

Learn Algorithm and Programming in Higher Education Using E-Learning During the COVID-19 Pandemic: Students' Perspective

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ABSTRACT

This study focuses on identifying students' perspectives on online learning using e-learning in algorithms and programming courses in higher education, especially in the Department of Electronic Engineering, Faculty of Engineering, Universitas Negeri Padang. In this regard, students' perceptions of online learning, ability to use e-learning, information absorbing ability, and e-learning platform utilization were analyzed. This study uses a quantitative research approach. The online survey was conducted based on Google Forms. Data were collected from 238 students. As a result of the study, the students' overall perception of the teaching or learning process of algorithms and programming using e-learning was found to be quite positive (76.71%). The benefits of online learning in this way are more flexible because students can easily access it anytime, anywhere, and students feel safer with online learning while avoiding the risk of transmission of the COVID-19 virus. Technical issues were the most important, followed by teachers' lack of skills, teaching style, and digital learning materials inadequately adapted to the online environment (69.87%). The difficulty is that students cannot interact with the lecturers or communicate with them well. However, students said they were ready for online learning (79.77%).

Keywords: *Students' Perspective, Online Learning, Algorithm and Programming, COVID-19*

1. INTRODUCTION

The COVID-19 pandemic has a very real impact on changes in teaching and learning in educational institutions, especially universities[1]. Due to the pandemic, universities are constrained to carry out various activities ranging from research, conferences, international mobility, teaching and learning processes[2]. Learning that previously took place face-to-face in the classroom is now turning to e-learning using virtual classrooms[3]. This learning transition is also a government policy in physical restrictions in suppressing the spread of the virus, minimizing the possibility the clusters formation of the COVID-19 spread in universities. The implementation of online learning or known as online is also one of the steps that the government must take to ensure the continuity of the education process.

Not only in Indonesia, universities around the world have also adopted online learning in the teaching and learning process. A study of 424 universities around the world found that the impact of the pandemic on universities was felt in different ways[4]. The shift in the learning model that occurs certainly provides new challenges for lecturers and students. The online teaching and learning process certainly requires the skills of lecturers in presenting online learning content, as well as the ability of students to use online learning media and other learning support applications[5].

Online learning is learning that utilizes technology and the internet[6]. Overall, online learning was chosen as the safest alternative during the COVID-19 pandemic[7]. Universities are currently in the process of continuous change, all

universities strive to meet the needs, desires, and demands of students in online learning[8]. Technology and E-learning are seen as important factors to strengthen and support online teaching and learning[5]. Universitas Negeri Padang already has e-learning which was developed using LMS Moodle and has been used as a complementary method before the pandemic COVID-19[9], of course, it is now essential to experience full online learning. Therefore, it is essential to optimize the e-learning system in order to continue effective learning[9]. As shown in Figure 1. is an e-learning of Universitas Negeri Padang.

This optimization must also consider input from lecturers and students. These considerations address possible potential issues that may arise in the online learning process for students, such as reduced student motivation to learn, and delayed feedback because instructors are not always present when students need help while learning using the e-learning platform. It can take the form of a barrier or feel isolated due to lack of physical presence in classmates[10].

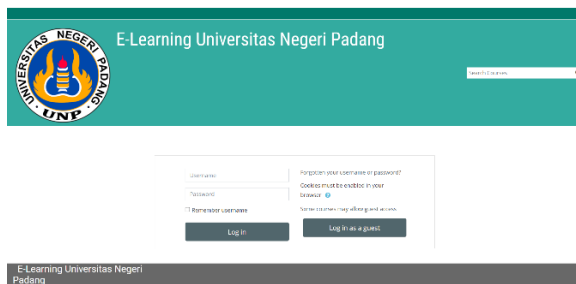


Figure 1 E-learning of Universitas Negeri Padang

E-learning offers many advantages for both lecturers and students, in addition to supporting student-centered learning and a more flexible learning process. The online learning tools used are not limited to e-learning, other learning platforms are also available. Internet technology is also very useful for simultaneously distributing educational content to all students participating in an online class[11].

The e-learning platform also provides many advantages for students in managing study time that can be adjusted to the needs and learning objectives[12]. According to (Rahayu, 2020), skills, experience and knowledge about teaching online using various learning platforms are certainly needed[13]. Creative online learning skills are important for lecturers to master, starting from the selection of online learning media used, also easily accessible by students because not all students have good internet access, prepare interesting learning

content, manage classes in online learning, and communication skills[14].

On the other hand, students also have difficulties. To explore this, this study studied online learning during the pandemic to identify some of the major challenges that students face, including social problems caused by lack of accessibility, connectivity, and appropriate devices, and lack of communication and interaction. It focuses on the student's point of view on with teachers and classmates. Given the aspects mentioned above, the transition from face-to-face learning to online learning in general has a huge impact on the curriculum. Students' perceptions of the teaching and learning applications of online learning will be the focus of this study.

The purpose of this study revealed the perspective of students on online teaching and learning experiences during the COVID-19 pandemic to improve existing online learning, especially in algorithm and programming course. This study also examines how the learning process during a crisis period and investigates students' views on learning and also identifies the main difficulties faced by students when learning online. So, it contributes to the development of the online learning process in the future, because it provides information about the use of certain technologies in material delivery, time management, student complaints, teaching recommendations and preferences.

2. METHOD

The method used in this study is a quantitative approach [15]. The tool used in this study was an online questionnaire using Google Forms. In this study, we will discuss the following list of questions: (a) How do students perceive the online teaching and learning process in algorithms and programming courses?. (b) How do students perceive the skills of teachers in algorithmic and programming courses that use e-learning?. (c) How do students perceive students' preparation for algorithms and programming lessons using e-learning?

The sample used a purposive sampling technique, the sample was determined based on certain criteria, namely Department of Electronics Engineering students, Universitas Negeri Padang, the Year 2020 who were taking algorithm and programming courses. The total population is 341 people. The research sample was taken using the *Slovin formula*.

$$n = N / (1 + (N \times e^2)) \tag{1}$$

$$n = 341 / (1 + (341 \times 0.0025))$$

n = 184 people (Minimum Number of Samples)

n is the minimum number of samples; the value of N is the population while the value of e is the margin of error. From the data obtained, it is known from the total population of 341 students, who filled out the questionnaire as many as 238 students with a response rate of 70% of the total population or exceeding the minimum sample of 184 students, then all respondents who filled out this questionnaire were used as the final sample in the study, namely 238 students.

Each item is a positive statement measured using a Likert Scale consisting of 4 scales with each rating score, namely: *Poor (1), Fair (2), Good (3), Excellent (4)*. Data collection uses a closed questionnaire method whose validity is determined by expert judgment. Then to find out the percentage of student perceptions is calculated using formula (2).

$$SP = (x / (N \times \text{item} \times SM)) \times 100\% \quad (2)$$

SP is Percentage of Student Perception; $\sum x$ is total scoring score; N is total respondents; item is number of statement items; SM is Max score.

Table 1. Category of student perception

No.	Percentage	Perception
1	81 – 100%	Excellent (E)
2	61 – 80%	Good (G)
3	41 – 60%	Fair (F)
4	0 – 40%	Poor (P)

3. RESULT AND DISCUSSION

Data obtained from the distribution of online questionnaires using Google Forms, there were 238 people who filled out the questionnaire. Following are the results of the questionnaire data:

Table 2. Data on demographic characteristics

Indicator	Information	Frequency	Percentage
Gender	Male	117	49%
	Female	121	51%
Residence	City	97	41%
	District	141	59%
Device used	Smartphone	184	77%
	Notebook	54	23%
	Desktop PC	0	0%
Parent's Income	0 – 1 million	59	25%
	1 – 2 million	77	32%
	2 – 3 million	56	24%
	> 5 million	36	19%

Based on Table 2 and Figure 2 as many as 51% of respondents are female students and 49% are male students. Then the data shows that there are 59% of students from districts and 41% from cities as shown in Figure 3. Of course, by looking at the differences in the characteristics of life in cities and districts from an economic aspect, it can be concluded that income in the city is better than in the district, seen in the income of students' parents in Figure 5.

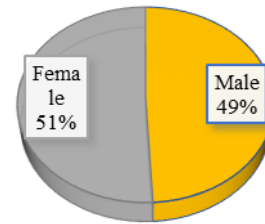


Figure 2 Gender of students

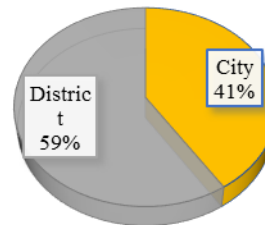


Figure 3 Residence of students

Furthermore, overall students already have devices that will be used in online learning, there are as many as 77% using smartphones and 23% using notebooks (laptops), while the use of Desktop PCs does not exist, i.e., 0% means that no students use desktop computers in online learning at home as shown in Figure 4.

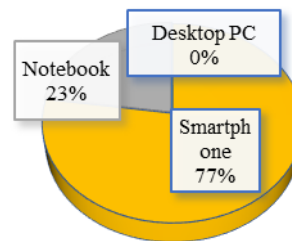


Figure 4. Device Used

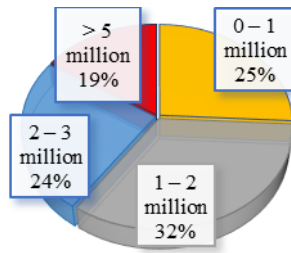


Figure 5. Parents' Income

Table 3. Online teaching and learning process

No.	Statement	Response Frequency				%	Score
		P(1)	F(2)	G(3)	E(4)		
1	The online learning process is easily accessible and more flexible.	0	34	52	152	64% (G)	832
2	RPS, course contracts, and online learning materials are well-available.	15	32	20	171	72% (G)	823
3	Interaction with lecturers is very easy to do at any time.	35	83	66	54	35% (P)	615
4	The allocation of tasks given during the online teaching and learning process is appropriate.	45	97	32	64	41% (F)	519
5	The material provided in online learning is easy to understand.	57	87	26	68	37% (P)	581
6	There is a sense of security in online learning from the spread of the covid-19 virus.	0	0	12	226	95% (A)	940
Total Score Rating							4382

From the data obtained in Table 3. it is known that the majority as many as 64% of students responded by agreeing that the online learning process is easy to access and more flexible. This happens because of the use of the internet so that learning can be accessed anywhere and anytime. Then 72% agreed that the lesson plans, lecture contracts, and learning materials were well available in the e-learning platform media.

About 35% of students disagreed that the teacher-student interaction is very easy when learning online, and 41% of students disagree that the assignment of assignments set by the instructor is accurate. Students felt that there were still many difficulties with online learning. Additionally, 37% of students said they did not agree that the materials offered in online learning were easy to understand. Finally, 95% of students

agreed to feel safe in online learning by maintaining physical distance to reduce the risk of spreading the COVID-19 virus. As a result of calculating student perception, students' perception of online learning and learning process was 76.71%, which can be said to be good (somewhat positive).

Table 4. The ability of lecturers in online learning

No.	Statement	Response Frequency				%	Score
		P(1)	F(2)	G(3)	E(4)		
1	Lecturers are able to respond to student questions well in online learning.	0	12	56	170	71% (G)	872
2	Lecturers are able to explain the material very well.	34	23	127	42	53% (F)	629
3	Lecturers are able to provide material that is interesting and easy to understand.	53	85	23	77	35% (P)	600
4	Lecturers are able to use various online learning support platforms.	45	21	32	140	59% (F)	743
5	Lecturers are able to always hold face-to-face online in learning	88	90	26	34	38% (P)	482
Total Score Rating							3326

Next, based on Table 4. it is known that the majority of students are aware of the instructor's ability in online learning, and 71% of students declare that they agree to receive an answer from the lecturer whenever they ask a question in online learning, a majority of 53% of students declare the ability of lecturers to explain material when online learning is normal, then as many as 35% of students stated that they did not agree about the ability of lecturers to provide interesting and easy-to-understand material. As many as 59% of students agreed that lecturers were able to use various other online learning support platforms such as *Zoom, Google Meet, Telegram, WhatsApp, Mentimeter, BigBlueButton*. Finally, as many as 38% of students stated that they did not agree about the ability of lecturers to always hold face-to-face online in learning. However, the overall perception of students regarding the ability of lecturers in online learning is Good (quite positive), which is 69.87%. This means

that lecturers have a good ability in providing management and implementation of online learning.

Table 5. Student preparation for online learning

No.	Statement	Response Frequency				%	Score
		P(1)	F(2)	G(3)	E(4)		
1	The devices used support online learning.	0	0	0	238	100% (E)	952
2	The internet connection used is very good.	21	46	70	101	42% (F)	727
3	Ready to take online learning every class schedule.	0	54	0	184	77% (G)	844
4	Able to use online learning platforms well.	0	0	37	201	84% (G)	743
5	Have sufficient internet quota in online learning.	111	44	0	83	47% (F)	531
Total Score Rating							3797

Based on the data in Table 5 is known that all of students' perceptions as a whole or 100% of students stated that they already have devices that support online learning, the devices are smartphones and notebooks (laptops) as the data obtained in Table 2. Then as many as 42% of students stated that they have good internet connection, as many as 77% of students stated that they were ready to take online learning every lecture schedule. As many as 84% of students stated they were able to use online learning platforms well, and as many as 16% of students said they were normal. Finally, 47% of students stated that their internet quota was not enough for online learning. However, the overall perception of students regarding their readiness in online learning is Good (quite positive), which is 79.77%.

4. CONCLUSION

Data analysis shows that students have positively received online learning during the COVID-19 pandemic. There are still students who disagree or find it difficult to interact with instructors and peers when doing it online. This is because in online learning it is impossible to perform direct interactions limited to physical interactions, and Internet outages also affect the smoothness of the online learning process. It is also known that students feel burdened by giving assignments that do not fit their share or having too many instructors in online learning.

Another finding is that some students find it difficult to understand e-learning material. This

certainly has to do with the faculty's ability to select media and present materials in the teaching process. Lecturers should be able to choose the medium that is right for their students, while paying attention to trends in student learning styles. Materials are presented in the form of audiovisual materials, augmented reality (AR) technology, or educational games (gamification) to make it more interesting and easier for learners to understand[20]. And although it is generally known that the internet connection used by students is good enough and sufficient to support their online learning process, the analysis shows that some students suffer from insufficient internet quotas. Of course, the government has adopted the right policy to support online learning in the form of free internet quotas. The researchers hope that this study will give governments, universities, educators, and students an overview of how to improve the quality of online learning to make it better and more optimal in the future.

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