



Barriers and Perceptions Among Engineering Students in Conducting Online Learning During COVID-19 Outbreaks

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ABSTRACT

Keywords:

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 Students Perception;
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Since the last of 2019, the Corona Virus Disease (COVID-19) identified and its spreading globally as pandemic disease. During the COVID-19 outbreaks all countries all over the world change in terms of regulation include educational system. The majority of countries were implementing online learning from elementary to higher education level. However, how students' barriers and perceived during attending the online learning were still unidentified. This study aims to investigate the engineering students' barriers and perception in online learning environment during the pandemic. This study applied cross-sectional study were participants recruited from engineering schools both mining and civil engineerings. There are 170 students participated in this study, and predominantly who age range 17-20 (81.2%), men (84.1%), mining engineering (55.9%), freshmen (47.6%), students' barriers in severe level (50%), and students' perception in good perception level (55.9%). The statistic analysis using Chi-square test found that there is no effect of socio-demographics on students' barriers and perception in online learning. While, the correlation test shows that barriers and perceptions has positive correlation in online learning.



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A. INTRODUCTION

The Coronavirus disease 2019 (COVID-19) pandemic is a mainly health disaster in this decade, and the condition and spreading of the diseases affect almost every aspect of life include education (Yodang et al., 2021). Since the World Health Organization (WHO) announced that the COVID-19 as pandemic, almost country all over the world introduced and implemented the temporary school closures regulation in order to decrease cases and spreading of the COVID-19 (Khan et al., 2021). By this time, the online learning methods opt to fulfil and ensure the continuity of the educational process and requirement for students. Thus, since that time online education has become a global phenomenon both in developed and developing countries (Wang et al., 2020). During the coronavirus pandemic it became an essential element for maintaining activity schools and universities (Coman et al., 2020).

Originally, online learning offered for working adult aged 25-50 years old, it offers a convenience and flexibility that traditional face-to-face classes cannot, especially important for

those learners balancing work, school and family (Kauffman, 2015). Online learning defined as the using of information communication technology devices and media to deliver, support and enhance both learning and teaching, and involving actively communication interaction between teacher and students utilizing online content (Baticulon et al., 2021). Another definition, online learning is learning which takes place via a web browser on the Internet, intranet and extranet (Chew, 2013). Online learning can provide students with easier and more effective access to a wider variety and greater quantity of information (O'Doherty et al., 2018).

Even though several studies were done in comparing students' performance in online classes and conventional classes, and the majority of these studies reported that there is no differences among students' performance in both class types (Bhattacharya et al., 2020). Similar finding were reported by Russell in 2001, and Summers et al in 2005, both emphasised that the number of topics or studies offered which consistently showing no significant differences in student learning outcomes when comparing amongs the online learning, hybrid learning, and on-campus learning (Holmes & Reid, 2017). Thus, a university has enormous opportunity to promote and implement online classes in order to fulfil students demand (Bhattacharya et al., 2020). In contrast, some studies reported that the existance of online learning faced some obstacles such as students perceived isolated and lack of engaged in community (Holmes & Reid, 2017). Further, other factors which contributed to influence the students learning outcomes were the students perception on quality of the course or topic, interaction between teacher and students, the time commitment required to complete an online course, and the level of support provided by the teacher and educational institution.

In order to reduce COVID-19 transmission, the Indonesian Government announced some regulations such as stay at home, restriction for big scale social gathering, and closure of the schools (Yodang et al., 2021). Since then, all educational institutions implemented online learning all over the country include at a university level. Both lecturers and students were there is no doubt that online learning was a new thing in teaching and learning especially in a public university which this study conducted. Impact, these bring the transition from conventional to online learning is not without challenges (O'Doherty et al., 2018). For that reason this study aims to investigate the barriers and perceptions among engineering students during attending online learning through pandemics outbreaks.

B. METHODS

This study applied a cross-sectional survey, and it was conducted from May to July 2020. During this time of period, social gathering restriction was applied within the country. Conducting an investigation during the period was not feasible due to stay at home regulation still spread all over the country in include in Kolaka regency, and choosing online methods to collect data of the study. The social-networking app used to share the questionnaire to potential participants, namely WhatsApp. Population is university students who were actively registered during the period of semester, and the participant selected by using snowball-sampling method. All participants were recruited meet inclusion criteria such as students were attended online class, were used information communication technology devices (mobile phones, computers neither desktop or laptop), and agreed to participate in the study by clicking the survey link and completed the whole questionnaire.

The questionnaire distributed by students through private channels and group channels in the social-networking apps. The participant needs to answer the yes-no question to confirm that

the willingness to participate voluntarily in the study. Confirmation to agree to be a participant was followed by the fulfilment and completion of the self-reported questionnaire. All collected data were anonymous.

Socio-demographics variables included age (in year), gender, and semester enrolled level. A barriers and perceptions questionnaire was created and modified by the researchers. In the barriers-related questionnaire had 30 questions, which consist of information technology literacy, and online learning principle. These questions were answered on an agree/disagree basis with an additional "I don't know" option. While the perceptions about online learning were measured through 14 items questions. These questions were answered on an agree/disagree basis.

The answer of barriers and perceptions were counted in frequencies and classified it into three categories each. Comparison between the participants' socio-demographics and students' barriers and students' perception were analysed with chi-square test when the data of participants distributed normally.

C. RESULT AND DISCUSSION

The data were analysed using IBM SPSS (Statistical Package for Social Science) version 23 (SPSS Inc., Chicago, IL, USA). Descriptive statistics describe sample characteristics which including frequencies and percentage. Distribution of socio-demographics characteristics among participants were analysed using the chi-square test. Bivariate analysis applied to examine the relationship between the socio-demographics characteristics and self-reported barriers and perception among participants during attending online learning in pandemic era.

There are 170 out of 1,253 students, who registered during the semester both in mining and civil engineering schools, evolved and participated in this study. The participation rate was counted for 13.56%. The participants were dominated from mining engineering school (55.9%), who have age range from 17 to 20 years old (81.2%), male (84.1%), mining engineering (55.9%), freshmen (47.6%), students' barriers in severe level (50%), and students' perception in good perception level (55.9%). This data is presented in Table 1 below.

Table 1. Socio-demographics of participants

Socio-demographics	Frequency (%) (n=170)
Age range (17-26 yo)	
17-20	138 (81.2)
>20	32 (18.8)
Gender	
Male	143 (84.1)
Female	27 (15.9)
Field of Study	
Mining Engineering	95 (55.9)
Civil Engineering	75 (44.1)
The Level of Study	
Freshmen (1 st year)	81 (47.6)
Sophomore (2 nd year)	64 (37.6)
Junior (3 rd year)	19 (11.2)
Senior (4 th year)	6 (3.6)
Students' barriers	
Mild	8 (4.7)
Moderate	77 (45.3)
Severe	85 (50)

Students' Perceptions	
Good	95 (55.9)
Neutral	67 (39.4)
Worse	8 (4.7)

In this study, analysed that all socio-demographics characteristics namely age, gender, field of study, and the level of study were having no significantly correlate to students' barriers and perceptions. The data about this study presented in Table 2 below.

Table 2. The socio-demographics and students' barriers and perceptions

Characteristics	Students' barriers			p-value	Students' perceptions			p-value
	Mild	Moderate	Severe		Good	Neutral	Worse	
Age in years								
17-20	6	62	70	0.861	79	52	7	0.603
>20	2	15	15		16	15	1	
Gender								
Male	8	64	71	0.452	77	58	8	0.289
Female	0	13	14		18	9	0	
Field of study								
Mining Engine	3	38	54	0.108	55	37	3	0.531
Civil Engine	5	39	31		40	30	5	
The level of study								
Freshmen	4	37	40	0.242	46	31	4	0.207
Sophomore	2	31	31		35	26	3	
Junior	1	9	9		9	10	0	
Senior	1	0	5		5	0	1	

To the best our knowledge, this study was the first conducted in Indonesia to investigate the barriers and perceptions among engineering students attending an online learning methods during COVID-19 pandemics. This study only focuses on barriers and perceptions from learners view points.

1. Barriers

Even though, based on statistical analysis found that there is no significantly effect or correlation between socio-demographics of the participants and barriers in online learning. However, according to individual characteristic basis, the study result found students were 17-20 years old, male, mining engineering students, and freshmen who have faced severe level in barriers on online learning. Further, this study finding informs us personal factors were predominantly as a barrier in conducting online learning. This study results supported by a study that investigated independent variables that significantly affected student rating of online learning as barriers factors including gender, age, type of institution, and online learning skills. A review study of online learning in medical education found that there are four main barriers online learning education both development and implementation such as skill deficit, time of medical educators, infrastructure, poor communication, and attitude (O'Doherty et al., 2018). This study results also emphasise that personal factors also has a significant important and influencing factor in online learning. Similar finding, another study also reported that barriers among both learners and teachers were divided into three categories namely, personal factors, institutional and cultural factors, and technical factors (Jokiaho et al., 2018). More over, students' individual characteristics and students' behavioural factors were justified as

contributing factors to online interaction and engagement improvement and development (Purarjomandlangrudi et al., 2016).

We totally agree with China scholars' view point, based on their study that identified barriers to communication are factors which breakdown the continuous communication loops in distance education system include online learning (Bakar et al., 2020). Further, as a social interaction process, communication is considered an important tool to educate society, and a way that provides a mutual understanding between educators and students in educational context. In similar to our finding, mostly participants (72,9%, n=124) reported that students faced difficulty to communicate to teachers, lack of interaction and communication among students during study online (80,6%, n=137), lack of communication skills especially in arguing and expressing idea or opinion (73,4%, n=125). More over, Bakar and colleagues point out that the main obstacle in communication is understanding of concept followed by complex topics (Bakar et al., 2020). We assumed that this situations could be affected by the of students' knowledge and literacy about course topics and information communication technology related issues since nearly a half of participants were freshmen or first year students. This study result also in line with another Indonesian scholars study that they reported that 70% of students faced difficult and lack of time to discuss with teachers (Syafril & Novrianti, 2021). The lack of interaction among students and teachers may lead to social isolation with lack of communication that often lead to mental health problems such as anxiety or negative thoughts (Ismail & Ismail, 2021). However this study uninvestigated that mental health issues related online learning in education system.

2. Perceptions

In order to improve the learners' perspectives on online learning, there are seven principles practice for education in undergraduate level such as emphasizing time on tasks, encouraging active learning, giving prompt feedback, communicating high expectations, encouraging contact between leaners and teachers, developing reciprocity and cooperation among students, and respecting diverse talents and ways of learning (Jing et al., 2020)(Zhang et al, 2020). Interestingly to notice, another study reported that there are seven main aspects, which contributed in learners' perceptions between, online and face-to-face learning environments are technology, course, instructor, communication, learning, satisfaction, and preferences (McArthur Baker & Unni, 2018). While other scholars identified three important aspects that strongly effect students' perceptions in online learning environment namely course structure, leaners interaction, and instructor presence (Gray & DiLoreto, 2016).

Even though regarding to the statistical analysis on socio-demographics characteristic and students perceptions about online learning shows that there is no correlation or affect. However, in this study we found that the students were 17-20 years old, male, civil engineering students, freshmen who have worse perceptions about online learning based on individual characteristic basis. Previous study also was identified that gender as an important characteristic that affect students' perceptions of online learning (Ashong & Commander, 2012). However, in contrast in that study reported that male students have more pavorable perceptions than female students. Due to the imbalance of proportion, based on gender, among students participants who predominantly men (81.4%, n=143) we assumed that it was contributed to students' perceptions in overall in our study. However,

Since this study result shows that there is no correlation between socio-demographics characteristics among participants and students' barriers and perceptions about online learning

during pandemics. We identified there some aspects which may contribute to this study results such as sample size was small, imbalance according gender' participants, or may participants just fulfilled the questionnaires without acknowledging and understanding the quiz since answer optional of the quiz provided only two options, agree and disagree basis.

D. CONCLUSION AND SUGGESTIONS

The online learning becomes more popular in all level of educational institutions all over the world during the COVID-19 pandemics. Even some countries implement online learning as a solution to fulfil student demand during the outbreaks. However, there are many challenges were found include barriers and perceptions among students as learners. This study conclude that personal factors was main barriers in online learning. While mostly of engineering students perceived the online learning was challenging tasks since online learning unfamiliar with them, even more than a half of participant have a good perception.

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