A Survey on Students' Interests toward On-line Learning Media Choices: A Case Study

Daniel Febrian Sengkey ID ***1, Sary Diane Ekawati Paturusi1, Alwin Melkie Sambul1, and Chyntia Theresa Gozali1**

1Department of Electrical Engineering, Faculty of Engineering, Universitas Sam Ratulangi, Manado 95115, Indonesia

a danielsengkey@unsrat.ac.id; b sarypaturusi@unsrat.ac.id; c asambul@unsrat.ac.id, d 14021106133@student.unsrat.ac.id

*Corresponding author

ABSTRACT

The advancement of Information Technology alters various aspects of human life, including learning. In the present era, on-line learning facilities are provided by institutions, ranging from formal higher education to open course-ware providers. On-line learning or e-learning is mostly achieved through stored media that widely available. These media take forms in various formats such as text and images, slide that equipped with narration from the lecturer, or a video where the lecturer appears inside the frames. We conducted a research about how students would response to the available learning media. The research was conducted with repetitive measures. Each measurement was a module that divided into three parts, where each part was presented to the student as one out of three media listed above. Hence we had three media types for each module. Each module took one week, and at the next week we gather their responses through evaluation forms. All modules were completed in six consecutive weeks. After all modules were completed, we analyze their responses and found that our samples responded best to the video with the appearance of the instructor/lecturer, then the slide with audio, and finally text and images.

1. INTRODUCTION

By the advent of the Internet technology and its proliferated uses, new ways of life arise. Within this era of Industrial Revolution 4.0, where the information has become a human primary need, Internet plays a very important role (van Dijk, 2006). Due to the increasing usages and advancements of the Internet, people have seen the transformation of various fields including education. In the e-learning theoretical framework published by Aparicio et al. (2016), it even can be traced back to 1960s where the educators started to use computer in teachings. e-Learning implementation triggers the development of blended learning, which as its name suggest, is a mixture of the conventional methods of teaching and e-learning. According to the study of Okaz (2015), blended learning approach could be highly beneficial as it will improve learning quality and increase students' access to information. Later, based on the evaluation of Hubackova and Semradova (2016) blended learning is found as a very favorable method for students.

Research on the implementation of e-Learning and blended learning in Universitas Sam Ratulangi (UNSRAT) can be traced back as far as 2011 where the first report is published in 2012 (Paturusi, Chisaki, & Usagawa, 2012). It is concluded that the responses of the students were very positive, where they can set their own learning plan. Later study in 2016 evaluated the satisfaction of students who already used the e-Learning platform (Paturusi, Usagawa, & Lumenta, 2016). The result is encouraging the development of courses with more attractive and/or informative contents, that engage students in the learning process that is suitable for UNSRAT educational atmosphere.

Since 2011, e-Learning adoption within UNSRAT is catalyzed through the availability of the e-Learning platform https://elearning.unsrat.ac.id. The platform itself is established using the famous Modular Object Oriented Dynamic Learning Environment, that is known by its acronym: MOODLE (Dougiamas & Taylor, 2003). In 2018, by the Rector's Decree number 82/UN12/LL/2018

("Keputusan Rektor No. 82/UN12/LL/2018 tentang Pedoman Penyelenggaraan Pembelajaran Daring (e-Learning) Universitas Sam Ratulangi," 2018), the online learning usage within UNSRAT gained its legal status.

The study of media itself is not something new. Eventhough in this present era learning sources are available everywhere, yet the study of Gutmann et al. (2015) shows that the millenial students still need the learning media that provided by the instructor. In the field of communication science, Appiah (2006) studied the usage of multimedia as a mean of advertising in commercial websites. It is found that the companies will gain benefits upon incorporating multimedia in their retail websites. Later in 2013, Sherman et al. (2013) found that video chat brought greater bonding between friends, compared to audio chat and Instant Messaging. Recent study by Putri and Solema (2019) shows that variations of learning media has great impact on learning activities. Therefore, in accordance with previous researches within this topic in our institution (Paturusi et al., 2012, 2016), the purpose of this study is to systematically analyze students response to several learning media choices.

Formerly, we were able to identified that the utilization of various learning media is found to be interesting for students, and according to their opinion this scenario could improve their achievements (Gozali, Paturusi, & Sambul, 2018). This paper serves as a preliminary study within this field of blended learning implementation whereas future scenarios are being developed based on the current findings. As this section already presented an introduction to the problem we addressed as well as some related works, then the rest of this paper is organized as follow: in Section **Error! Reference source not found.** we present the research design that was used; Section 148 presents our findings; and finally in Section 0 this paper is concluded and some issues for future development are presented.

2. METHODS

We focused our study to three types of media commonly used by our lecturers: pure text and images (TIM), recorded lecture slides with narration from the lecturer (slide and audio [SAD]), and recorded lecture slides with the appearance of the lecturer within the video frames (VID). All media types are used each week with different order. The sequences of the media (permutations) are randomly generated. The random sequences were used to make sure there would be as small as possible influences from the sequence of the media to the student preferences. Hence, there were 6 weeks (3×2×1), with different sequence of media for each week. Each media presents different part/sub-topic of the lecture. The schedule of lesson including media used is shown in **Table 1**. This method is the same one used by Gozali et al. (2018) , with different media sequences, but instead of quantitative achievements based on scores, here we use the qualitative approach by employing questionnaire.

Table 1. Course schedule, the lessons/modules, sub-topics and media sequences

Module/ Lesson	Sub-topic	Media Type		
		TIM	SAD	VID
1	1.1			▨
	1.2	▨		
	1.3		▨	
2	2.1		▨	
	2.2	▨		
	2.3			▨
3	3.1		▨	
	3.2		▨	
	3.3		▨	
4	4.1		▨	
	4.2		▨	
	4.3	▨		
5	5.1			▨
	5.2		▨	
	5.3	▨		
6	6.1		▨	
	6.2			▨
	6.3	▨		▨

To deliver these contents as learning sources for students, we made use the available e-Learning platform. Due to the space considerations, the upload size is limited to 8 MB, hence the video files are uploaded on YouTube, and then we provided the links in the e-learning platform. We present the examples these learning media: text and image, slides and audio narration, and slides with the appearance of the lecturer in Figures , , and , respectively. The text and image is available only within the LMS, while other two are privately shared on YouTube.

As declared in the title this paper, this design was applied to the Operations Research course, that was given during spring semester 2018. There were 28 students participated as our samples. As described earlier, for each week the students will be given access to three types of media, where each media has its own sub-topic. After a week, at a conventional class meeting, we distributed evaluation forms that consisted of multiple-choice questions and questionnaire. The questionnaire was used to gather information related to their responses to the media in the past week (Figure). At the preamble of each questionnaire, a statement was given, that anything they answer in the questionnaire would not affect their scores. These actions were repeated for six consecutive weeks, according to the schedule shown in **Table 1**.
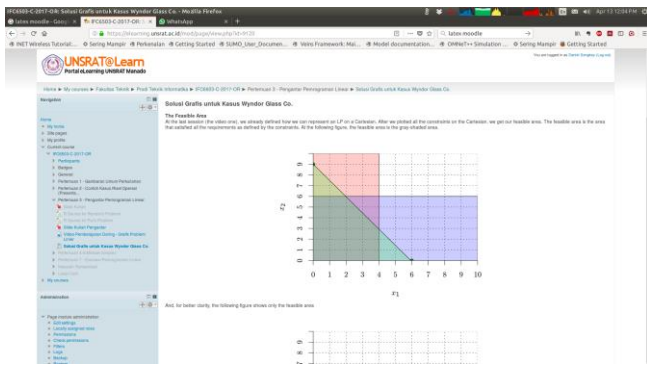
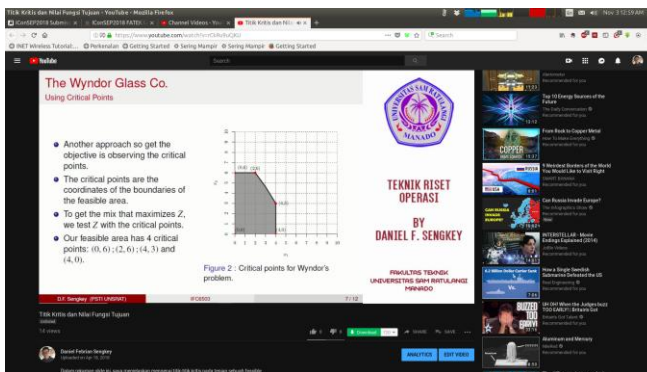**Fig 1**. The Text And Image (TIM) Media In The LMS Platform

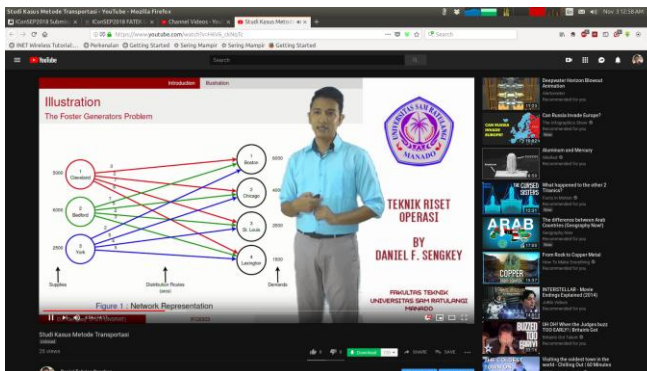**Fig 2**. Recorded Slides With Narration From The Lecturer (SAD).

Fig 3. Recorded slides with the appearance of the lecturer inside the frame (VID)

The evaluation items (questions) within the questionnaire are related to their access behavior toward provided media. The purpose of these evaluation items are to evaluate, whether the students access the media or not; if they accessed it, how did they consume it? Were they read the whole TIM? Or they just scanning through it? Or maybe they read it repeatedly? How did they watch the video? and so on. Due to the nature of the media, there were four choices for TIM evaluation, and seven choices for SAD and VID as shown in **Table 2**. These items were translated from the original questions in Bahasa Indonesia.

When the data had been collected, they were analyzed, first using descriptive statistics by comparing the linearly aggregated data and by using plots. To grasp better understanding of the results, the analysis was continued with inference statistical test to find whether the differences are significant or not.

Fig 4. Students Filling The Evaluation Form

Table 2. Items on the Evaluation Questionnaire

Response	TIM	SAD and/or VID
A	Not reading at all (did not access the media)	Not watching at all (did not access the media)
B	Scanning	Watched from the beginning to less than half
C	Read the whole media and continuing with scanning	Watched from the beginning to more than half
D	Read whole media repeatedly	Watched, but some parts were skipped
E	-	Watched whole video once
F	-	Watched whole video once and watched it again by skipping some parts
G	-	Watched whole video repeatedly

3. RESULTS AND DISCUSSION

After responses for all module/lessons were gathered and analyzed. First, we analyze the relative frequency of the responses to find weekly motif. Next, the responses are linearly aggregated, using 0-100 scale. Assuming that the repeated access to the media is the highest expectation of an instructor, then the related choices then deemed as 100, whereas the other end (no access at all), was deemed as 0. To simplify the discussion, we picked the term score to represent the linearly aggregated values. In other words, higher score means better response/higher preferences by the students, and vice versa. Eventhough in **Table 2** the responses were put side-by-side, yet it does not imply that 2 responses with same option/code share the same score.

3.1 Motives

The weekly motives represent the order of most frequent responses by the students toward media for each module. These motives help us to figure out how the media were accessed. To get these motives, responses were tabulated, and the frequency of each response type is divided with the total responses for the particular week. Hence it means that these motives are in relative frequency, or percentage of each response type to the total responses. For each media media, the motives are represented in a table and a stacked bar-chart. In the table, the response with highest frequency for each module is marked with an asterisk (*). Later, row

that represents the most common response is shaded.

Table 3 And Figure show the relative frequency for text and image. For this media, the motif is the response B, which means the students mostly only scanning through the provided text and images. Option B showed up as the highest for three times, where option A (not accessing at all) came up twice as the motif. Only at the fifth week most students read the whole media. Repeatedly access of the text and images media is a very uncommon case for our samples.

Table 3. Relative frequency (%) of the responses toward text and images for each module/lesson

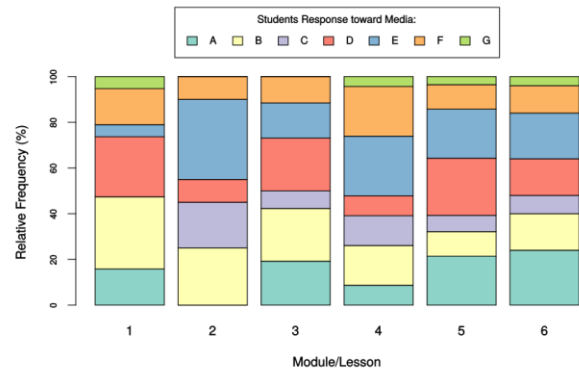| Response	Module/Lesson Number					
	1	2	3	4	5	6
A	42.10*	5.00	26.92	39.13*	21.42	20.00
B	26.31	70.00*	53.84*	26.08	35.71	48.00*
C	15.79	25.00	15.38	30.43	39.28*	28.00
D	15.79	0.00	3.84	4.34	3.57	4.00
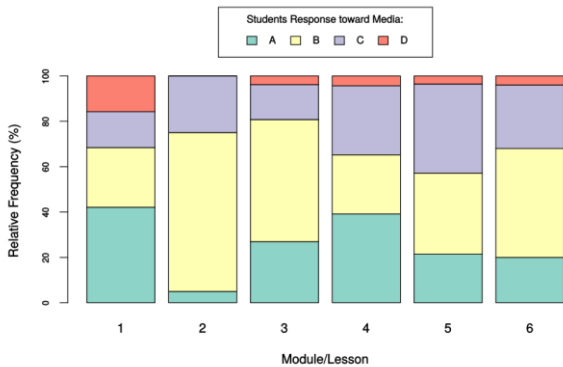
Fig 5. Stacked bar chart of the relative frequency (%) for the responses toward text and images for each module/lesson.

For slides and audio, the responses were more divergent. It is quite common to find ties in a module, such as in module 3 (responses B and D, 23.07%) and module 1 (responses A and F, 15.78%). Therefore, another asterisk sign is added. Response type with highest frequency marked with double-asterisk, where the single asterisk sign marks the second highest frequency within a particular module. With the involvement of the second highest frequency response, the motif is easier to found. As shown in both **Table 4** and Figure , the response E: *watched whole video once*, comes up as the most common response for the whole course. It is appeared as the most response for modules 2 and 4, and took the second place on modules 5 and 6. On the other hand, the fact that responses *B: watched from the beginning to less than half*; and *D: watched, but some parts were skipped*; came up as the second most common cannot be ignored. This finding suggest that although students mostly watched the whole video, yet sometimes they watched only several parts of a particular video. Similar with TIM, repeated watching is rare in this type of media.

Table 4. Relative frequency (%) of the responses toward slides with audio for each module/lesson

Response	Module/Lesson Number					
	1	2	3	4	5	6
A	15.78	0.00	19.23*	8.69	21.42*	24.00**
B	31.57**	25.00*	23.07**	17.39	10.71	16.00
C	0.00	20.00	7.69	13.04	7.14	8.00
D	26.31*	10.00	23.07**	8.69	25.00**	16.00
E	5.26	35.00**	15.38	26.08**	21.42*	20.00*
F	15.78	10.00	11.53	21.73*	10.71	12.00
G	5.26	0.00	0.00	4.34	3.57	4.00

Fig 6. Stacked bar chart of the relative frequency (%) for the responses toward slides with audio for each module/lesson.

The last type of media, recorded slides with the appearance of the instructor within frame shares similar results with the previous media: slides with recorded narration. Although the most frequent response can be clearly seen, yet due to ties spread in several occasion, the observation is kept extended up to the second highest frequency for each module. According to **Table 5** and Figure , students mostly watched the video once. Watching by skipping some parts is also the second motif here, but this time with no contention from the other types of response. Watching the video repeatedly is also a rare case within this type of media.

Table 5. Relative frequency (%) of the responses toward slides with the appearance of the instructor within frame, for each module/lesson.

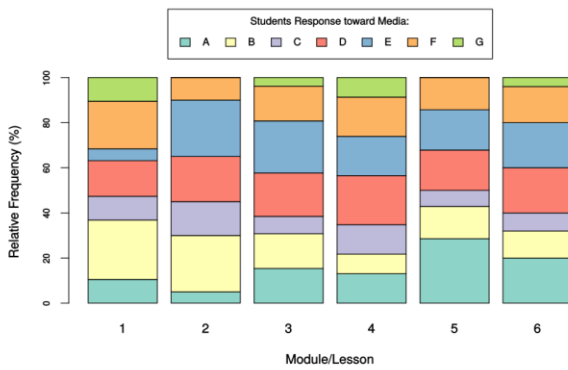| Response	Module/Lesson Number					
	1	2	3	4	5	6
A	10.52	5.00	15.38	13.04	28.57**	20.00**
B	26.31**	25.00**	15.38	8.69	14.28	12.00
C	10.52	15.00	7.69	13.04	7.14	8.00
D	15.78	20.00*	19.23*	21.73**	17.85*	20.00**
E	5.26	25.00**	23.07**	17.39*	17.85*	20.00**
F	21.05*	10.00	15.38	17.39*	14.28	16.00*
G	10.52	0.00	3.84	8.69	0.00	4.00

Fig 7. Stacked bar chart of the relative frequency (%) for the responses toward slides with the appearance of the instructor within frame, for each module/lesson.

3.2 Media that Gained the Most Interest

The previous sub-section gives a hint about how students responded to various media choices. Judging from the responses, we may gain knowledge about the media that gains most interest from the students. This sub-section addresses the question: what is the most interesting media for students? This question specifically comparing the sum of responses to each media for each lesson. To get the answer, responses are linearly scored form 0 to 100. As defined earlier, repeated access (reading and/or watching) course material is the best thing an instructor could expect within the context of this study, while not accessing the media sits on the other end of the expectation. To keep the consistency, only responses from the students who attended the whole lecture that are included within this discussion.

There are 13 students who were regularly attended the evaluations. Hence, if the highest score is 100, then the highest possible sum is 1,300. Figure shows the comparison of these scores. In Figure , the recorded slides with the appearance of the instructor within the frame (video, VID) gained most interest in 4 occasions (modules 1, 3, 4, and 6), where slides with audio narration commonly sits as the 2nd, except on modules 2 and 5. Media with only text and images always take the bottom place. It means that the students in our samples are more attracted/interested to study from a video. This conclusion confirms the finding in sub-section 3.1, where the video-based media were commonly fully watched at least once while for text-and-image media, students were commonly scanning through it.

3.3 The Significance of the Findings

As in sub-section 3.2 the most interested media is found, yet it is still unknown whether the differences are signifianct or not. Therefore we employed statistical test to gain knowledge about the significance. All statistical tests as well as the graphics found in this paper are produced by using the statistical software R (R Core Team, 2019). For all tests the standard confidence level of 95% ($\alpha = 0.05$) is assumed. We use the p-value as the general parameter for all tests. Therefore, in every test, the null hypothesis (h_0) is rejected if the p-value is less than or equal to 0.05, vice

versa. Since in the following test the significance for each module will be justified independently, then the responses from all students are included.
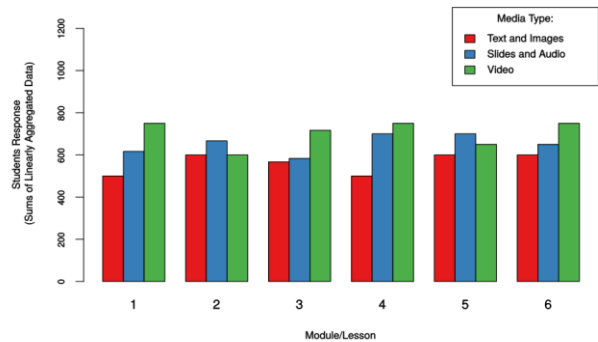

Fig 8. A bar chart showing the sum of linearly aggregated response data. The x-axis represents module/sub-topic, while the y-axis shows the sums of linearly aggregate responses, that we use as a justification of students' interest.

Before going further with deciding the whether the differences are significant or not, we started with the distribution normality test by using the Shapiro-Wilk method. The results of the distribution normality tests are given in **Table 6**. These numbers are already rounded to 3 decimals, hence we have a 0.000 in Module 2 due to the really small number, 0.000033923. In R, the null hypothesis of the Shapiro-Wilk test is that the data is normally distributed. Therefore, based on this information, it is clear that most of the responses for the are not normally distributed. Only in two occassions that the responses are considered as normally distributed under our level of confidence.

Table 6. p-values of the Shapiro-Wilk test using R for each module. Each value is rounded to 3 decimals. The asterisks denote value that are higher than the defined alpha value.

Media	Module 1	Module 2	Module 3	Module 4	Module 5	Module 6
TIM	0.002	0.000	0.001	0.001	0.001	0.003
SAD	0.039	0.010	0.018	0.055*	0.020	0.023
VID	0.058*	0.116	0.048	0.178	0.002	0.036

As the responses are not commonly normally distributed, then further tests should use the non-parametric methods. To decide whether the differences found in previous sub-sections significant or not, we use the Friedman test. Its null-hypothesis is there is no significant difference between compared variable. We compared the responses of the students to each media for every module, and then presented the results in

Table 7. It is found that the significance general interest toward different media is tied (50:50), where   at 3 modules (2, 5, 6) they found to be significantly different, while on the other 3 (1, 3, 5) the differences are not significant. Therefore, it is still hard to conclude further and give a fair judgement based on current data.

Table 7. Results of Friedman test for each module. Each value is rounded to 3 decimals. The asterisks denote value that are higher than the defined alpha value.

	Module 1	Module 2	Module 3	Module 4	Module 5	Module 6
χ^2	6.310	1.125	14.659	6.083	0.899	1.960
p-value	0.043	0.570*	0.001	0.048	0.638*	0.375*

4. CONCLUSION

Previous studies at the Dept. of Electrical Engineering UNSRAT have shown that blended learning is well accepted. This paper can be considered as a continuation of the previous studies, mainly focusing on learning media and students response toward them. In this studies, a course had been developed where its topics were divided into 6 modules, and each module is delivered in one week. Each module consisted of 3 sub-topics, where each of it was delivered using studied media types: text and images only; recorded slides with audio narration; and recorded slides with the appearance of the instructor.

In this study we found that for text and images, students mostly scanned through it, whereas for video-based media they tend to watched them at least once. This findings later confirmed by linearly scoring the responses in 0-100 scale. According the sums of these scores, recorded slides with the appearance of the instructor got the most well responses from students, followed by the recorded slides with audio narration, and then text and images with the least response. However, these findings are not significantly different. Therefore the reader should be aware about this issue while considering learning media choices for in-class use based on these findings.

In future studies, the issue of significance should be readdressed with expanded sample size and, ideally, more subjects/courses, so we may gain better understanding and wider overview within this particular field of study in e-Learning. Later on, the impacts of various learning media to the students' achievement (i.e. scores, grades) should also come into account.

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Daniel Febrian Sengkey was graduated from the Department of Electrical Engineering, Universitas Sam Ratulangi, Indonesia in 2012; and from the Department of Electrical Engineering and Information Technology, Universitas Gadjah Mada, Indonesia in 2015 for his undergraduate and master studies, respectively. Since 2016 he joins the Electrical Engineering Department, Universitas Sam Ratulangi as a lecturer. His research interests are data communications networks, intelligent transportation system, and IT-assisted learning.

Sary Diane Ekawati Paturusi is a lecturer at the Department of Electrical Engineering, Universitas Sam Ratulangi. She obtained her Doctor of Engineering degree from Kumamoto University, Japan in 2016, as well as her master degree in the same field, in 2012. Formerly, she was graduated in 2003 for the undergraduate degree in Electrical Engineering, from the Department of Electrical Engineering, Universitas Sam Ratulangi, Indonesia. Her present research fields are E-learning, Educational Technology, Learning Analytics, Educational Data Mining.

Alwin Melkie Sambul is a lecturer at the Department of Electrical Engineering, Universitas Sam Ratulangi. He is also the first and the present head of the Center for Learning Innovation and Technology, Universitas Sam Ratulangi. He obtained his Ph.D. and M.Eng. degrees in Computer Science and Electrical Engineering from Kumamoto University, Japan, in 2015 and 2011, respectively. Formerly he was graduated in 2003 for his undgraduate degree in Electrical Engineering, from he Department of Electrical Engineering, Universitas Sam Ratulangi, Indonesia. His research fields are human-computer interactions, medical engineering, and e-learning applications. He is a contributor of the Indonesian national online learning system, SPADA.

Chyntia Theresa Gozali is a former student in the Undegraduate Program in Informatics, Universitas Sam Ratulangi, Indonesia. She started her undegraduate study in 2014 and then graduated in 2018. Her undergraduate research topic was about students' preferences toward various learning media in an online learning environment.