (*share. its.ac.id*) and University of Indonesia (ocw.ui.ac.id).

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This research focused on online learning material, especially on lecture note content. Generally lecture notes consist of presentation slides and other digital documents. The observation found that the creation of existing lecture notes still did not optimize design aspects in constructing knowledge for students. The management of text and graphic elements makes the design aspect has an important role in developing lecture note materials. Many lecture note contents do not use the basic principles of good design in its application. The application of design elements such as text, shapes, images, and colors has not been effectively supported by design principles such as composition, contrast, harmony, flow, and alignment. The information conveyed in the lecture note requires reading easiness of information and clarity of student knowledge construction. The use of graphic elements have not been optimally applied to create a good knowledge construction, many graphic elements have only as decorative function. The development of graphic elements can be improved on a higher stage of knowledge construction. This situation can be seen in Figure 1.

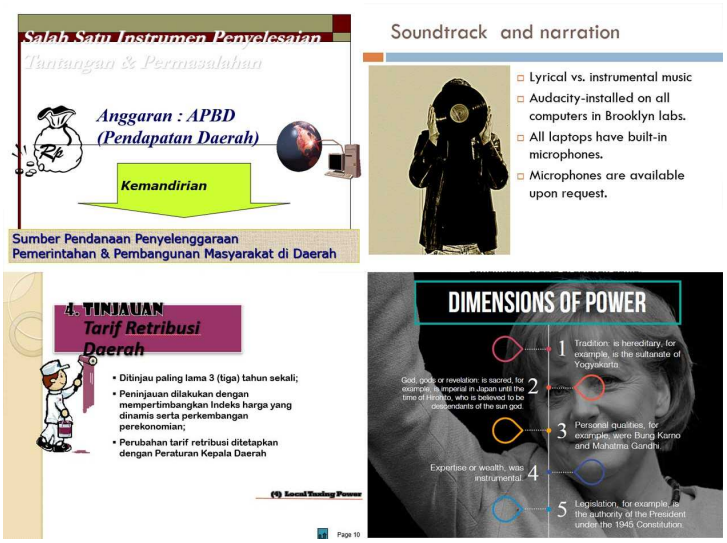

Fig. 1. Implementation of visual elements that are not optimal in online learning lecture notes. The application of design elements such as text, shapes, images, and colors has not been effectively supported by design principles such as composition, contrast, harmony, flow, and alignment. Many graphic elements have only as decorative function.

Digital information technology in a digital network society displays information on real-time which creates an immediate effect. Time for one territory can be simultaneously present for another territory. Immediacy is seen from the effect of transition from chronological time (sequences and duration of past, present, and future) towards chronoscopic time (interruption of current-time sequences). The chronological time which is static and related to natural life gives birth to reflective meaning. Reflection relates to contemplation, search for meaning, appreciation and comprehensive consideration. The chronoscopic time is revolutionary and is related to the immediate birth of the reflex meaning. Reflexes are associated with automatic movements, instantaneous responses, thinking without depth [2]. The question arises whether there is still a critical or reflective aspect in online learning? Is it possible to include reflective elements in online learning?

2. METHOD

Observation is one of the oldest and the most fundamental research method approaches. Observation is carried out by collecting impressions of the world using human senses, such as looking and listening. Then it processed systematically for specific purposes related to the observed phenomenon. Another methodology is to use literature review. The concept of the literature review is to use some literature related to the research. The diversity of various literature can strengthen the understanding of the subject area [3]. Observation in this research is to make observations on lecture notes from online learning materials. Several related theories such as Bloom's taxonomy theory and Mayer's multimedia learning theory shape the basis of this literatures review. Researches related to online learning, especially visual aspects are the concern in the literature review.

3. RESULT AND DISCUSSION

Experiment process based on the phenomenological study of the student experience in online learning and the application of related theories and previous studies. An assumption is built that will be implemented into the content features of lecture note material that will be tested:

1. Segmentation: will students learn better if the material of text elements is organized and managed to uses layout aspects that divides segments rather a continuous text material?
2. Multimedia: Will students learn better if learning material is a combination of text and image compared to material that consist of only text elements?

Case studies to be tested are aesthetic course. Experiments will be conducted in mid-lecture. The content of the material to be tested is lecture note content. To understand user experience, a phenomenological study will be conducted. Input from students will be used as a foundation for the application of online learning coupled with the implementation of multimedia principles of the lecture note.

Mayer proposed the multimedia learning theory relating to the student's knowledge construction of a multimedia material. The experiments conducted produced 12 principles of multimedia learning [4]. The principle analyzed in this study relates to the principle of segmentation that students will learn better material that can be controlled by students, rather than running linearly. The difference in this research is the proposed segmentation related to visual aspects and design principles. Segmentation by paying attention to the layout settings of the lecture notes material, the combination of typefaces and the use of colors. The second principle used relate to the principle of multimedia. The principle of multimedia states that students will learn better from material that contains a combination of text and images than text alone. The difference in this study is that the elements of the images and text being tested are related to aspects of design. This research pays attention to design principles such as the principles of hierarchy, legibility, balance, and harmony. Combined elements such as the use of infographic aspects became part of the design of this experiment.

The application of these features of experiments can be seen in Table I. Lecture note materials and evaluation will be uploaded in an LMS and students will access it online.

Table 1. Experimental Lecture Note in Affective Domain

Group type	Use of features
Control group	Content of learning materials that consist of black colored text and white background with no layout settings.
Experimental group 1	Content of learning materials that consist of black text material and white background with combination of layout settings and type combination of fonts.

Experimental group 2	Content of teaching materials that consist of black colored text and white background with combination of layout settings, type combination of fonts and color combinations.
Experimental group 3	Content of learning materials that consist of a combination of images and text that is both black and white backgrounds with combination of layout settings and type combination of fonts. The material displayed via infographic displayed
Experimental group 4	Content of learning materials that consist of a combination of images and text that is have color combination and white backgrounds with combination of layout settings and type combination of fonts. The material displayed via infographic displayed and using color combinations

Previous researches related to visual aspects, especially graphic functions of learning materials. Research related to emotional design in multimedia learning materials was conducted by using a combination of aspects of color and shape, emotional design can facilitate cognitive and learning processes [5]. Research conducted by Richardson et alrelates to aspects of color and contrast with online learning design. This relates to the readability of information. This study recommends suitable color choices to optimize the contrast to text and background, use *sans serif* typefaces, minimize visual complexity, use white space wisely, and apply visual cues sparingly [6]. The aspects of color and shape in these studies are still at the basic level and do not consider design principles of colors such as color psychology, color properties and good color combinations. The experiment proposal of Table I will associate the color elements with the design principles of colors such as color psychology, color properties and good color combinations. Other research relating to the appearance of color in the process of memorizing and the level of trust in e-learning material. Memory is a key goal in the e-learning system and at the same time, trust level in the system becomes important for students to adopt effective e-learning. The results of this study color become a component in the process of memorizing and increasing students' trust [7]. Other research addresses the topic of efficient e-learning by designing color combinations of text and background. This study objective to find the effect of color on students' memories. The findings in this study state that color contrast are an important consideration in e-learning materials [8]. The distinguishing aspect in author's research is the color aspect will be focused on the level of student engagement on online learning. Research conducted by Kumar et al. relating to gender relations and academic success that affect learning outcomes. Emotional design is concerned with integrating color elements, graphics, text, audio, and video in providing positive emotions and online learning. Experiments carried out by displaying three types of material, each of which has a visual difference. Positive design material has the appearance of bright colors, neutral design material has a colorless appearance and negative design material has the appearance of monochrome colors. The experimental results show that female respondents preferred positive designs while male respondents preferred negative designs. Male respondents are more satisfied and motivated by negative designs than female respondents [9]. Another aspect to be analyzed from this research is the subject of research which is a digital generation or generation Z that closely attached to daily information technology effect.

There are still few researches relating to the visualization of information that affect learning, especially individual factors such as learning styles and the enjoyment of the information. Lyra et al. examine the difference between infographic-type content material and material that contains text and image combination. In this study, no difference was found between learning outcomes using infographic material than the other. But students that receive infographic material has a high enjoyment factor and long-term memory [10]. The weakness of this study is that it uses a small sample and also has not done research related to various types of infographics and their complexity. Other research related to the use of interactive infographic

compared to traditional methods of learning mathematics in elementary schools. The results of this experiment found that the use of interactive infographic obtained results that were superior than traditional methods [11]. But this research did not mention what kind of infographic and which mathematical problems were solved by this infographic method. Another infographic research is to compare the differences between the static infographics and animated infographics that are applied through WhatsApp social media. The results of this study found that both types of infographic were equally effective in building the ability to recognize the elements of visual design. But the static type of infographic is stronger in building a visual learning. This is because of the static form so students are easier to do interactivity such as enlarging and reducing certain parts of the image. The display on an animated infographic is a continuous moving image, so students see the material as a continuous form [12]. Limitations of this study are the media used are mobile media that had limited readability display. In addition, this study recommends the need to combine graphic elements with design principles so that it can guide students to pay attention to the material. Clark and Lyons describe the six functions of graphic element communication, namely as a decorative, representative, mnemonic, organizational, relational, transformational and interpretive function. Decorative functions are visual things that provides aesthetic enhancements. Representational functions illustrate the appearance of objects. The organizational function shows a qualitative relationship between contents. Relational functions show quantitative relationships. Transformational functions illustrate changes in space and time. The interpretive function visually displays the concept of an unseen phenomenon [13]. An understanding of the types of knowledge structures and their relationship to the types of graphs will clarify the visual information displayed in online learning materials.

Table 2. Evaluation in Affective Domain

Evaluation type	Description	Type of problem
Retention test	Measure the ability to remember important elements of the learning materials that have been delivered	10 multiple-choice questions
Attitude test	Measuring the ability of students to respond and valuation	10 scale type questions
Comprehensive transfer test	Measure the ability to classify new examples at a more comprehensive level	1 essay problem
Troubleshooting transfer test	Measuring students in transferring topics learned in an unknown environmental context to present problem-solving tasks	1 essay problem

Experiments were carried out by comparing two groups of students with a minimum number of 30 peoples [14]. Comparison aims to see how effective the learning process in each group. The control group uses lecture notes with standard features while the experimental group uses certain additional features related to certain multimedia principles. The effectiveness of the results will be measured by evaluating learning in retention tests, transfer tests, and attitude tests. This evaluation relates to the stages of the affective domain outcomes that will be achieved starting from the stages of receiving, responding, assessing, regulating, and characterizing [15]. Retention tests are evaluation that measures the ability to remember important parts of material that have been delivered. Transfer tests are related to the process of understanding the material. Transfer tests can be comprehensive-transfer tests and problem-solving transfer tests. Attitude tests objectives to measure the ability of students to respond and valuation. The evaluation types using evaluations in Table II.

After an evaluation test is performed, each group will take the group's mean value and a standard deviation value is calculated. Successful learning material is effectively characterized by high average scores and low standard deviations. Differences produced by the experimental

and control groups were seen using effect sizes [16]. Calculations can be seen in Figure 2. The effect size values below 0.2 indicate the absence of significant effects by applying a certain feature of the experimental group. The effect sizes value that has a value of 0.5 have a moderate effect, while the effect sizes value that has a value above 0.8 have a strong effect [17].

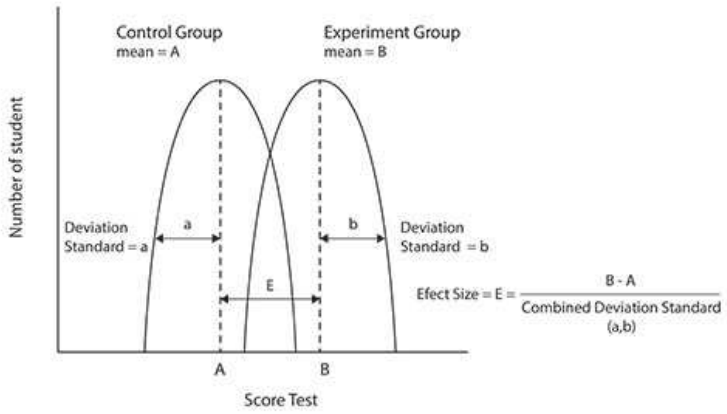

Fig. 2. Effect Size of the groups

This publication aims to get input on the effectiveness of lecture notes in online learning, especially for lecture material that is dominant in the affective domain. In-depth discussions related to methodology, application of theory, development of video features, and the types of evaluations that will be used will make this research more developed.

4. CONCLUSION

Good designed principles can be used as a process and strategy in designing online learning materials, especially lecture notes in lectures on the affective domain. The design element can be used as a new pedagogy in digital-based learning by taking into account the interests in the digital generation and considering the transformation of past and present cultures. So that students will get reflective learning.

REFERENCES

[1] K. H. Dewantara, *Pemikiran, Konsepsi, Keteladanan, Sikap Merdeka. Pendidikan*. Yogyakarta: Universitas Sarjanawiyata Tamansiswa, 2013.

[2] Y. A. Piliang, *Immediacy dalam Teknokultur*. Bandung: Makalah Extension Course Filsafat, Fakultas Filsafat Unpar dengan tema "Slow Sofia: Againts the Acceleration of Technoculture, 2019.

[3] T. Barone *et al.*, *The Sage Encylopedia of Qualitative Research Methods*, Volume 1 & 2. Thousand Oaks, California: Sage Publications, Inc., 2008.

[4] R. E. Mayer, *Multimedia Learning*, Second. Cambridge: Cambridge University Press, 2009.

[5] J. L. Plass, S. Heidig, E. O. Hayward, B. D. Homer, and E. Um, "Emotional Design in Multimedia Learning: Effects of Shape and Color on Affect and Learning," *Learning and Instruction*, vol. 29, pp. 128–140, 2014.

[6] R. T. Richardson, T. L. Drexler, and D. M. Delparte, "Color and Contrast in E-Learning Design, A Review of the Literature and Recommendations for Instructional Designers and Web Developers," *MERLOT Journal of Online Learning and Teaching*, vol. 10, 2014.

[7] J. Zufic and D. Kalpic, “More efficient e-learning through design: color of text and background,” *World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education (ELEARN)*, 2009.

[8] J.-E. Pelet and P. Papadopoulou, *Investigating the Effect of Color on Memorization and Trust in E-Learning: The Case of KMCMS.net*. IGI Global. Information Resources Management Association, 2012.

[9] J. A. Kumar, B. Muniandy, and W. A. J. W. Yahaya, “Emotional Design in Multimedia: Does Gender and Academic Achievement Influence Learning Outcomes?,” *Malaysian Online Journal of Educational Technology*, pp. 37–50, 2016.

[10] K. T. Lyra *et al.*, “Infographics or Graphics+Text: Which Material is Best for Robust Learning? ,” *Proceedings of the IEEE International Conference on Advanced Learning Technologies (ICALT)* , 2016.

[11] M. A. Alshehri and M. Ebaid, “The Effectiveness of Using Interactive Infographic at Teaching Mathematics in Elementary School,” *British Journal of Education*, vol. 4, no. 3, pp. 1–8, 2016.

[12] M. K. Afify, “The Effect of the Difference Between Infographic Designing Types (Static vs Animated) on Developing Visual Learning Designing Skills and Recognition of its Elements and Principles,” *International Journal of Emerging Technologies in Learning*, vol. 13, no. 9, pp. 204–223, 2018.

[13] R. C. Clark and C. Lyons, *Graphics for Learning: Proven Guidelines for Planning, Designing, and Evaluating Visuals in Training Materials*, Second. San Francisco: Pfeiffer, 2011.

[14] J. Cohen, *Statistical Power Analysis for the Behavioral Sciences*. Lawrence Erlbaum Associates, 1998.

[15] D. R. Krathwohl, B. S. Bloom, and B. M. Bertram, *Taxonomy of Educational Objectives, the Classification of Educational Goals. Handbook II: Affective Domain.* New York: David McKay Co., Inc., 1973.

[16] R. C. Clark and R. E. Mayer, *E-learning and the Science of Instruction: Proven Guidelines for Consumers and Designers of Multimedia Learning*, Third. San Francisco: Pfeiffer, 2011.

[17] K. Saddhono, A. Amalia, I. K. Sudarsana, and A. Indahingwati, “Multimedia Use For Beginner Level of Teaching Languages For Deaf Children: Study in Special Schools in Surakarta,” in Journal of Physics: Conference Series, 2019, vol. 1254, no. 1, p. 12060.