Online Learning in Faculty of Mathematics and Natural Sciences, State University of Medan: Lecturers' Preferences for Online Learning Media During the Covid-19 Pandemic

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Abstract. Online learning has long been promoted by the Faculty of Mathematics and Natural Sciences (FMNS), State University of Medan (SUM). The online learning system (SIPDA) has been developed by Unimed as the backbone of online learning, but the number of lecturers using the system has not been as expected. The covid-19 has succeeded in forcing all lecturers to migrate from classroom face-to-face (offline) to online learning. This research was aimed to study the preferences of lecturers for available online learning media during the Covid-19 pandemic. The data were obtained using questionnaire that distributed online to all lecturers and students who were active in lectures for the even semester of the 2019/2020 academic year. The data shows that all lecturers have implemented online learning to serve all classes. The majority of lecturers serve their class by using more than one online media. The order of the three types of online media which became the main preference of lecturers experienced a shift during the 3 months of observation, namely from WhatsApp (WA) - Email - Google Classroom (GC) in the first, to WA - GC - SIPDA in the second, and to WA - SIPDA - GC in the third month. It can be concluded that, although initially the lecturers' main preference in learning was social media (WA), they have tried hard to make SIPDA as the main choice among the available e-learning media.

1. Introduction

Education 4.0, the education era influenced by the industrial revolution 4.0 (IR 4.0), is a general term used to describe how to integrate digital technology and cyber systems into learning process [1][2]. Education 4.0 is a response to the needs of IR 4.0 which focuses on smart technology, artificial intelligence and robotics; all of which now have an impact on our daily lives. Education 4.0 is expected to be able to make the learning process take place continuously without space boundaries and without time limits. In order for higher education to survive and continue to produce successful graduates in society, students must be prepared to face the cyber physical system which is commonly applied in the industrial sector.

The learning vision related to education 4.0 encourages students to learn not only skills and knowledge but also to be able to identify learning sources. The learning process is built around students so that they know where and how to study, and their performance is tracked through a data-based system [3]. Thus peers are very important in learning, students learn together while teachers or lecturers take the role of facilitators of learning [1].
The Covid-19 pandemic (coronavirus disease) has affected almost all aspects of life, including education. Since being declared a pandemic by the World Health Organization (WHO), more than 1.2 billion students (nearly 70% of the world's student population) in 186 countries, from kindergarten to university, have been affected [4][5][6]. Covid-19 has changed learning drastically, students have been forced out of class, and learn online relying on digital platforms. In Indonesia, the policy of learning from home is based on the Minister of Education and Culture circular number 3 of 2020 dated 9 March 2020 followed by the circular Number 36962/MPK.A/HK/2020 dated 17 March 2020 and more specifically by the circular of Dirjendikti number 262/E.E2/KM/2020 dated March 23, 2020. The essence of the circulars is to organize learning from home which can be carried out in a variety of positive activities, both online and offline, or activities based on the spirit of independent learning: independent campuses, such as project-based learning, humanitarian volunteers, or research relevant to efforts to contain the spread of the Covid-19 outbreak. In addition, Dirjendikti also regulates the implementation of laboratory practicums and field practices, final project research, and all learning activities at all levels of higher education programs to ensure that all academic activities are carried out properly. In response to the policy mentioned above, since 19 March 2020, Unimed has transferred all academic activities and services to online forms, including face-to-face lectures.

Online learning was unavoidable at higher education (HE), even before the pandemic. However, not all HE institutions have adequate infrastructure, systems and human resources and are ready to fully switch to a digital platform. Some universities are already accustomed to using online learning but there are still many who are not used to implementing online learning. For some universities that are already established and accustomed to blended learning, the adaptation of all lectures to online will definitely be smooth. For other universities, it will certainly cause serious problems, both for lecturers and students.

The limited survey conducted of students from the four FMIPA Unimed majors in the second week of April 2020, one month after studying online, revealed the same thing. Of the 305 students: 1) 27% said online lectures were too many tasks, there was no new knowledge, 2) 15% said online lectures were less effective because they were carried out irregularly, 3) 13% said their health had decreased due to dealing with too many laptops and android, 4) 13% complained about the reliability of SIPDA, and 5) the rest, between 2 - 10%, complained about the limited facilities and reliability of the internet network, the gap between parents and students, shifting class schedules, and not being attractive. The hope of students is that the number of assignments is reduced, improvement of SIPDA and assistance in buying internet packages.

The description above shows that although technically it can be implemented by all universities, it turns out that online learning needs to be planned very carefully by considering many variables in order to function effectively. It turns out that online learning is not only related to technical facilitators, technology facilities and infrastructure, but also to non-technical matters such as socio-economic conditions, geographical position and also the sophistication of thinking (skills and mentality) of human resources (especially lecturers and students).

Education 4.0 as an answer to the world of education for the era of Industrial Revolution 4.0 demands a paradigm shift in learning [1][7]. Education 4.0 is a creative response from the world of education in utilizing digital technology, open sources contents and global classrooms in the application of lifelong learning, flexible education systems, and personalized learning, to play a better role in society [8]. On the other hand, new normal online learning is not just an answer to a question, but far more than that, namely critical adaptation efforts that must be made to this new condition so that learning can continue to be effective.

Therefore, both during and after the Covid-19 pandemic (namely the new normal stage of education), online learning must be improved and refined so that it can truly meet the standards as a reliable counterpart of classroom learning in the concept of blended learning, which combines lecture methods.

face to face online. Blended learning can be relied on to become the backbone of the independent and independent learning campus program that has been introduced by the Ministry of Education and Culture
[9]. For this reason, online learning must be as effective as classroom learning. At times like this, the campus will truly be in the era of Education 4.0.

In an effort to improve the online learning system in the future, so that it can become a strong component of blended learning to accelerate the achievement of the Education 4.0 era while facilitating independent learning programs and independent campuses at FMIPA Unimed, it is necessary to measure the effectiveness of online learning carried out during the Covid-pandemic era. 19. It is also necessary to identify the strengths and weaknesses of online media and LMS (namely SIPDA) in use today, as well as technical and non-technical variables related to lecturers, students and society that affect the effectiveness of online learning. This information is very much needed to make improvements and improvements to online learning in order to realize Education 4.0 and facilitate an independent and independent campus program to study at FMIPA Unimed.

2. Materials and Methods

2.1. Research subject and setting
The research was carried out at the Faculty of Mathematics and Natural Sciences (FMIPA), Universitas Negeri Medan. The research subjects are lecturers and students of FMIPA Unimed who are teaching or taking courses in the even semester 2019/2020, namely on during the covid-19 pandemic.

There are 11 weeks of online meetings held during this semester, starting from week 5 to week 16 of the semester. The eighth and 16th weeks were not included in this study because in that week the midterm and final semester exams were held.

In the even semester 2019/2020 there are 759 scheduled classes. The entire class was served by 230 lecturers and attended by 4,250 students from 4 different departments or 10 study programs plus one bilingual program.

2.2. Type of research
The type of this study is policy research to find out what is actually happening and to determine new policies in the development and implementation of online learning. This research produce data on the effectiveness of implementing online learning in the FMIPA Unimed environment during the Covid-19 pandemic. This research also produce an inventory list of technical and non-technical constraints faced by lecturers and students during online learning during the Covid-19 pandemic. This data is very much needed for consideration before making policies in the development and improvement of the existing online learning system.

2.3. Data collection technique
Data collection in this study was carried out using a questionnaire (questionnaire). The distribution of questionnaires was carried out both to lecturers and students aimed at obtaining data about the obstacles or obstacles faced during the mentoring process. In addition, as a comparison, information will also be collected through interviews with students and lecturers who are randomly assigned to represent each study program in the faculty.

2.4. Research instruments and procedures
The instrument used in this study was a questionnaire, namely a lecturer questionnaire and a student questionnaire. Both types of questionnaires are anonymous and contain closed (i.e. yes/no, multiple choice, or scale questions) and open questions aimed to exploring opinions of students and lecturers about online media commonly used by lecturers.

The main questions posed to both lecturers and students are: 1) Do you carry out regular online learning on a schedule? [Do you attend lectures regularly as scheduled?], 2) What is the name of the online media that you use when implementing online learning? [What is the name of the online media used by the lecturer when implementing online learning?], 3) Do you feel comfortable using the online media of your choice? [Are you comfortable attending lectures with the online media chosen by the
4. What is your role as a lecturer?
5. What are the main problems you face when implementing online learning?
6. What were the main problems you faced when participating in online learning?

The questionnaire is distributed online so that it reaches all lecturers and students who were active in lectures for the even semester of the 2019/2020 academic year. Respondents (lecturers and students) were encouraged to be willing to fill out the questionnaire voluntarily, during the period of week 5 to week 15. The questionnaires that have been filled in the previous week can no longer be accessed by respondents in the following week. Respondents must fill out the appropriate questionnaire each current week.

2.5. Data analysis
Most of the data obtained in this study are in qualitative form, the data will be analyzed descriptively. Only questionnaires that met the requirements were analyzed in this study.

Among all respondents who filled out the questionnaire online, 200 classes (50 classes per department) were selected for analysis. The selection was made based on the following criteria: 1) Lecturers who conduct courses and at least 25% of student participants complete the questionnaire, 2) Lectures take place regularly every week, not intermittent, and 3) The questionnaire was filled out according to a predetermined schedule. In the analysis, the lecturers’ answers were compared and confirmed with the students' answers.

3. Results and Discussion
3.1. Lecturer preference for online learning media
Lecturers at the Faculty of Mathematics and Natural Sciences, Universitas Negeri Medan prefer social media as online learning media during the Covid-19 pandemic in the even semester of the 2019/2020 academic year. As many as 59 - 76% of the class learned about social media every week, only 24 - 41% used special learning media (Figure 1). The main choice of social media from lecturers is the Whatsapp (WA) application, other social media are very rarely chosen. Media specifically designed for the learning process is the second choice for lecturers. However, the use of SIPDA, a learning management system owned by Unimed, has become the main choice among other specialized media that are freely available.

![Figure 1. Lecturer preferences for media in online learning during the Covid-19 pandemic are based on lecturers' respondents. Lecturers prefer social media, especially WhatsApp (WA), compared to the special learning media available (LMS).](image-url)

If the lecturers' answers above are compared with the answers of students participating in the course, then a more or less the same picture is obtained about the preferences of the lecturers in the selection of this online learning media (Figure 2). But it seems that students give a slightly better response than the lecturers. Students stated that 56 - 75% of the class were taught using social media, and the remaining 25 - 45% had used special learning media (compare with the lecturers' answers: 59 - 76% social media and 24 - 41% special media). This means that there is a 1% increase in the use of special media based on student answers. Although the main choice of lecturers is social media, especially WA, the use of special media for learning, especially SIPDA Unimed, shows a very positive trend from week to week.
Figure 2. Lecturer preferences for media in online learning during the Covid-19 pandemic are based on students' respondents. Lecturers prefer social media, especially WhatsApp (WA), compared to the special learning media available (LMS).

Unimed itself has pioneered online learning since 2007 by developing a learning management system (LMS) under the name Sipoel, then refined in 2017 to become SIPDA. Almost simultaneously with the development of SIPDA, Unimed has also implemented blended learning, where face-to-face lectures are allowed only 60% and the rest can be carried out online. With this condition, suddenly switching from face-to-face lectures to full online during a pandemic should not cause disruption or problems. It is expected that the achievement of learning objectives can be carried out effectively.

3.2. The convenience and constraints of online learning
When asked whether they felt comfortable or not in taking online classes, the majority of lecturers (57%) and students (69%) said they were uncomfortable. Furthermore, it was found that the percentage of lecturers who stated that they were comfortable (43%) in organizing online learning was much higher than that of students who felt comfortable (31%) attending the lecture (Figure 3).

The reasons for the inconvenience presented were varied, and of course very different between the two groups (Figure 3). The five reasons most often cited by lecturers for this discomfort are: can not control the class (24%), ineffective (12%), difficult to verify student work (9%), interaction can not be spontaneous (7%), and difficult to prepare teaching materials (5%). Meanwhile, the main reason for students for the inconvenience of learning online that they put forward is: too many assignments (27%), inadequate gadget (15%), inadequate internet quota (13%), unreliable network (9%) and can not focus (5%) (Figure 3).

Figure 3. Total and type of leucocytes counts (mean + SD) of normal and diabetic rats treated with LEE at the day 14 of the experiment.
However, apparently the problem is not that simple, even for universities that have established infrastructure, human resources and are accustomed to implementing online learning. A survey conducted by the Indonesian Education University (UPI) after one month of online learning revealed that 54 percent of students disagreed with online learning as an alternative to lectures. In fact, 82.4 percent of them consider that online learning more difficult than face-to-face one. Even though the same respondents thought that the lecturers had prepared the material quite well (52%) and presented them based on the UPI LMS system (74%). The main difficulties for students are limited internet quota, network difficulties, the availability of learning devices (such as laptops), the level of understanding of the material, the atmosphere of the house and the unsupportive environment [10]. The same results were also revealed from an online survey involved nearly 240,000 students from all over Indonesia as respondents [11]. Although almost all universities were able to carry out online learning during the pandemic, the majority of students felt that online lectures were ineffective. In fact, 89 percent of students felt that face-to-face was better than online. The main obstacle faced by students is internet connection or network (73% of students use internet connection from mobile phones so that it is burdensome for internet packages, only 22 percent are using WiFi), limited internet quota, limited devices (only 25% of students use notebooks or computers, the rest forced to use a mobile phone), an unstable internet network [11].

Similar to student complaints, the survey results from the Ministry of PPPA also show that 58% of school children (under 18 years of age) spread across 29 provinces in Indonesia do not like the policy of learning from home [12]. These school children hope that the teachers do not give too many assignments when studying at home, and they prefer two-way communication with teachers in class.

The antidiabetic mechanism of flavonoids can take various pathways, for example lowering blood glucose, increasing insulin resistance and sensitivity, decreasing a-amylase and a-glucosidase enzymes, increasing pancreatic function, and others [43].

Organ weight is an excellent indicator of organ function. A number of factors have been reported that can affect organ weight of the animals, including strain, age, sex and environmental and experimental conditions [44]. This variation in body weight may be considered a potential source of bias in the analysis of organ weight data. Therefore, when considering organ weight data, the difference in body weight must be taken into account. The data of this study indicated that the spleen-to-weight ratio in diabetic control mice was lower than that in diabetic rats given alloxan or bosibosi leaf ethanol extract (LEE) and from normal control rats as well. The organ-to-body weight ratio may be associated with the occurrence of improvement and spleen function after the rats received metformin and LEE. As is known, the spleen is part of the lymph system or lymphatic system which functions to filter out damaged red blood cells and maintain and maintain the body’s immune system. Cells in this system are known as immunocompetent cells, namely cells that are able to distinguish body cells from foreign cells or substances. The spleen is an organ that produces lymphocytes, so it is estimated that the heavier work of the spleen in producing lymphocytes can increase the size of the spleen [45].

Lymphocytes play a role in forming antibodies that protect the body against chronic infection and maintain certain immunity against infection. Bosibosi leaf extract may play a role in protecting the body from external factors, and providing immune defense through the induction of lymphocyte production. This can be seen in the increase of lymphocytes in rats given bosibosi extract through the number of lymphocytes found in normal control mice or diabetic rats given metformin (Table 2). One of the functions of lymphocytes is to produce antibodies. The resulting antibodies will carry out a specific immune response with antigens [46]. In addition, mice given the extract also showed an increase in the number of neutrophils on day 14. As is known, neutrophils function to prevent and fight bacteria invading the body [47]. All of these data, coupled with data on the increase in spleen-to-body weight ratio (Figure 2), indicate that the ethanol extract of bosibosi leaves has a good immunostimulant potential.
4. Conclusion
Based on the findings of this study, it can be concluded that although the main choice of lecturers in implementing online learning during the pandemic is social media, especially WhatsApp (W), lecturers are eager to use the learning management system, namely SIPDA, which has been developed by Unimed long before. This fact is a very valuable asset for faculty managers to be able to carry out activities to strengthen the use of SIPDA.

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