Predicting satisfaction among the students on e-learning under the pandemic situation

Muthumal A.L.
Department of Computer Science and Engineering
University of Moratuwa
Katubedda, Sri Lanka
arumahandi.21@cse.mrt.ac.lk

***Abstract*—E-learning has emerged vastly over past 2 years due to the Covid pandemic. The concept of classrooms was no longer possible with the conditions of this pandemic where people had to approach other ways for learning. In this situation many countries adopted e-learning. Even though e-learning was not a new concept the rapid development of this was seen during past 2 years. Not only developed countries, developing countries and under developed countries switched their physical learning classes to online learning. But, the effectiveness or the satisfaction among the students should be considered in order to proceed with e-learning. This paper has focused on predicting the satisfaction among the students on e-learning in Sri Lanka under the pandemic situation.**

Keywords—COVID-19, online learning, e-learning, statistics, hypothesis testing.

I. INTRODUCTION

In the tradition learning the physical participation of the students and the lecturer is mandatory. They gather in a classroom and the learning is done. But e-learning is completely different where student and the teachers do not meet each other physically. Before 2020, learning with physical participation was very common where it allowed the students and the teachers to meet each other in one place and gather knowledge. This was not possible any longer with the Covid 19 pandemic which emerged on early 2020's. After only a few months in 2020, the COVID-19 virus has swiftly spread over the world. COVID-19 was assessed by the World Health Organization [1] on March 11, 2020. Because of its widespread nature, it is classified as a pandemic [1]. Following that, numerous governments around the world outlawed public gatherings and Schools and universities have been suspended and educational institutions have been closed. School and university closures affect around 1 billion students globally as a result of the COVID-19 pandemic [2]. The epidemic is still going on. COVID-19 had a huge impact on schooling all across the world. The same impacted for Sri Lanka as well. Island wide curfew was initiated from 19th March 2020 with the intention of preventing spread of this virus in the country. With this initiation schools, learning institutions, universes were closed until further notice affecting the educations of the students badly. Direct online lectures, audio and video recorded lectures, shared online materials, and blended learning were all used by higher education institutions [3]. They also used online evaluation techniques like online quizzes, exams, and assignments [4]. Higher education institutions' migration to online learning during the COVID-19 Pandemic had an impact on students, teachers, and learning outcomes [5]. Many educational institutions, professors, and students, unfortunately, were not prepared for this new experience but had continue with e-learning due to the severity of the pandemic. For a country like Sri Lanka, it is difficult to switch completely from traditional learning to e-learning because the students do not have enough infrastructure to access online methods. Therefore, it is important to analyze the effectiveness of e-learning among the students.

II. METHODELOGY

1) Procedure

The first step of this research study is to collect data from the students who are experiencing the e-learning. This study has been conducted through online platforms. A questioner is developed to evaluate student satisfaction towards the online learning. Questioner was divided into three sections. Section one is designed to evaluate student satisfaction toward the learning. It includes how they satisfied with lectures learning techniques, learning materials… etc. Section two designed to evaluate student satisfaction towards internet connectivity. From third section demographics data is collected. All together questioner including 20 questions. All of them are categorical data.

2) Results

Then the designed questioner shared among student groups. All of them were voluntary participants. Their gender distribution and universities shown in Fig. 1 and Fig. 2 as you can visualized in Fig. 1 61% of the participants are male so that may cause biased. And also, as shown in Fig. 2 higher number of participants from University of Ruhuna (UOR) that also can reflect a biased in the sample data.

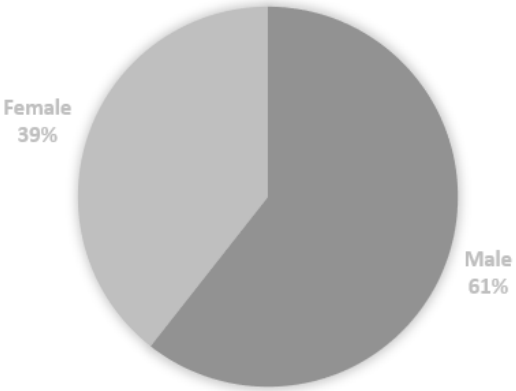

Fig. 1 Gender distribution of the participants.

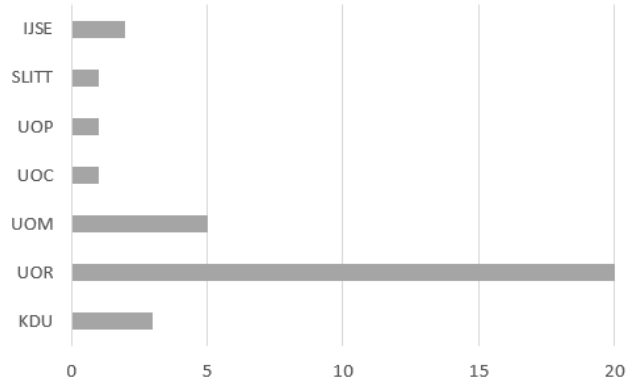

Fig. 2 Universities of the participants.

Then the students were asked "*How satisfied or dissatisfied were you with e-learning under the pandemic situation*?". The results are shown in Fig. 3, 61% of them are satisfied with the online learning, 18 % them are in the neutral ground and 21% of the participants are dissatisfied.

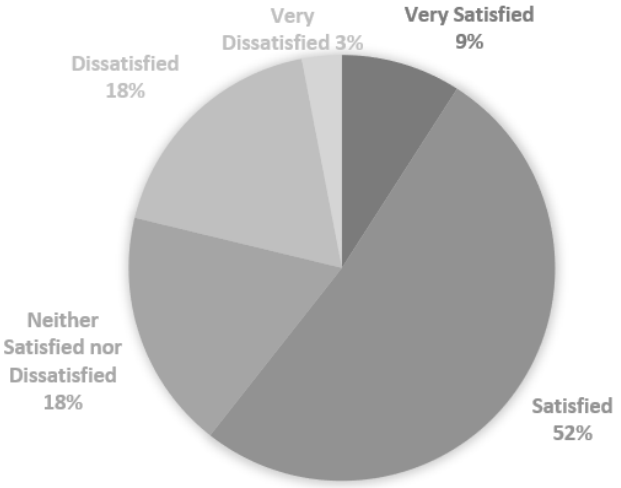

Fig. 3 Participant satisfaction with e-learning under the pandemic situation.

- Next question was "*How satisfied or dissatisfied were you with the online interaction you had with the lecturers*?" Then I got the results as 46% satisfied, 36% neutral ground and 18% dissatisfied. Data shown in the Fig. 4.

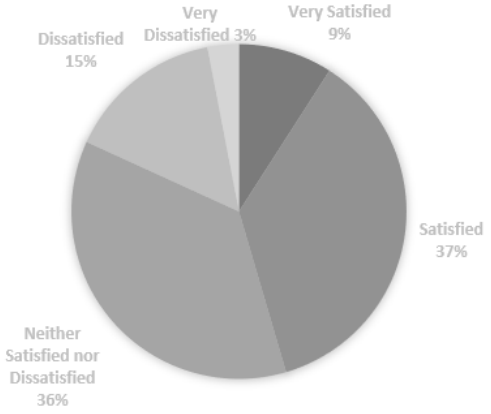

***Fig. 4 Participant satisfaction with* the online interaction you had with the lecturers.**

- Next question was "*How satisfied or dissatisfied were you with the course level of engagement?*" then participants result was 30% satisfied, 49% neutral ground and 21% dissatisfied. Data shown in the Fig. 5.

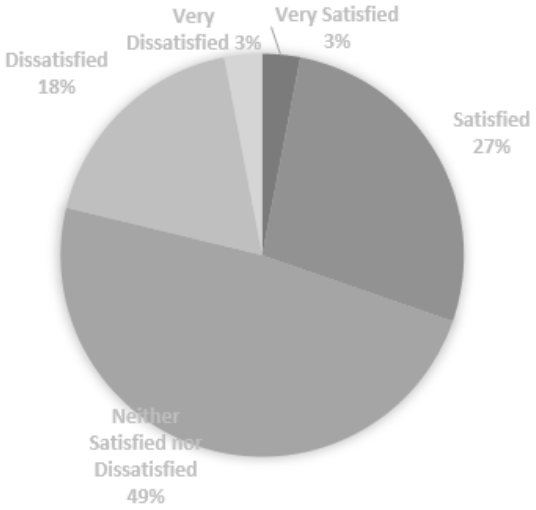

***Fig. 5 Participant satisfaction* with the course level of engagement.**

- Next question was "*How satisfied or dissatisfied were you with the lecture's various online teaching approaches*?" then participants result was 58% satisfied, 39% neutral ground and 3% dissatisfied. Data shown in the Fig. 6.

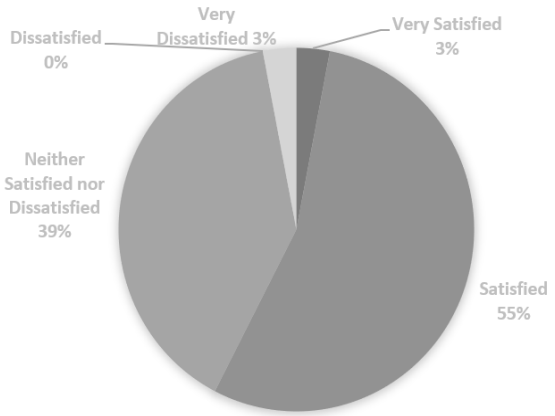

Fig. 6 Participant satisfaction with the lecture's various online teaching approaches

- Next question was "*How satisfied or dissatisfied were you with the e-learning materials?*" then participants result was 76% satisfied, 12% neutral ground and 12% dissatisfied.
- Next question was "*How satisfied or dissatisfied were you with your grades with e-learning?*" then participants result was 55% satisfied, 30% neutral ground and 15% dissatisfied. Data shown in the Fig. 7.

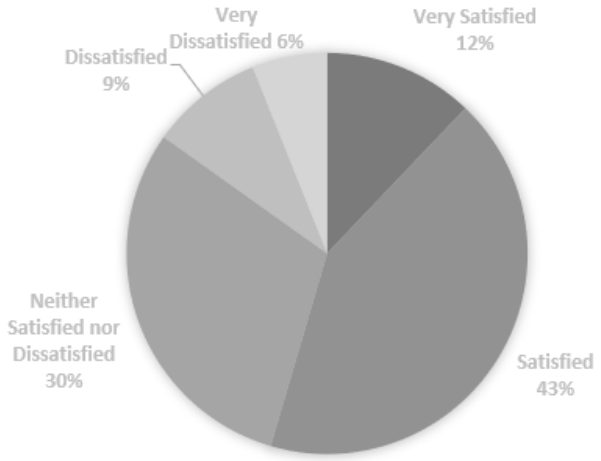

***Fig. 7 Participant satisfaction with* your grades with e-learning.**

- Next question was "*How satisfied or dissatisfied were you with satisfied with staff responsiveness to technical support?*" then participants result was 46% satisfied, 39% neutral ground and 15% dissatisfied. Data shown in the Fig. 8.

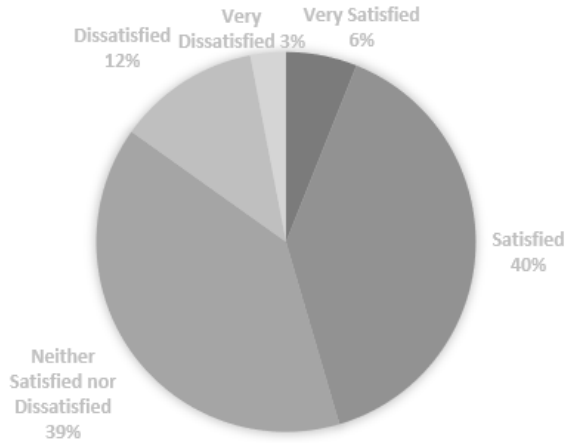

***Fig. 8 Participant satisfaction with* staff responsiveness to technical support.**

- Next question was "*What type of learning method (or methods) are you recommending as future learning*" then participants result was 18% only online classes, 67% blended classrooms and 15% only face to face classrooms. Data shown in the Fig. 9.

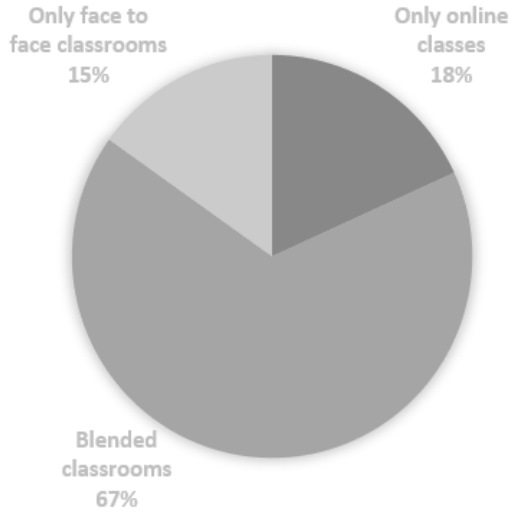

Fig. 9 Participant recommendation for future learning.

In the next section I have decided take information about the internet connection. Because if the connection is not into its standard level, it may be a reason for student dissatisfaction towards the e-learning. And also, this section I used acquire student's device information.

- First question was "*What kind of device you used for e-learning?*" then participants result was 21% phone users, 6% tablet users and 73% computer users. Data shown in the Fig. 10.

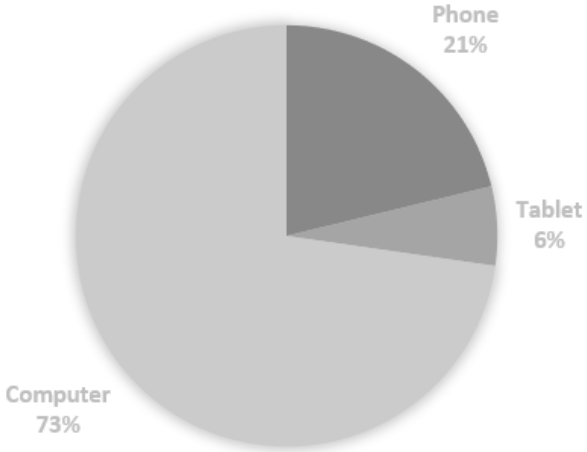

Fig. 10 Participant learning device distribution.

- Next question was "*How satisfied or dissatisfied were you with satisfied with your internet connectivity?*" then participants result was 43% satisfied, 24% neutral ground and 33% dissatisfied. Data shown in the Fig. 11.

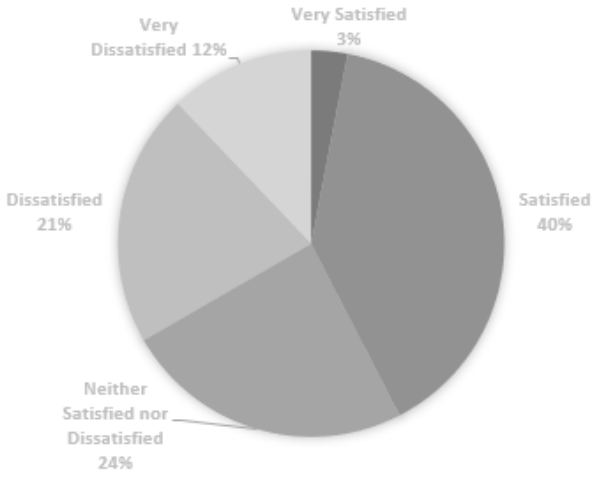

Fig. 11 Participant satisfaction with internet connectivity.

- Next question was "*How often did you face connection interruptions during lectures?*" then participants result was 12% always, 9% often, 67% sometimes and 12% rarely. Fig. 12 shows the results

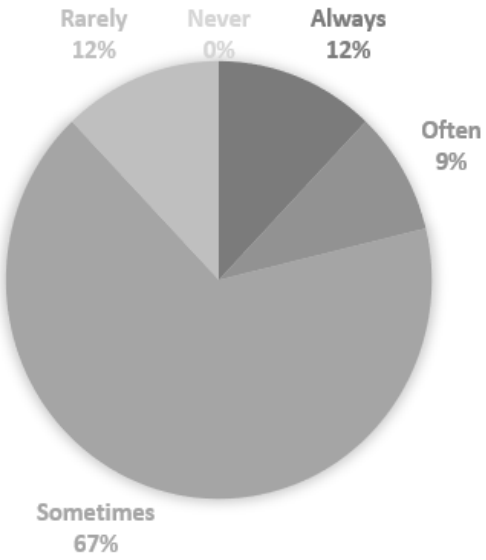

Fig. 12 Participant internet connectivity interruption during lectures

- Next question was "*What kind of network you are using for e-learning?*" then participants result was 82% use wireless connectivity, 6% use cable connectivity and 12% use fiber optic connectivity. Data shown in the Fig. 13.

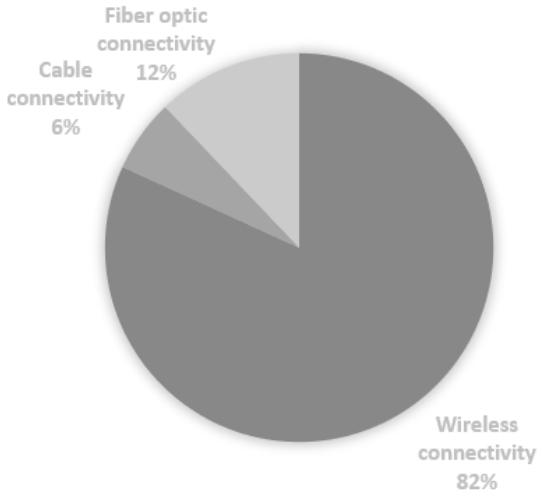

Fig. 13 Participant internet connection media.

As demographic data I have collected participants university, degree program, gender, age, district, nearest city and grama niladhari divisions. I have received responses from 33 students around 12 districts which is indicated in Fig. 14 In Sri Lanka there are 25 districts but the collection of data is from only 12 districts which could be subject to volunteer bias. Further, most of the responses are from Galle district which also could lead to a bias of the results.

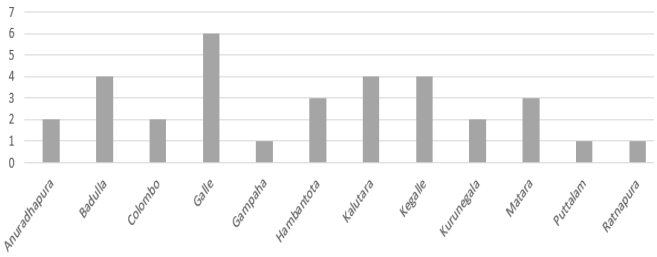

Fig. 14 Participants districts distribution.

3) Student statisfaction

Student satisfaction with e-learning under the pandemic situation shown in Fig 15. This is a categorical variable because of that I'm using proportion as the statistics. You can find 61% participants are satisfied with the e-learning. I have done a bootstrap distribution to find the confidence interval. For that I'm going to use StatKey [6] tool. From the analysis I can say that "I'm 95% confident that 45.5% to 78.8% undergraduates are satisfied with e-learning under the pandemic situation".

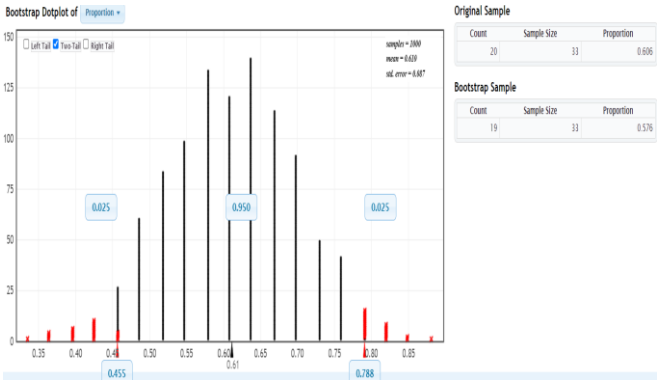

Fig. 15 Randomization dot plot of the proportion.

4) Hypothesis Testing

I have done two hypothesis tests. First is used check the relationship between student dissatisfaction and poor internet connectivity. My problem was "Does dissatisfaction towards e-learning not cause by students' dissatisfaction for internet connectivity?". For that I have defined below parameters and values.

p_e: *propotion of student dissatified with e−learning* = 0.212

p_i: *propotion of student dissatified with internet connectivity*=0.333

$$H_0 : p_e = P_i$$

$$H_a : p_e \neq P_i$$

$$p_e - P_i = -0.121$$

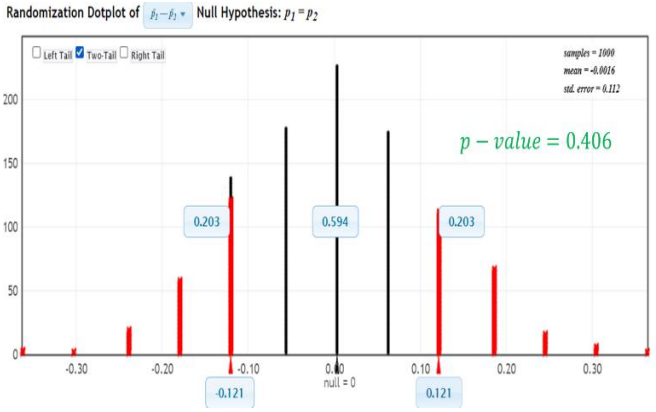

Fig. 16 Randomization dot plot of the proportion $p_e - P_i$.

Then I have generated randomized plot in Fig. 16 and found p-value as 0.406. This value is larger than α = 0.05. We cannot reject the null hypothesis. Therefore, may be student dissatisfaction toward e-learning caused by students' dissatisfaction for internet connectivity.

As second hypothesis test, I checked the relationship between student dissatisfaction and the lecture's various online teaching approaches. My problem was "Does dissatisfaction towards e-learning not cause by students' dissatisfaction for the lecture's various online teaching approaches?". For that I have defined below parameters and values.

p_e: *propotion of student dissatified with e−learning* = 0.212

p_a: *propotion of student dissatified withthe lectures' various online teaching approaches*=0.030

$$H_0 : p_e = P_a$$

$$H_a : p_e \neq P_a$$

$$p_e - P_a = 0.182$$

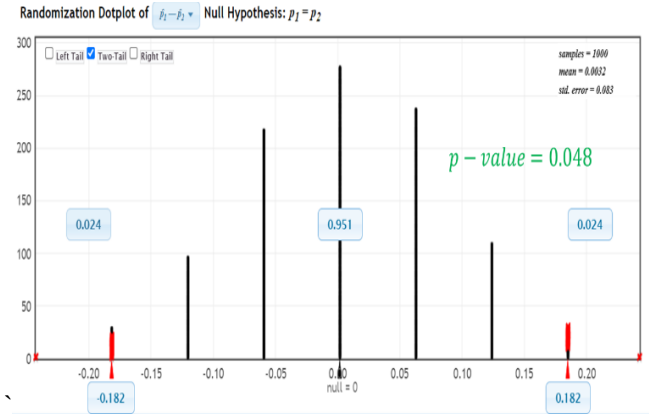

Fig. 17 Randomization dot plot of the proportion $p_e - P_a$.

Then I have generated randomized plot in Fig. 17 and found p-value as 0.048. This value is smaller than α = 0.05 significant level. We can reject the null hypothesis. Therefore, Dissatisfaction towards e-learning not cause by students' dissatisfaction for the lecture's various online teaching approaches.

III. Discusssion

This research study is focused to identify the satisfaction of students on e-learning. According to the gathered data through the online questionnaire, it is seen that the larger number of responses are given by male students where that could create bias. Further to that the students of University of Ruhuna have given more responses which is one of another reason to create a bias in the outcome. Apart from that this research study was able to collect data from only 33 participants which is not a considerable amount for a research publication. This research study has covered only 12 districts even though the country has 25 districts. This could be a reason for volunteer bias. If the data collection was done physically more responses would have been collected. If there was a possibility of sending emails for the university emails of students, more randomize responses could have been collected. A randomize sampling technique could provide better results.

IV. Conclusion

The collected sample is not truly random it may include volunteer biased and therefore cannot finalize the conclusions for population. According to the result of randomize distribution I am 95% confident that 45.5% to 78.8% undergraduates are satisfied with e-learning under the pandemic situation. By doing the hypothesis testing it is tested that dissatisfaction towards e-learning not cause by students' dissatisfaction for the lecture's various online teaching

approaches and dissatisfaction towards to e-learning may be caused by dissatisfaction for internet connection.

GitHub link:
https://github.com/muthumal21/OnlineLearningUnderPandemic

V. References

[1] "Predicting satisfaction among the students on e-learning under the pandemic situation," [Online]. Available: https://www.who.int/news/item/27-04-2020-who-timeline---covid-19.

[2] " Global Education Coalition. COVID-19 Education Response.," [Online]. Available: https://en.unesco.org/covid19/educationresponse/globalcoalition.

[3] Favale, T., Soro, F., Trevisan, M., Drago, I., & Mellia, M., "Campus traffic and e-Learning during COVID-19 pandemic," *Computer Networks*, vol. 176, p. 107290, 2020.

[4] M. L. George, "Effective Teaching and Examination Strategies for Undergraduate Learning During COVID-19 School Restrictions," *Journal of Educational Technology Systems*, vol. 49, pp. 23-48, 2020.

[5] G. Ustun, "Determining depression and related factors in a society affected by COVID-19 pandemic," *International Journal of Social Psychiatry*, vol. 67, pp. 54-63, 2021.

[6] "StatKey to accompany Statistics: Unlocking the Power of Data," [Online]. Available: https://www.lock5stat.com/StatKey/.