STUDENTS' PREFERENCES OF LEARNING MATERIALS DURING UNPRECEDENTED ONLINE LEARNING DUE TO COVID-19

'Atifah Hanim Rosli[1], Norshahriah Abdul Wahab[2*], Syed Nasir Alsagoff[3], Mohd Rizal Mohd Isa[4], 'Afizi Mohd Shukran[5]

[1,2,3,4]Department of Computer Science, Universiti Pertahanan Nasional Malaysia, Malaysia

Email: atifahhanim@gmail.com[1], shahriah@upnm.edu.my[2]* (corresponding author), syednasir@upnm.edu.my[3], rizal@upnm.edu.my[4], afizi@upnm.edu.my[5]

DOI: https://doi.org/10.22452/mjcs.sp2021no1.4

ABSTRACT

Teaching and learning processes in higher education have been affected due to the COVID-19 pandemic. Face-to face learning has been transitioned to online learning. This study explored student preferences for online materials during unprecedented online learning due to COVID-19. Through an online questionnaire, quantitative data was collected from 104 students from the Department of Computer Science, Faculty of Defence and Science Technology. The factors focused on in analysing the student's preferences in online learning material include the layout, and multimedia analytics approach. The results present how multimedia analytics such as video, audio, graphic, and animation in online learning material play a significant role in the cognitive engagement and student's motivation in online learning. Also, respondents preferred online learning materials with element of multimedia such as video and audio, rather than text only. This study presents suggestions on how to enhance online learning materials to improve online learning.

Keywords: Online learning, human computer interaction, gamification

1.0 INTRODUCTION

At the end of 2019, the world was hit by a new pandemic known as Coronavirus (Covid-19). The pandemic was first detected in Wuhan, China [1]. This pandemic has spread to all corners of the world in a short time, including Malaysia. Various measures are being taken to curb this epidemic from continuing to spread. One of the measures is reducing close contact with infected individuals [1,2]. To avoid this close contact, the Malaysian government has implemented a Restricted Movement Order (RMO) where people need to stay at home to break the chain of infection. Due to this fact, the teaching and learning processes in higher education specifically have been affected. Since the pandemic can cause death at the end, the education sector from the Ministry of Education (MOE) and Ministry of Higher Education (MoHE) has been committed to provide online teaching and learning using Learning Management Systems (LMS) and other online mediums such as Microsoft Teams, Webex, Moodle, GoogleClassroom, Massive Open Online Courses (MOOC) and other platforms.

Therefore, this research is to justify the significant factors in online learning materials that give advantages in enabling students to learn anytime, anywhere, and without any physical boundary issues, as well the ability to make students stay motivated during learning activities. This is because there are subjects that require more attention and cannot be learned by just reading such as programming, that require students to go to the lab and undergo hands-on learning in the lab and close monitoring by the lecturer. During this bitter time, the need to implement various learning platforms was much needed. By using smart devices, students can undergo a learning process with the designed multimedia analytic based learning materials, student's motivation is much higher [3].

In this study, we aim to understand students' preferences in learning materials during online learning and provide suggestions to enhance current online learning materials. A study was conducted among Department of Computer Science students. This research identified the students' preference for online learning materials due to the COVID-19 pandemic. The result of this paper can help tertiary education institutions decide the most suitable learning materials for students in the future.

2.0 LITERATURE REVIEW

The spread of the COVID-19 pandemic has brought changes in the way of teaching and learning in Malaysia. Most universities in Malaysia are still practising face-to-face teaching and learning instruction. Students are having difficulties throughout the online learning sessions due to poor Internet connection, poor technological infrastructure, an unconducive study environment at home, and a lack of device technology. To provide a truly effective learning experience, a balance between technology and education is required [4]. Online teaching and learning using e-learning

has been discovered to transform classic face-to-face teaching and learning into distance online learning easier with virtual learning environments and software applications [5]. E-learning is seen as the most suitable learning platform nowadays.

The most important part of developing e-learning is developing effective learning materials. To achieve effective content in learning materials, it is important to find ways to reduce cognitive load while studying. Cognitive load is classified into two types: first is intrinsic cognitive load, which is due to material difficulties, and the second is extraneous cognitive load, which is related to the method of presentation [6,7]. Learning materials using multimedia is a method of presenting visual content such as text, pictures, audio, and video that is seen as able to reduce extraneous cognitive load on students while studying. Learning materials using a multimedia approach is also able to enhance students' skills in problem solving and increase motivation in learning. Multimedia learning will help student stimulate their minds and have a better retention rate. Online learning multimedia approaches are also able to make students more proactive and self-motivated in their learning. It can also help students in their learning process by attracting and engaging them [8].

2.1 Online Learning

Students are physically separated from the teachers in online or remote education, which necessitates a delivery mechanism [9]. Technology mediates the connection between students and teachers, and the design of the learning environment has a significant impact on learning results [10]. Online teaching and learning are computer-based learning or web-based learning and require electronic delivery forms of teaching. Online teaching and learning require a balance between education and technology to provide effective learning experience for students [4]. Online teaching and learning take place in the traditional classroom or face-to-face learning environment.

2.2 Student's Motivation

Motivation matters in learning, and this is part of the attraction of learning materials using multimedia elements. Multimedia elements such as graphics, video, and audio are considered motivational elements that can entertain students and enable them to engage or immerse themselves in the learning materials [11].

2.3 Cognitive Engagement

Because of the COVID-19 outbreak, many students were forced to switch from face-to-face instruction to an online learning environment in the midst of the semester. Combining learning modalities can lead to cognitive overload. Furthermore, if students lack trust in the technology they are utilising or lack a sense of cognitive engagement and social connection, the outcome may be negatively affected [9]. Students have their own personal learning methods, which has created a new educational dilemma. As a result of the digital revolution, a fundamental problem in education has emerged: a lack of student participation in the educational environment, as well as a lack of student involvement during the learning process [12]. This is the issue that multimedia elements can assist with. Multimedia elements such as text, graphics, animation, video, and audio are proven to be able to increase students' motivation and involvement during the learning process [13]. The phrase refers to a trait that is aimed to promote and inspiring task performance by creating enjoyable experiences and enhancing student involvement in learning activities.

3.0 METHODOLOGY

Multimedia materials make students' learning more efficient and maximise the amount of information gathered by learning using visual and audio content, according to [14]. This is supported by [15], who claim that multimedia materials intrinsically attract students' attention and are found to have a learning effect, as well as reduce students' cognitive load during learning activities. Therefore, a questionnaire was distributed to 104 respondents, consisting of students in their undergraduate studies from the Department of Computer Science, Faculty of Defence and Science Technology, who participated to represent higher education in Malaysia to study students' preferences for learning materials. The questionnaire was distributed to respondents through group of social media platforms where the questionnaire was created using Google Form. This questionnaire consists of 8 questions to indicate respondent's preferences in online learning materials and 3 demographics questions. Questionnaire was distributed through social media group chat to make it easier for the respondents to answer the questions. Respondents can answer the survey via their electronic devices such as smartphones, tablets, laptops, or personal computers based on their preferences.

4.0 DISCUSSION

This questionnaire was answered by undergraduate students in their degree from Department of Computer Science. There are respondents from Computer Science (Security) programme with 23.1% and Computer Science (Artificial Intelligence) programme with 76.9% of those who participated in this questionnaire. In this survey, the percentage of

male respondents was 57.7% compared to 42.3% for female. All the respondents' age range between 19-21 years old. The chart that represents respondents' gender, programme, and age are presented as Fig. 1, Fig. 2, and Fig. 3 below.

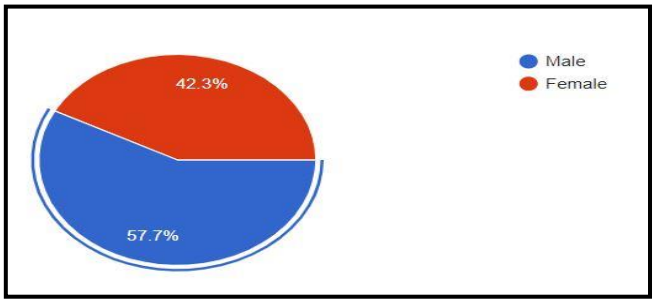

Fig. 1: Student's gender

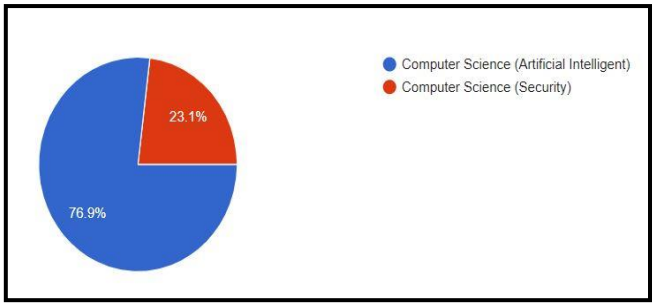

Fig. 2: Student's study programme

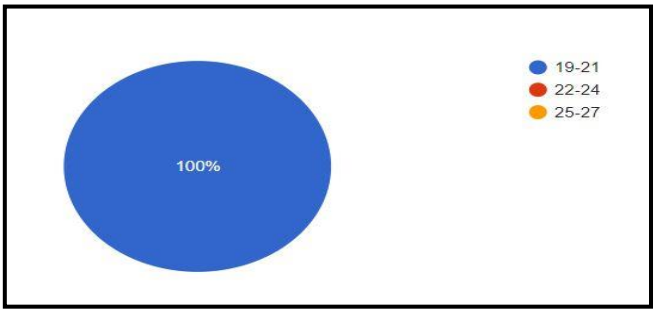

Fig. 3: Student's age group

In order to investigate students' preferences for online learning materials, 8 questions were added to this questionnaire. The first question asked respondents whether online learning materials using multimedia analytics such as video, audio, animations, text, and graphics can support online teaching and learning. The result is shown in Fig. 4. The highest percentage of respondents is 54% who agree, and 35% of respondents strongly agree with the statement that online learning materials using multimedia analytics can support distance learning. This shows majority of respondents agree with multimedia analytics online learning materials.

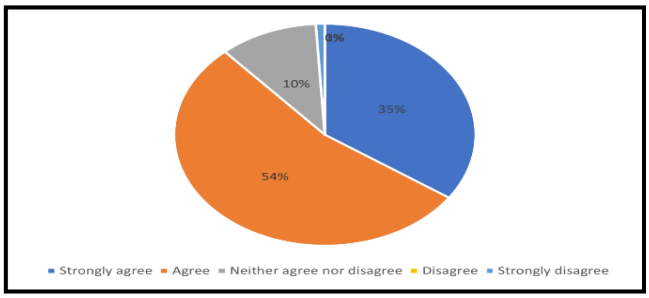

Fig. 4: Online learning materials using multimedia analytics approach such as video, audio, animations, texts, and graphics can support online teaching and learning.

The second question is to determine learning environment through learning materials. Result is shown in Fig. 5.

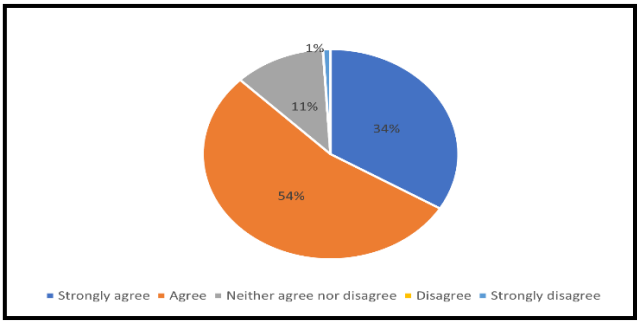

Fig. 5: Online learning materials such as video, audio, animations, texts, and graphics can create high quality learning environment.

Fig. 5 shows the percentages of respondents who agree that online learning materials with multimedia analytics can create a high-quality learning environment, with 34% voting to strongly agree and 54% who vote for agree with this statement. There are only 1% of respondents who are opposed, while another 11% are neutral.

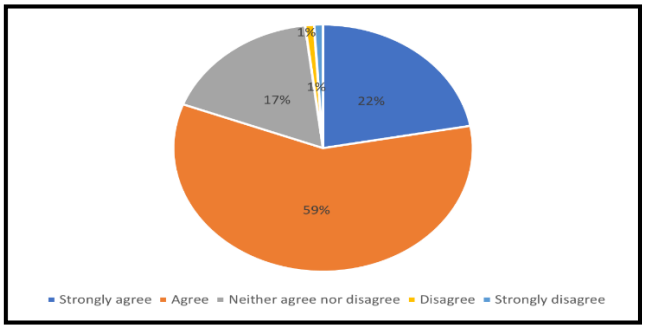

Fig 6: Embedded video and audio in online learning materials increase student's motivation in lesson.

The result in Fig. 6 shows that online learning materials with embedded video and audio can increase students' motivation during lessons. The majority of respondents agree, with only 1% strongly disagree and 1% disagree that learning materials with video does not enhance students' motivation in learning. 17% of respondents are in between.

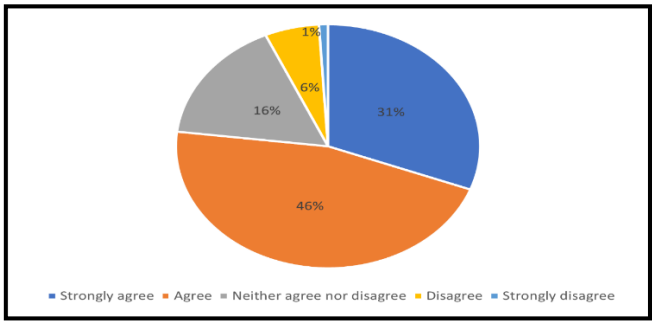

Fig. 7: Motivation is high in participating online class.

Although the learning process has changed from face-to-face to distance online learning, students' motivations are high. It is clear from the figure, which depicts the outcome of the respondent's motivation to participate in an online class. 31% and 46% of respondents who vote for strongly agree and agree with this statement. 6% of respondents are disagree and 1% of respondent strongly disagree while another 16% neither agree nor disagree.

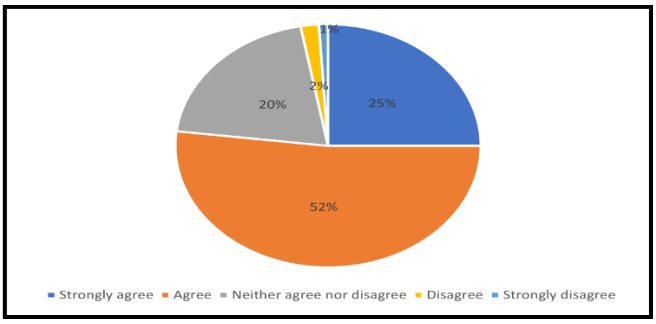

Fig. 8: Simple layout of online learning materials is more suitable and easier to understand.

Fig. 8 shows the respondents' preference for learning materials layout. The figure shows most of the respondents find it easier to understand any learning materials with a simple layout, while 2% of disagreeing and 1% of strongly disagreeing respondents say the layout of learning materials does not affect their understanding.

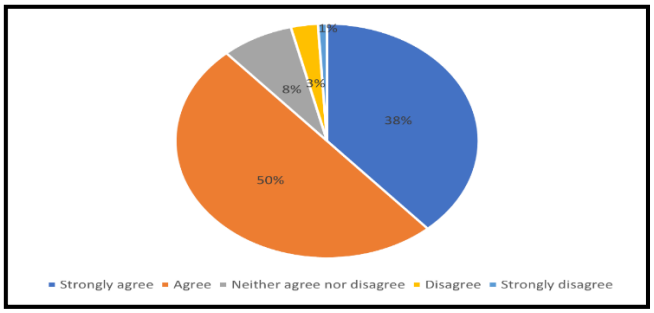

Fig. 9: Learning materials with graphics, video, and audio are more effective than text only.

Learning materials are more effective with graphics, video, and audio than text alone, according to the majority of respondents. It is shown in Fig. 9. 50% of respondents agree and another 38% strongly agree with this statement. Only a small percentage of respondents disagree, while 1% and 3% strongly disagree and disagree respectively, and 8% neither agree nor disagree.

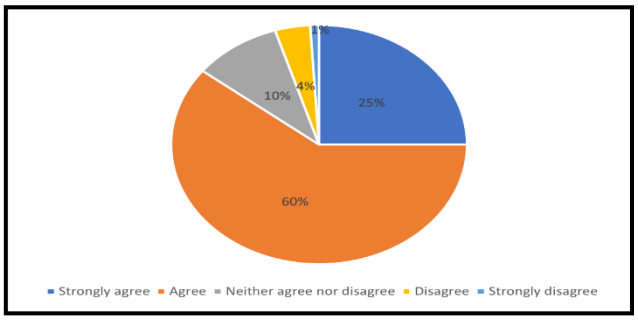

Fig. 10: Multimedia based instruction is more efficient and effective for online learning.

Multimedia based instruction is a message instruction which contain word and pictures in order for student go deeply learning from word and pictures instruction than word alone. In Fig. 10 shows that respondents agreed that multimedia-based instruction is more efficient and effective for online learning. 25% of respondents strongly agree with this statement, and 60% agree. Percentages of disagreeing respondents: only 4% of respondents disagree and 1% strongly disagree, while 10% of respondents are neutrals.

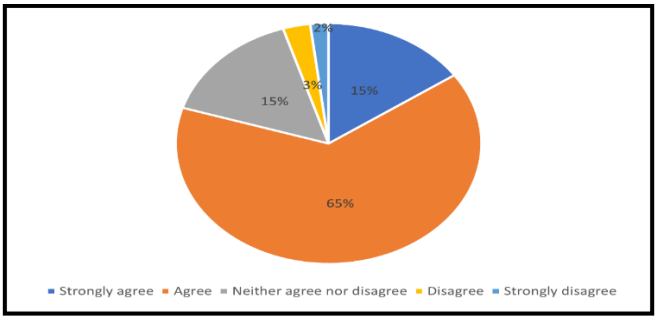

Fig. 11: Learning materials with video and audio enhancing learner's interest while being locked down.

While being locked-down and distance learning because of the COVID-19 pandemic, students' interests and motivation may be disturbed. The figure above shows respondents majorly agree with 65% and strongly agree with 15%. Respondents who disagree are only 2% (strongly disagree) and 3% (disagree).

5.0 CONCLUSSION

The aim of this study is to investigate students' preferences for online learning materials during this unprecedented distance learning due to the COVID-19 pandemic. From the result of the questionnaire, it shows that the majority of students prefer online learning materials with a simple and easy to understand layout with multimedia analytics approach, such as video, audio, graphic and animation, rather than text only. According to the results of the survey, only a small percentage of students disagree with multimedia analytic online learning materials.

Many students struggle to adapt to new learning methods and technologies as a result of unprecedented distance learning; however, a well-planned and interestingly designed learning material with a multimedia analytics approach can help students engage their imagination, develop a deep understanding of new knowledge, and engage in self-learning exploration [8]. Therefore, online learning materials with multimedia elements such as graphics, video, audio, and animation seem more acceptable and helpful in students' learning process during online class learning to maintain their mood and motivation in study. It also plays a significant role in student cognitive engagement and motivation during distance learning.

6.0 ACKNOWLEDGEMENT

This study was supported by the Computer Science Department of Universiti Pertahanan Nasional Malaysia for allowing online questionnaires to be distributed among students in the Computer Science Department. Thank you to all the students who participated and contributed to this study.

REFERENCES

[1] Y. Zhao, Y. He, and X. Zhao, "COVID-19 Outbreak Prediction Based on SEIQR Model," 2020.

[2] P. He, "Study on epidemic prevention and control strategy of COVID-19 based on personnel flow prediction," in *Proceedings - 2020 International Conference on Urban Engineering and Management Science, ICUEMS 2020*, Apr. 2020, pp. 688–691. doi: 10.1109/ICUEMS50872.2020.00150.

[3] A. Alla and K. Nafil, "Gamification in IoT application: A systematic mapping study," in *Procedia Computer Science*, 2019, vol. 151, pp. 455–462. doi: 10.1016/j.procs.2019.04.062.

[4] M. Wang, "The evolution of learning: From classroom to cloud," in *Proceedings - 8th International Conference on Intelligent Environments, IE 2012*, 2012, pp. 16–18. doi: 10.1109/IE.2012.67.

[5] M. Lamri, S. Akrouf, A. Boubetra, A. Merabet, L. Selmani, and D. Boubetra, "From local teaching to distant teaching through IoT interoperability," in *Proceedings of 2014 International Conference on Interactive Mobile Communication Technologies and Learning, IMCL 2014*, Jan. 2015, pp. 107–110. doi: 10.1109/IMCTL.2014.7011115.

[6] M. Ando and M. Ueno, "Cognitive load reduction on multimedia e-learning materials," in *Proceedings - The 8th IEEE International Conference on Advanced Learning Technologies, ICALT 2008*, 2008, pp. 268–272. doi: 10.1109/ICALT.2008.218.

[7] Y. W. Li, N. Mai, and N. Tse-Kian, "Using mayer's design principles in online learning modules: Implementation in a student centered learning environment," in *Proceedings - 2013 International Conference on Informatics and Creative Multimedia, ICICM 2013*, 2013, pp. 304–309. doi: 10.1109/ICICM.2013.57.

[8] Norshahriah Abdul Wahab, "VIRTUAL REALITY AND VISUALISATION IN IMMERSIVE LEARNING ENVIRONMENT (VR&V)," 2019.

[9] A. Patricia Aguilera-Hermida, "College students' use and acceptance of emergency online learning due to COVID-19," *International Journal of Educational Research Open*, vol. 1, p. 100011, 2020, doi: 10.1016/j.ijedro.2020.100011.

[10] T. Gonzalez *et al.*, "Influence of COVID-19 confinement in students' performance in higher education."

[11] S. Nicholson, "Two Paths to Motivation through Game Design Elements: Reward-Based Gamification and Meaningful Gamification," *iConference 2013 Proceedings (pp. 671-672). doi:10.9776/13313*, pp. 671–672, 2013, doi: 10.9776/13313.

[12] M. Garcia-Iruela and R. Hijon-Neira, "What Perception Do Students Have about the Gamification Elements?," *IEEE Access*, vol. 8, pp. 134386–134392, 2020, doi: 10.1109/ACCESS.2020.3011222.

[13] F. Roosta, F. Taghiyareh, and M. Mosharraf, "Personalization of gamification-elements in an e-learning environment based on learners' motivation," in *2016 8th International Symposium on Telecommunications, IST 2016*, Mar. 2017, pp. 637–642. doi: 10.1109/ISTEL.2016.7881899.

[14] Azami. Zaharim, N. E. Mastorakis, and Ioannis. Gonos, *Recent advances in e-activities : proceedings of the 7th WSEAS International Conference on E-Activities (E-Activities'08), Cairo, Egypt, December 29-31, 2008*. WSEAS Press, 2008.

[15] M. Ando and M. Ueno, "Cognitive load reduction on multimedia e-learning materials," in *Proceedings - The 8th IEEE International Conference on Advanced Learning Technologies, ICALT 2008*, 2008, pp. 268–272. doi: 10.1109/ICALT.2008.218.