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The Impact of Covid-19 to Biology Teacher Education: Emergency Distance Learning at Islamic Universities in Indonesia

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ABSTRACT
In response to the Indonesian government's policy forcing a rapid transition to distance learning, the college developed an emergency e-learning programme plan to ensure learning continues. Generally, this paper aims to highlight the impact of the COVID-19 pandemic on Islamic universities in Indonesia, especially biology teacher education. This paper also describes lecturers' experiences in developing approaches different from those proposed by the institute. We used mixed methods to dig deeper into online teaching transition and its problems. Data was collected through a questionnaire on faculties and students studying at the biology education department of Islamic state universities in Sumatera, Java, Sulawesi, and Nusa Tenggara, Indonesia. Faculties and students expressed their attitudes, beliefs, and evaluations. The developed emergency e-learning programme cannot be used optimally due to potential factors, such as information and communication technologies (ICT) tools and technological pedagogical knowledge. Faculties improvised online teaching using other platforms such as WAG and e-mail, which are guaranteed easy access by students. With this way, they maintained social contact with students and ensured students to keep continuing to build literacy skills. Faculties also created content in the form of demonstration videos for practicum, which is uploaded on YouTube. Unless, using the virtual laboratory is still a big problem.

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Introduction

In just one week after being identified, the virus that causes COVID-19 has spread and resulted in the suspension in education in 117 countries (UNESCO, 2020; Viner et al., 2020). The records said around one billion students were affected (Abuhammad, 2020). More specifically, in the higher education sector, The International Association of Universities reported that nearly 40% of learning at universities in Asia and the Pacific had to be postponed and canceled due to the Covid-19 pandemic (Marinoni, van't Land, & Jensen, 2020). In Indonesia, through Press Release Number:

137/sipres/A6/VI/2020, the Ministry of Education and Culture has instructed all universities have to continue their learning on a fully online platform. Beyond stakeholder expectations, online learning has rapidly become the main alternative to tertiary institutions in Indonesia during the pandemic (Arum & Stevens, 2020).

In this pandemic era, teaching in universities has been forcibly transferred to the digital world without proper preparation. As if there were no options, lecturers had to teach online even though they felt not ready to do so (Hechinger & Lorin, 2020). The implementation of online learning as the primary access to education delivery must be carried out so that learning continues and institutions continue to function (Cutri, Mena, & Whiting, 2020; Quintana, 2020). Perhaps, as stated by Kerres (2020), who also represents the voice of lecturers in Indonesia that "Online learning is done without going through managerial strategy development and training, there are no arguments about the pros and cons of technology design, in the end, we only do what has become the policy". This situation is shocking, for example, in the majority of medium-sized Islamic universities in Indonesia, where online learning is still very unfamiliar to them, and then suddenly has to move from traditional learning to online learning. There is no doubt that the current situation puts much pressure on because not all of these universities have an adequate online learning infrastructure (Assunção Flores & Gago, 2020).

Responding to this situation, the side that we consider positive is that most universities are starting to make great efforts by building e-learning (Osman, 2020). The most developed ones are Learning Management Systems (LMS) (Assunção Flores & Gago, 2020). As far as we know, many lecturers have made great efforts so that online learning with the LMS built by the universities where they teach can run well, like preparing online modules and recording interactive videos. However, suddenly what they had prepared could not be used due to several obstacles, for example, low bandwidth and difficult access LMS. Ideally, LMS delivers learning material and presentations and an actual learning environment where lecturers can provide virtual teaching, especially for practicum teaching (Osman, 2020).

Seeing this situation, we can assume that Islamic universities in Indonesia have taken advantage of the Covid-19 pandemic as an opportunity to digitalize learning. However, in distance learning, our discussion is not only around infrastructure. When the LMS has been built optimally, we need to inquire about the lecturers' readiness to use it. Thus, online learning identification includes at least two things: the technology itself and how lecturers and students learn (Eom, 2013). There is a need to investigate further their ability to use technology, apart from evaluating the technology itself (McGill, Klobas, & Renzi, 2011; Motaghian, Hassanzadeh, & Moghadam, 2013).

We must realize that online learning requires excellent lecturers' readiness and abilities (Assunção Flores & Gago, 2020; Kuhfeld et al., 2020). On the other hand, many lecturers still lack formal education about online teaching (Gulbahar & Adnan, 2020), but they are asked to transition and implement it (Cutri & Whiting, 2018). Of course, as previously explained, lecturers who feel ready to teach online, prepare well. However, attention must still be paid to lecturers who may feel unprepared or not enthusiastic about doing it (Cutri & Mena, 2020).

The readiness of lecturers in implementing online learning also benefits students. The technology experience of prospective teacher-students is an essential factor to determine their readiness to apply ICT in the classroom (Lawrence & Tar, 2018). Recent research shows that they are still not ready to integrate ICT into their learning (Ranellucci, Rosenberg, & Poitras, 2020). One of the main highlights is that prospective teacher-students often do not use ICT in practicum activities (Tondeur, Roblin, Braak, Voogt, & Prestridge, 2017). Investigating student's online learning readiness is an important field of inquiry (Yeh et al., 2019; Yu, 2018). However, there is no current data on this matter, especially in prospective biology teachers at Islamic universities in Indonesia. Research that focuses explicitly on faculty and students' transition from traditional teaching to online teaching is still limited (Kraglund-Gauthier, Chareka, Orr, & Foran, 2010). Furthermore, the limitations of research on the readiness of

using LMS will impact the underutilization of LMS in developing countries (Akaslan & Law, 2011) such as Indonesia.

With this background, this paper's primary purpose is to explain how lecturers' readiness in Islamic universities in Indonesia in implementing online learning in emergencies, especially in utilizing the developed LMS. This study also aims to measure student responses to online learning that has been implemented to be used as evaluation material for lecturers and universities. From these explanations, the question arises, how do students deal with the rapid digitalization of learning during the pandemic? How do students in learning use LMS during the pandemic? How do they judge the usefulness of the LMS?

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Theoretical Framework

As far as we know, there is limited specific literature in detail and related to the process of changing universities and lecturers associated with the shift of offline learning to online learning, especially in biology education. We found only the literature regarding online learning methods and strategies to increase their effectiveness. Finally, we adopt organizational theory and change theory to form the theoretical framework for this study. We will start with a biological metaphor for understanding the university as an educational organization in a massive movement to online learning and then describe the organizational theory and change theory as a framework for analyzing research findings.

Borrowing a biological metaphor offered by Morgan (2006), we try to understand the university's shift to online learning during the Covid-19 pandemic. In this context, universities can be characterized as organisms that need food from their environment, so universities need to develop the right relationship with the environment for learning continuity. From the perspective of Morgan's contingency theory, we can also view universities as open systems that need to adapt to a changing environment.

Wheatly (1999) also views universities as a living system that needs to adapt to the changing educational landscape. Furthermore, Wheatley views that organizational change occurs through a change in meaning in a symbolic framework. When the status quo is disturbed, the individual organization will be encouraged to change its operation mode. In organizational theory, the symbolic framework describes the university as culture (Bolman & Deal, 2013). To create university change using a symbolic framework, lecturers must undergo a cultural change that causes face-to-face learning to be abandoned as a "ritual" of the past for something more beneficial to current university realities, namely online learning.

Next, we adopt a change theory to analyze our research findings related to university, and faculty changes. This study is expected to offer insight into how universities and lecturers respond to external challenges during the Covid-19 pandemic. Lewin (1947) identified a change model in the following three steps.

- First, not freezing, involving individuals who are no longer dependent on the status quo. In this regard, universities and lecturers realized that face-to-face learning was no longer acceptable in today's reality.
- Second, moving, involve changing to acceptable behavior. During this phase, universities and lecturers repeatedly practice online learning until they reach competency.
- Third, freezing occurs when a new behavior becomes an entrenched habit so that there is no attempt to return to the old behavior (Burnes, 2004). In this phase, universities and lecturers consider that online learning needs to be adopted permanently.

Methods

a. Research Design

b. This study uses a mixed-method sequential explanatory model. We measured lecturers' readiness and student responses in online learning during the pandemic in the first stage. Measuring lecturers' readiness and student responses were carried out using a cross-sectional survey technique (Creswell, 2012). In the second stage, we conducted semi-structured interviews with lecturers. This interview focused on the lowest item of the quantitative measurement results in online learning readiness. Interviews were conducted to dig deeper into lecturers' experiences using the LMS developed by their universities, obstacles in their implementation, and steps to overcome these obstacles.**Recruitment of Participants**

The data collection process took place for two weeks, between 7 and 21 December 2020. Before conducting the survey, we sent a letter of approval to the department to conduct survey research. The letter is then forwarded to lecturers who are interested in being involved in the study as participants. After the participants agreed to be involved voluntarily, we followed up by providing complete information about the research and its objectives to the lecturer. After that, lecturers were asked to fill out an online learning readiness questionnaire. Finally, the lecturer distributed the questionnaire link in the form of a google-form that has been prepared for their students via Whatsapp. Thus, the technique used by student recruitment was snowball sampling.

Participants are lecturers and biology education students selected from Islamic universities in various regions in Indonesia. The regional criteria used to select participants are divided into parts of Indonesia in the western, central, and eastern parts of Indonesia. The island of Sumatra represents the western region, the island of Java represents the central region, and Sulawesi and Nusa Tenggara's islands represent the eastern region. A total of 18 Islamic universities have participated in filling out the questionnaire. Seventy lecturers have received the online learning readiness questionnaire, but only 44 lecturers have returned the questionnaire, or only about 62.86% of the questionnaires returned. Besides, 812 students had received the online learning response questionnaire, but only 727 students returned the questionnaire, or only 89.53% of the questionnaires returned. The demographic distribution of lecturer and student participants can be seen in Table 1.

Table 1. ***Demographic distribution of lecturer and student participants***

Participant	Criteria	Groups	N	Percentage (%)
Lecture	Gender	Female	32	72.7
		Male	12	27.3
	Region	Sumatra	7	15.9
		Java	25	56.8
		Sulawesi	6	13.6
		Nusa Tenggara	6	13.6
	Functional positions	Senior	11	25.0
		Junior	33	75.0
Student	Gender	Female	600	82.5
		Male	127	17.5
	Region	Sumatra	279	38.4
		Java	306	42.1
		Sulawesi	67	9.2
		Nusa Tenggara	75	10.3
	Study-year	First-year	106	14.6
		Second-year	239	32.9
		Third-year	266	36.6

	Fourth-year	116	16.0

Finally, eight of the 44 lecturers involved in filling out the questionnaire were selected to participate in a semi-structured interview. The eight lecturers were selected using a purposive sampling technique that took into account the criteria for their availability and willingness to participate and their ability to communicate experiences and opinions in an articulate, respectful, and reflective manner (Palinkas et al., 2015). The eight lecturers were also chosen based on the largest and oldest Islamic universities representing western Indonesia (Sumatra), central Indonesia (Java), and eastern Indonesia (Sulawesi and Nusa Tenggara). Apart from that, gender and functional position were also considered criteria to reflect the 44 other lecturers' actual conditions. Table 2 shows the participants involved in semi-structured interviews.

Table 2. ***List of interviewees in a structured manner***

Name	Gender	Region	Functional positions
Lecturer#1	Female	Sumatra	Senior
Lecturer#2	Female	Sumatra	Junior
Lecturer#3	Female	Sulawesi	Junior
Lecturer#4	Female	Nusa Tenggara	Junior
Lecturer#5	Male	Java	Senior
Lecturer#6	Male	Java	Senior
Lecturer#7	Male	Sulawesi	Junior
Lecturer#8	Male	Nusa Tenggara	Senior

c. Conditions of Online Learning at Islamic Universities in Indonesia

Respondents of this research are the department of biology education at Islamic Universities in Indonesia, located in Sumatra, Java, Sulawesi, and Nusa Tenggara. The Indonesian government's policy on learning during the COVID-19 pandemic since March 2020, through Press Release Number: 137 / sipres / A6 / VI / 2020, has encouraged almost all universities to transition from face-to-face learning to online learning. Many universities have made online learning preparations by developing or improving the quality of their LMS. The results of distributing questionnaires show that 16 (89%) Islamic universities have made preparations by providing LMS facilities. In comparison, 2 (11%) other Islamic universities have not provided LMS, so they use online learning platforms available for free. In more detail, of the 44 biology education lecturers involved in this study, 26 (59%) prefer to use other online learning applications (Zoom, Google Classroom, Wag, Google Meet, Telegram, Youtube, etc.), three people (7%) chose a free LMS (Moodle, Schoology, Blackboard, etc.). Only a third of them used an LMS developed by a university.

d. Instrument

Measuring lecturers' readiness in implementing online learning uses the Faculty Readiness for Online Crisis Teaching (FROCT) questionnaire developed by Cutri et al. (2020). Initially, the questionnaire was translated using back-translation techniques and made adjustments to the context of learning in Indonesian universities. The online learning readiness questionnaire for lecturers has gone through the content validation stage by still referring to the construct and theme in the original questionnaire, namely comfort with risk, identity disruption, teaching norms, equity, and tenure norms by four biology education experts. As a result, the questionnaire for lecturers consisted of 23 question items.

Questionnaires measuring student responses to online learning also use a questionnaire that refers to FROCT, but due to differences in context and modification, the questionnaire needs to be tested. Questionnaire trials have been conducted on 250 students. The results of the RASCH analysis showed

24 question items were declared valid. Consistent answers are classified as good (Pearson reliability = 0.78). Quality of items in special instruments (item reliability = 0.99). This value reflects that the questionnaire can be widely applied. The Cronbach alpha value is quite good (α = 0.81). The questionnaire consisted of items measured on a 5-point Likert scale, with five indicating "strongly agree", and one indicating "strongly disagree." To interpret each item's mean value, a score of 1 indicates poor readiness, 2 for low readiness, 3 for moderately ready, four indicates ready until an average score of 5 indicates high readiness.

e. The semi-structured interview instrument is an interview guide based on the questionnaire items that have the lowest value. Interviews were conducted online through the Zoom application with a duration of 45-60 minutes for each participant. Some questions were asked, namely, why do you prefer face-to-face learning to be online using LMS? What are the obstacles faced in learning using LMS? How is the online learning method that has been applied using LMS? What efforts have been made to support practicum learning?**Data Analysis**

The quantitative data of the scale measurement results were analyzed descriptively using the mean and standard deviation, which aims to explain the level of online learning readiness for lecturers and students on each theme. The higher the mean score, the higher the readiness. Because this data is related to ordinal data, the statistical analysis used is non-parametric. Statistical analysis with the Mann-Whitney U test to compare the readiness of lecturers and students based on gender and functional position (especially for lecturers), meanwhile comparisons based on region and year of study used the Kruskal-Wallis H. test.

The qualitative data from the interviews were analyzed using content analysis techniques, according to Bengtsson (2016). Data analysis was carried out at the manifest level using the informants' words directly, hoping that the results would be close to the original meaning and context. The coding is done deductively so that the results obtained have good reliability (Catanzaro, 1988). These codes serve as the basis for grouping themes in analyzing qualitative data, for example, using online learning constraints grouping based on research results (Coman, Țîru, Meseșan-Schmitz, Stanciu, & Bularca, 2020). In the final stage, the researcher validates with a member check. Besides, we also use these various methods. For example, research is carried out by a collaborative process and ends with data triangulation so that qualitative findings can be relied on (Silverman, 2013).

f. Ethical Considerations

Respondents were informed about the research objectives; data usage and anonymity guaranteed for all. Participation of respondents is entirely voluntary thatthe data collection was carried out following the Declaration of Helsinki.

Findings

The results of the study are described in two parts. First, quantitative findings provided an overview of the level of readiness for online learning. Second, qualitative findings described lecturers' experiences and the obstacles faced in online learning using LMS in more detail.

a. Quantitative findings

The lecturers' readiness level in online learning using LMS shows a total average of 3.68. This value is still on a scale of 3 (sufficient) but approaching a scale of 4 (good readiness), which is in the "good enough" category. The lowest average score was on the theme of equity and tenure norms (M = 3.61, SD = 1.05) and the theme of teaching norms (M = 3.61, SD = 1.00), while the highest was on the theme of identity disruption (M = 3.93, SD = 0.93) The lowest items in each theme 1, 2, 3, and 4, respectively, are items 7, 8, 12, and 19. In more detail, the mean for each theme and each item is the lowest can be seen in Table 3.

Although practically speaking, senior lecturers and those in the Sulawesi region have better readiness than juniors and other regions. The results of non-parametric statistical analysis show that

there is no difference in the readiness of lecturers based on gender (p = 0.990), occupation (p = 0.145), and the teaching area (p = 0. 214).

Table 3.*Lecturer online learning readiness level (n = 44)*

Theme	Mean	Std. Dev	Min.	Item
Comfort with risk	3.65	1.05	2.07	Item. 7 "I prefer to carry out learning with LMS than face-to-face learning."
Identity disruption	3.93	0.90	3.36	Item. 8 "As a lecturer, I feel that my ability is good when I use LMS in online learning."
Teaching norms	3.61	1.00	2.95	Item. 12 "I feel more comfortable teaching using LMS because students do not rely entirely on direct instruction from me."
Equity and Tenure norms	3.61	1.05	2.00	Item. 19 "I use LMS more often than other media such as WAG and e-mail because LMS can make it easier for students with equity problems (e.g., weak internet network, etc.)
Total	**3.68**	**1.02**	**2.00**	

The student's readiness level in online learning using LMS shows a lower average than lecturers, which is 3.07, which is also classified in the "sufficient" category. The lowest average score was on the theme of equity and tenure norms (M = 2.08, SD = 1.14), while the highest was on the theme of teaching norms (M = 3.25, SD = 1.18). The lowest items in each theme 1, 2, 3, and 4, respectively, are items 7, 9, 14, and 20. In more detail, the mean for each theme and each item is the lowest can be seen in Table 4.

The inferential statistical analysis results showed no difference in readiness between male and female students (p = 0.497). However, the different test results based on region and year of study showed contrasting results: there was a significant difference in student readiness (p = 0.000). Students residing in the Sulawesi region are better prepared than others. Students in the fourth year of study have better readiness than those in the third and second years but have the same readiness as the first year.

Table 4. *Levels of students' online learning readiness (n = 727)*

Theme	Mean	Std. Dev	Min.	Item (Min.)
Comfort with risk	3.15	1.13	1.57	Item. 7 "I prefer to carry out learning with LMS than face-to-face learning."
Identity disruption	3.14	1.28	1.56	Item. 9 "Learning with LMS made me realize that the presence of lecturers in person is not so important."
Teaching norms	3.25	1.18	2.10	Item. 14 "I feel comfortable carrying out learning with LMS because the learning is no different from face-to-face learning."

Equity and Tenure norms	2.08	1.14	2.25	Item. 20 "My lecturers use LMS more often in online lectures than other platforms such as WAG and e-mail because it can make it easier for me if there are equity issues (for example, weak internet network, etc.)
Total	3.07	1.19	1.56	

b. Qualitative findings

The majority of respondents preferred face-to-face learning to online learning using LMS. All respondents agreed that face-to-face learning could create a more active, interactive, and effective atmosphere than e-learning. Many lecturers stated that online learning with LMS had shortcomings, such as limited interaction, less freedom in conveying material and expressions, and a lack of student responsibility. Besides, many lecturers said it was challenging to ensure that students attended lectures from beginning to end.

> Lecturer # 8 "Face-to-face learning is preferred because lecturers and students can interact directly so that it is more responsive."
>
> Lecturer # 4 "Online learning has a weakness in ensuring/controlling the attendance of all students at every meeting forum."
>
> Lecturer # 2 "Face-to-face learning is superior to online learning because face-to-face learning can be more flexible in learning, such as providing analogies, explaining concepts in more detail, and displaying expressions."

Apart from the shortcomings of learning with an LMS, there are also some obstacles in using it. The obstacles conveyed by the respondents can be grouped into four variables, namely technical conditions, teachers' technical skills, teaching style, and interaction with students/teachers. A summary of the obstacles faced by lecturers in learning with LMS can be seen in Table 5.

Table 5. *Summary of obstacles faced by lecturers in learning with LMS*

Variable	Category	Statements
Technical conditions	Technical problems while learning online	"Signal constraints because some students come from less supportive places."
	Use of multiple online platforms (depending on the teachers' preferences)	"Sometimes LMS access is often hampered if there are too many users, teachers tend to use multi-platform which is more practical."
Teachers' technical skills	Diversified use of the tools offered by the E-learning platform	"The features in the LMS are considered quite complicated and impractical."
	Lack of teacher's technical skills	"Less understanding of the features in the LMS."
Teaching style	Lack of adaptation of teaching style for the online environment (which generated difficulties of assimilation and understanding)	"Less familiar with LMS learning."
Interaction with students/teachers	Lack of support from teachers in the learning process (deficient interaction)	"Less interactive learning and messages conveyed to students are not optimal."

	Lack of interaction with peers/teachers	"Less emotional bonding between lecturers and students."

The existence of lecturers' weaknesses and obstacles in online learning with LMS impacts teaching methods carried out by lecturers. Most of them did not use the LMS provided by the campus. The main reason was that setting up and using an LMS is quite complicated so that it is less practical and confusing. Finally, they preferred to move to other platforms such as WAG and Google Meet.

> Lecturer # 3 "Online learning that has been done so far, and does not take advantage of the campus LMS because it is not practical, so learning is carried out using platforms such as Google Meet, Zoom Meeting, and WAG."
>
> Lecturer # 4 "Online learning using LMS is new and unfamiliar, so its use tends to be confusing, so I chose more practical media such as WAG and Google Meet."
>
> Lecturer # 1 "There are many technical problems in using LMS, such as signal constraints and large quota, so that online learning is carried out with media that has a low risk of technical problems, such as WAG."

Based on Press Release Number: 137 / sipres / A6 / VI / 2020 and higher education lecture regulations, the implementation of lectures and practicum is also required to be carried out online. A learning approach that focuses on theory is usually carried out using the online lecture or discussion method. Meanwhile, practicum activities that are compulsory for biology education students are carried out with several alternative approaches. First, the demonstration inquiry approach, the lecturer made a practical demonstration video uploaded on the YouTube channel, then the students listened and answered some questions given by the lecturer. Second, with the guided inquiry approach, the lecturer provides a theme or problem that students must solve, then the students compile procedures and do practicum independently in their respective homes. The lecturer provides online guidance during the preparation of procedures and practicum implementation. Before determining the practicum approach, the practical topic is mapped first by the lecturer because not all practicum topics can be done independently at home. The alternative to a virtual laboratory simulation approach is still a big challenge because the preparation is quite tricky and requires expensive costs and time. Besides that, lecturers also need special skills.

> Lecturer # 4 "The theoretical learning approach during the pandemic was dominated by online lecture and discussion methods, while the approach to practicum activities was mostly made by listening to demonstration videos and also independent practicum."
>
> Lecturer # 7 "The lecturer does a topic mapping before determining the practicum approach because some practicum topics cannot be done independently at home, so the lecturer provides demonstration videos via YouTube and also gives some questions."
>
> Lecturer # 3 "The practicum approach with guided inquiry is carried out on topics that allow students to carry out experimental activities at home, such as observing plants, animals, ecosystems, and phenomena about other living things."
>
> Lecturer # 6 "The practicum approach with computer simulations such as virtual laboratories has never been done because they still do not know how to obtain and

develop the media, to develop it requires special expertise and requires expensive time and money."

Discussion

This research is the first attempt to evaluate online learning readiness for lecturers and students at Islamic universities in Indonesia during the pandemic. Readiness in the context of this research is defined as the ability of lecturers and students to use the technology required in the LMS efficiently (Hashim & Tasir, 2014; Hung, Chang, Lin, & Hsiao, 2014). This research is important to determine whether lecturers and students can follow the transition and how LMS can affect the learning process (Emelyanova & Voronina, 2014; McGill et al., 2011) andcan provide a big picture of lecturers' experience from various Islamic universities in Indonesia in online learning during the Covid-19 pandemic (Lloyd, McCoy, & Byrne, 2012). We need to repeat that the results presented in this paper were not only based on lecturers' research but also students.

Our research showed that the readiness of lecturers and students is still in a good category. Still, a more detailed descriptive analysis on each item and the results of in-depth interviews, especially from some of the lowest questionnaire items, showed that lecturers were still not comfortable with online learning because of their low abilities. How that lecturers and students are not ready to online learning - if there is a choice - they prefer to learn offline. The theoretical framework as a reference in the analysis of findings showed that the lecturer was still in the moving stage. We presented some reasons. Namely, offline learning was considered more expressive, responsive, and interactive than online learning. Gay (2016) and Holsapple & Lee-Post (2006) stated that lecturers with low pedagogical readiness will prefer traditional learning compared with online learning and will prefer verbal feedback over written feedback.

We identified that their unpreparedness was affected by several constraints. These constraint variables refer to the research results of Coman et al. (2020), namely technical conditions, teachers' technical skills, teaching style, and interaction with students/teachers. Although almost all types of obstacles were identified in this study, we focused on two main obstacles that resulted in the LMS not being used optimally, namely pedagogical readiness and technical readiness. Previous researches had also identified that the level of readiness for implementing learning using LMS is related to technical skills and pedagogical training (Darab & Montazer, 2011; Gay, 2016; Keramati, Afshari-Mofrad, & Kamrani, 2011).

First, pedagogical readiness refers to lecturers and students' ability to access learning (Akaslan & Law, 2011) and their LMS perceptions (Keramati et al., 2011; Wei & Chou, 2020). As reported by other studies from the literature, this study also confirms that lecturers have not optimized LMS use (Assunção Flores & Gago, 2020; Kuhfeld et al., 2020). This may also be related to the negative perceptions of lecturers and students towards online learning. It cannot be denied that the transition process involves strong emotional and affective characteristics (Cutri & Mena, 2020), as confirmed by Mitchell, Parlamis, & Claiborne (2015) that sources of resistance to online learning are linked to fear of the unknown and failure.

The lecturer in the interview and the item statement (the lowest score on the identify disruption theme) showed that the lecturer also has an identity disorder as a lecturer. In the transition process, lecturers may experience confusion between who they are as lecturers in traditional learning and what they should do in an online learning environment (Johnson, Ehrlich, Watts-Taffe, & Williams, 2014). The lecturers are clearly uncomfortable and have a strong desire to return to face-to-face teaching formats as soon as possible (San Jose & Kelleher, 2009). Thus, lecturers must deal with stress related to their lack of expertise in using LMS technology (Golden, 2016).

Second, technical readiness refers more to network connectivity problems. Findings indicated that lecturers and students must have a network connection to access the stable internet and a relatively long time (Gay, 2016). Speed and access to the internet are the most important things when using an LMS (Darab & Montazer, 2011). They are a crucial variable in determining online learning success (Hasan & Khan, 2020). This is because all access to online learning uses technology and internet devices (Adedoyin & Soykan, 2020; Hasan & Khan, 2020).

In connection with the second obstacle, we also highlighted another substential finding that there was a move from LMS developed by universities to LMS that were freely available. This finding was related to the low quality of university LMS information, where the organization and format of the content are unclear and confusing. In other words, the practicality of university LMS is still low. This movement makes a lot of sense because the poor content organization will cause more time to be spent preparing for learning (Gay, 2016). Conversely, improving LMS information quality will enable lecturers to be faster in teaching preparation (McGill et al., 2011; Motaghian et al., 2013). Thus, the practicality of managing the LMS is a fundamental consideration for lecturers and students to continue using it or not (Adedoyin & Soykan, 2020; Hasan & Khan, 2020; Zhang, Wang, Yang, & Wang, 2020).

When lecturers and students are familiar with LMS, their satisfaction will also increase (Adeyinka & Mutula, 2010; Al-Busaidi & Al-Shihi, 2012). There is a positive correlation between LMS information quality and user satisfaction (Hashim & Tasir, 2014). Dissatisfaction with lecturers and students with the organization and format of the LMS content will result in less use and switching to other platforms (Hiltz, Kim, & Shea, 2007). In other words, lecturers feel that the LMS does not meet the needs of themselves or students, so it is impossible to use it (Buabeng-Andoh, 2012). In this study, most lecturers stated that online learning that was carried out tended to take advantage of several practical and free learning platforms, such as Whatsapp Group (WAG) and e-mail (Adedoyin & Soykan, 2020; Hasan & Khan, 2020).

Lecturers and students consider WAG as a supportive, interactive, and collaborative learning platform (Rovai, 2002). WAG and e-mail are also deemed appropriate to students' situations and conditions, where assignment and delivery via e-mail and WAG ensure easy access (Church & de Oliveira, 2013). During this pandemic study, lecturers also tried to give assignments that were not burdensome to students. The assignment given by the lecturer focuses more on students to improve literacy by providing reading material regularly (Awada, 2016). Only with WAG and e-mail, lecturers felt that they were facilitated enough.

We also analyzed how gender, functional positions of lecturers (senior vs junior), region (differences in infrastructure between regions), and student years of study affect online learning readiness. This effort was carried out to examine whether there were differences based on demographic characteristics in several constraints such as capabilities, perceptions, and infrastructure. The results showed that gender and the lecturers' functional position did not affect them; this result indicated that ICT skills and their perceptions were not related to gender and teaching experience. This result is in line with previous research (Gebhardt, Thomson, Ainley, & Hillman, 2019) and provides valuable information because every lecturer (male and female) turns out to have the same readiness and problems when forced to switch as quickly as possible from traditional to online teaching. The result beyond our expectation was that students in the Sulawesi region were more prepared than other regions. In terms of infrastructure and internet users, Java and Sumatra had better readiness than Sulawesi. An interesting finding was that students' higher readiness was accompanied by higher readiness of lecturers in Sulawesi, meaning that lecturers' and universities' readiness affected student readiness.

Meanwhile, fourth and first-year students had a higher readiness according to the study year. Suppose a more extended experience influenced the fourth year. In that case, the first-year students will likely be influenced by a more positive perception, and this result gives a positive picture that there is

no need to worry about online teaching for new students. Suppose fourth-year students were affected by a more extended experience. In that case, first-year students will likely be influenced by a more positive perception, and this result gives a positive picture that there is no need to worry about online teaching for new students.

The most fundamental difference between biology education study programs and others is the existence of practicum. In the final part of this article, we discussed more practicum activities in online learning. Considering that our research was about biology teacher candidate students, this discussion is important as part of the programs offered to improve students' ICT skills and their integration in practicum activities. Regarding this, we were quite surprised and far from our previous expectations that lecturers who did practicum online were very limited. Based on the results of in-depth interviews with eight lecturers, it was found that they were not ready for the online practicum and were still in the process of preparing. They admitted that the pandemic that occurred unexpectedly caused the online practicum process to be unable to prepare properly and quickly.

The difference with other science education disciplines is that biology is very close to the phenomenon in life around it so that some practicum topics can be done independently. Lecturers can map practicum topics that students can and cannot do independently at home. An inquiry-based learning approach focuses on enabling students to develop a process of concept and theory construction (Cotta Natale, Mello, Trivelato, Marzin-Janvier, & Manzoni-de-Almeida, 2020). Lecturers can apply guided inquiry to topics that students can do independently at home. In Guided Inquiry, the lecturer provides problems that students must solve. Then, students must compile procedures to get findings independently but still under the lecturer's guidance (Llewellyn, 2012). For some practicum topics that cannot be carried out independently at home due to limited tools and materials, the demonstration inquiry approach is one of the most widely used alternatives. Demonstrations are carried out by lecturers and then distributed through the YouTube channel. Lecturers' online learning is carried out to learn basic theory from a practicum (Cotta Natale et al., 2020).

The lecturers shared their experiences about using YouTube as a practicum learning medium. This activity is used as an alternative approach offered during online learning and aims to fill the theory-to-practice hole (Iqbal et al., 2015). The use of YouTube for learning in teacher education has been widely used and has been previously reported (Sun & Yang, 2015; Szeto & Cheng, 2014). Interestingly, during this pandemic, the use of YouTube seemed to have shifted from entertainment media, especially for playing music and films, to become a learning medium for practicum activities. More ideally, the online practicum is done using computer simulations. With increasingly sophisticated computers, online practicums can take advantage of virtual laboratories (VL) and augmented reality (AR), which offer a high perception of reality (Wildan, Cheong, Xiao, Liew, & Ng, 2020; Wildan, Yau, et al., 2020). However, making a computer-assisted practicum like this requires high skills. Thus, online practicum using VL and AR is still homework for lecturers. However, from these results, it can be seen that lecturers have been able to carry out diagnostic assessments to identify ICT resources that require relatively short preparation.

Conclusion and Implications

The online teaching axis has reached a point where faculty and students can no longer shy away and choose to return to traditional teaching. In general, lecturers and students were engaged and tried online teaching, but they still did not reach adequate competencies. As a result, recent research showed a move from the crisis-responsive migration method of External-Assisted Migration (using an LMS developed by universities) to External-Integrated Migration (WAG and Google Classroom) to deal with several obstacles. Thus, the learning readiness of lecturers and students in using LMS is still not sufficient. There are two obstacles, namely personal and technical obstacles.

Based on this study's findings, we identified two implications, namely pedagogical implications and practical implications. First, pedagogical implications, based on the identified constraints, the pedagogical implication suggested that training should be offered to lecturers and students continuously, not once before learning begins or begins a semester. It is hoped that the ICT skills of lecturers and students will continue to improve. Besides, in responding to the transition from traditional education systems to technology-based education, lecturers must have a positive perception of LMS and be willing to update their teaching methods and convenient activities. These are important suggestions for lecturers to increase positive perceptions of online teaching to improve university operations. Second, practical implications, technical readiness is one of the important requirements to improve the LMS system. Therefore it is necessary to improve the quality of LMS information. This is related to the LMS content and design organization and is an important element in the teaching process that emphasizes interactivity. Increasing LMS content and resources is crucial to support lecturers' pedagogical readiness and facilitate the learning process.

The present study included several limitations which, first, most of the participants consisted of junior lecturers. It can be said that junior lecturers had not enough experience and received training in managing to learn. However, having good enough ICT skills is even better than senior lecturers. Second, the data collected from the questionnaire was self-reported providing the possibility of does not reflect the real situation. Still, this study had been equipped with interview data. Third, interviews were conducted in Indonesian, while the presentation was in English. The word-for-word translation may lose certain meanings. Fourth, this study only measures online learning readiness. Based on a number of these studies, further research is suggested to pay attention to some things. First, the lecturer participants involved are more balanced between junior and senior lecturers. Second, future research can be carried out with competency-based assessments (Baran, Correia, & Thompson, 2011). Third, it is necessary to obtain various other data sources that provide direct and rich information to reduce sample bias and the possibility of measurement error.

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