

Factors affecting readiness toward online learning among medical students during COVID-19 pandemic in Indonesia

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ABSTRACT

The rapid spread of transmission COVID-19 leads to the government applied a regulation to close schools and colleges for a while, as an effort to stop the spread. It also has an impact on medical student education that can be threatened by their educational system. This study identified and analyzed the factors affecting the readiness of medical students for studying online during the COVID-19 pandemic. This was an observational analytic study with a cross-sectional approach. A total of 3,331 respondents from all over Indonesia participated in this study. An online questionnaire by Indonesian Medical Student Senate Association (*Ikatan Senat Mahasiswa Kedokteran Indonesia/ISMKI*) was used and distributed from April 9th, 2020 to June 21st, 2020. A Chi-square test (alternative: Fisher exact test) and logistic regression with significance $\alpha=0.05$ used to analyze. The university origin ($p=0.031$, $OR=1.130$ (1.012–1.263)), internet connections ($p=0.001$, $OR=1.387$ (1.134–1.696)), and learning interaction models ($p<0.000$, $OR=0.463$ (0.384–0.558)) were affected medical students' readiness for online learning.

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1. INTRODUCTION

Over the last few months, the world has a new threatening public health crisis, which is the largest pandemic since the last 100 years [1]. The COVID-19 from novel coronavirus has declared as a pandemic since March 11, 2020, by WHO, due to its rapid transmission and become a major reason for human-to-human transmission [2]–[4]. The pandemic affects all of the countries in various sectors. Various rules and regulations have been applied by their government as an effort to prevent the human-to-human transmission, including wearing masks when travelling outside, doing self-isolation at home, keeping physical distance between people, and temporarily closing schools and colleges [4].

Indonesia also implemented several rules and protocols related to educational system during the pandemic, including colleges. Schools and universities are temporarily closed for offline learning, but online [5]. The protocols are expected to reduce the number of COVID-19 cases in the community, but this will also affect their educational system that has been formed and implemented previously. Several problems that need to be considered in online learning in Indonesia are tools, institutional policies, and costs incurred [6]. The rapid development of technology does not make all educational institutions being ready to implement it, because of uneven access in the territory of Indonesia [7]. Student condition is also the most important aspect to be considered in learning readiness that affects learning success. Moreover, the learning models occur suddenly, so the preparation for this new online learning system is necessary [8].

The impact is also affecting medical students; it can even threaten their educational system [8], [9]. Medical education competencies require not only basic knowledge but also the basic practice skills that used when they do a physical examination to their patients after graduate [10], [11]. Medical students have to face the lab work, tutorials, clinical skills lab and learning evaluations as block exams and objective structural clinical examination (OSCE) with a hectic schedule during their medical degree [11], [12]. Medical students' learning methods that differ slightly from other students must be consideration so as not to detract their skill quality as doctors in the future.

Although there are previous studies related to the medical students' readiness for online learning in several countries [13]–[16], there are measly similar studies in Indonesia. It was used as a basis for the authors to research the factors that influence the readiness of medical students for online learning during the COVID-19 pandemic. It became the conflict of interest for the authors in analyzing and identifying the factors affecting the medical students' readiness toward online learning during the COVID-19 pandemic.

2. RESEARCH METHOD

The design of this research was an observational analytic with a cross-sectional approach. The population of this research was medical students in Indonesia who using the internet for medical learning. Using consecutive technique sampling, a total of 3,331 respondents from all over Indonesia participated in this study. An online questionnaire by Indonesian Medical Student Senate Association (*Ikatan Senat Mahasiswa Kedokteran Indonesia/ISMKI*) was used and distributed from April 9th, 2020 to June 21st, 2020. The questionnaire was tested on 502 respondents and declared valid and reliable, with values of 0.092 and 0.215. Data were collected using Google Form with a structured interview method in the form of a closed and open-ended question questionnaire. The results are used to conduct the factors affecting the medical students' readiness toward online learning during COVID-19 pandemic. This research was approved by Medical and Health Research Ethics Committee, Faculty of Medicine Sriwijaya University (No. Protocol: 014-2020).

Using a Likert scale, the readiness score is determined according to the question, with value "5" as highest to "1" as the lowest. The obtained data will be analyze using IBM SPSS Statistics 24. Data analyses used were univariate, bivariate, and multivariate data analysis. Univariate analysis shows frequency distribution and in tabulated form. Analysis bivariate using the Chi-square test, and multivariate analysis used is logistic regression. The results of the analysis displayed as p-value with significance $\alpha < 0.05$ and OR with 95% CI.

3. RESULTS AND DISCUSSION

Table 1 shows the frequency distribution and statistical analysis of the respondents toward online learning. The result displays that most respondents are women (70.4%). Majority of respondents from Region II-University based on the ISMKI area system (35.8%), private universities (61.5%), and were B-grade universities (62.3%). Almost every respondent is in preclinical phase (93.7%).

One third of respondents from the class of 2019 (33.6%) and two-thirds lived with family (85.1%). As much 48.5% respondents used desktop devices for online learning and applied a mixed-learning interaction model (49.8%). More than half of respondent used video-based application (60.9%), and chose Wi-Fi as their internet connection network (57.9%). Majority of respondents had good readiness (86.0%). The university origin ($p=0.004$), internet connections ($p=0.000$), learning interaction model ($p=0.000$), and devices ($p=0.016$) has associated with readiness toward online learning. Respondents who use Wi-Fi tend to have a good level of readiness for online learning compared to those who use the mobile phone/tethering. From regression logistic, internet connections have a chance 1.387 times (95% CI: 1.134–1.696) to affect medical students' readiness toward online learning as presented in Table 2.

Readiness is influenced by the level of development and maturity of an individual, which makes someone ready to respond in certain ways to a situation [17]. This study described several factors that affect the medical students' readiness in Indonesia toward online learning during the COVID-19 pandemic. University origin grouped by region, internet connections, learning interaction model, and devices are influential factors in this regard.

In general, there are three main factors that determine the successful implementation of online learning, which are individual factors, policy maker/instructor factors, also infrastructure and technology factors [18]. The origin of the university divided into four regions according to rules from ISMKI. It affects the medical students' readiness in Indonesia toward online learning during the COVID-19 pandemic. Universities have an important role in supporting the implementation of online learning [18]. Students' readiness is gained by education and regulations provided by universities or institutions in the first place, both in terms of policies, facilities, and services [19], [20]. Universities that are closer to the center and the

capital area have a better level of readiness because their facilities and services are more easily affordable compared to universities that are further away [19].

Table 1. Factors affecting medical students' readiness toward online learning (N=3,331)

Factors		Readiness				PR CI 95%	P value
		Low		High			
		n	%	n	%		
Gender	Male	141	14.3	844	85.7	1.020 (0.823-1.198)	0.776
	Female	327	13.9	2,019	86.1		
University origin (Region)	Region 1	160	17.5	753	82.5	-	0.004
	Region 2	153	12.8	1,039	87.2		
	Region 3	125	12.3	890	87.7		
	Region 4	30	14.2	181	85.8		
University origin (Accreditation)	A	124	13.4	86.6	89.4	-	0.216
	B	308	14.8	1,768	85.2		
	C	11	9.2	109	90.8		
	D/TA	25	12.1	182	87.9		
University origin (Type)	State/Public	171	13.3	1,113	86.7	0.905 (0.739-1.109)	0.336
	Private	297	14.5	1,750	85.5		
Class	<2015	25	10.6	211	89.4	-	0.321
	2016	40	15.5	218	84.5		
	2017	126	15.4	692	84.6		
	2018	118	13.1	781	86.9		
	2019	159	14.2	961	85.8		
Phase	Preclinical phase	437	14.1	2,661	85.9	0.934 (0.632-1.382)	0.734
	Clerkship phase	31	13.3	202	86.7		
Residence	Living with family	412	14.1	2,502	85.9	1.062 (0.786-1.433)	0.697
	Alone	56	13.4	361	86.6		
Application	Text-based	188	14.5	1,112	85.5	-	0.349
	Video-based	279	13.8	1,749	86.2		
	Mixed	1	33.3	2	66.7		
Internet connections	Internet from phone	234	16.7	1,170	83.3	1.446 (1.189-1.759)	0.000
	Wi-Fi	234	12.1	1,693	87.9		
Learning interaction models	Non-face-to-face	31	16.2	160	83.8		0.000
	Face-to-face	101	6.8	1,381	93.2		
	Mixed	336	20.3	1,322	79.7		
Devices	Handphone	90	18.4	400	81.6	-	0.016
	Tablet	15	13.9	93	86.1		
	Laptop	138	12.3	980	87.7		
	Desktop	225	13.9	1,390	86.1		

Table 2. Multivariate analysis of medical students' readiness toward online learning (N=3,331)

Variable	B	S.E.	Wald	df	Sig.	Exp (B)	95% CI for Exp (B)
University origin (Region)	0.123	0.057	4.675	1	0.031	1.130	1.012–1.263
Internet connections	0.327	0.103	10.105	1	0.001	1.387	1.134–1.696
Learning interaction models	-0.770	0.096	64.959	1	0.000	0.463	0.384–0.558
Devices	0.68	0.047	2.048	1	0.152	1.070	0.975–1.174
Constant	2.786	0.332	70.379	1	0.000	16.215	

Readiness is also strongly influenced by accessibility of technology. Conversely, the presence of barriers to this aspect will lead to the unsuccessful implementation of online learning [20]. Good internet connection is the key of the successful gaining the information in this era. This is the most important factor in implementing online learning [21]. This data is also supported by a cohort study in medical students who examined their experience of using the internet on their clerkship phase [22]. Internet connection is the challenge faced by students for online learning because not all students have good internet connections and live in urban areas [23]. Previous study at a university in Indonesia shown that about 46% of students had a good internet connection, also study in Malaysia has similar results [23], [24].

Internet connection in Indonesia is still a serious obstacle because considered being relatively slow and expensive [25]. This can affect the effectiveness and efficiency of the learning-teaching processes, such as communication becomes more hampered, difficulties in assignments online, and the material becomes hard to understand, so it is not conducive [24]. Modern devices are positively correlated to respondents' perceptions and work efficiency. In addition, Wi-Fi networks are also preferred over mobile phone [22]. It is also useful for medical students to always update their knowledge of the current COVID-19 pandemic.

Access to get the latest references, journals, and information easily are the reasons of it, although few people choose to use a mobile provider for reasons of cost [22].

Learning interaction methods will affect someone's readiness. A study shows that interactive face-to-face combination with non-face-to-face online learning is preferred over interactive or just non-face-to-face meetings. Some respondents prefer mixed method because the learning activities become more understandable and respondents are better prepared. Even so, there were some respondents who said it was difficult to focus while studying [26]. Other research also shows that mixed learning is more suitable to use by health workers [27], [28]. Compared to conventional learning in the classroom, mixed learning methods can improve student and teacher performance [29].

Learning during the COVID-19 pandemic becomes a challenge for all students to gain knowledge, including medical students. The closure of several universities temporarily resulted in the delay of some studies, especially for clinical students who need to contact with patients [9]. In fact, in recent years there has been a transformation in educational patterns in medical education from conventional learning to distance learning using technology. Technological developments occurring today may have a positive impact on the educational system in medical schools over the world [30].

A systematic review study on online learning in medical education discusses several applications of technology that can be used regarding the perceptions of users. E-learning is a technology-based website that can be used to create online classroom. This allows the user to hear different teachers and learning materials at one time comparing only one teacher and conventional learning material [30]. A meta-analysis study discussing medical education on E-learning reveals that multimedia can also be used as learning material, not just static written text [31]. Interactive multimedia, such as quizzes, tutorials, diagrams, and videos simultaneously fuse both visual and auditory information. Audience response system (ASR), simulations, and social media also have the important role for successful implementation of online learning [30].

Several studies have suggested several technology-based learning solutions and innovations that might be applicable during the COVID-19 pandemic. Studies conducted in the United Kingdom in medical students reveal that distance learning can utilize technology by providing face-to-face teaching for medical students [9]. That could be effective for students in preclinical phase, but clerkship students need learning more than just lectures. Communication and examination of the patients are also important things that must be learned during clerkship phase [32].

As an alternative, other innovations are telemedicine and teleteaching [32]. Students are given online access to open a file consisting records of interviews and case reports of the patients [9]. A study conducted in the United States in medical students shows that preclinical students who used telemedicine have an earlier opportunity to get to know the characteristics of the patients and the situation when dealing with patients. This condition can also affect the medical students' readiness when facing a clerkship phase. Meanwhile, clinical students who used telemedicine gain basic knowledge in shaping better skills and abilities when dealing with patients [33]. Even so, teleteaching and telemedicine cannot substitute patient contact directly. There are various factors that can affect a patient's illness, so that why complaints and symptoms for every person are not always the same [9].

However, another problem we faced in online learning is the swiftly changes in technology and student interest [34]. Teachers who are usually teaching offline need to adapt to the changes of technology. To ensure that the materials and learning processes are fine, lecturers must learn to use technology, such as updating reading resources and making interesting design during online learning [26].

4. CONCLUSION

Medical students' readiness toward online learning during the COVID-19 pandemic affected by university origin, internet connections, devices, and learning interaction models. The internet connections factor is the most important in readiness. Although online learning is must be applied to prevent the transmission of the virus more widely, the government and related institutions should be able to provide education appropriately for medical students, so the educational system remains effective and efficient during the pandemic. The internet connection problem must be priority solved.

The large number of respondents obtained during the COVID-19 pandemic that applied the online learning system is the strength of this research. This study can also prove several factors related to the medical students' readiness toward online learning during the pandemic. The limitations of this study are the unrepresentative sample taken. It is because of limited access to the internet and the exclusion of knowledge and experience variables to determine whether the readiness can also affect their knowledge and abilities during the COVID-19 pandemic. For further research, it can be advisable to examine those variables.

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