PERCEPTIONS OF TEACHERS AND LEARNERS ABOUT ONLINE LEARNING IN AN ELECTRICAL AND ELECTRONIC ENGINEERING DEGREE IN SRI LANKA

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Due to the temporary closure of educational institutions during the COVID-19 pandemic situation, online education was enforced across the world. However, this transition from a traditional classroom environment to an e-learning environment has led to several arguments. Despite the COVID-19 epidemic being four years ago, some universities continued online learning while others reverted to the traditional onsite education system. This study aimed to determine how well online learning was perceived by both students and teachers. To carry out the study, two questionnaires were prepared and distributed among students and teaching staff in three engineering faculties in some Sri Lankan universities. The questionnaires were prepared to collect their view on online lecture sessions, online examinations, and online lab classes. The analysis of the data revealed that both students' and teachers' satisfaction with online education will be impacted by the quality of the equipment. One of the main issues raised by the lecturers was how poorly the students interacted with the lecture owing to the concept of remote learning. Another finding from the students' questioner data analysis shows that the maximum online session length that students could tolerate was 1-1.5 hours. In addition, around two third of the students who participated for the survey choose a mix of both asynchronous and synchronous education system. As a conclusion, the traditional educational system will be effective for exams and practical lessons, and a combination of synchronous and asynchronous teaching methods will be fecundity for learning and teaching concepts.

Keywords: E-learning, E-teaching, COVID-19, Synchronous, Asynchronous, Hybrid

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INTRODUCTION

The COVID-19 pandemic has led to a dramatic change in human life. The impact of the pandemic and its consequences affect differently on different sectors. As a result, the temporary closure of educational institutes during this pandemic has resulted in a distinctive rise in online education. Online education can be defined as a new concept of learning based on information technology (Distance Education, n.d.). Many studies have been carried out to compare the effectiveness and productiveness of online education (Rajabalee et al., 2020, Gopal et al., 2021).

However, fewer amount of the studies addresses the effectiveness of online education in the engineering education system. Therefore, this study focuses on identifying the students' and lecturers' concerns in the online education system in teaching and learning in the field of Electrical & Electronic Engineering. Moreover, the study addresses the issues and perceptions in online lecture system, online exam system and online lab classes.

METHODOLOGY

This study was done based on an online questionnaire. In order to carry out the study, two questionnaires were prepared targeting students and lecturers in the field of Electrical & Electronic engineering. This survey was conducted by means of online with the use of Google Form between May-June 2021 and May 2023. Conveniently selected aforementioned lecturers and students belong to three engineering faculties, and they were invited and informed about this survey, through various social media platforms such as WhatsApp, Messenger and Email. 15 Lecturers and 92 students responded to it.

The prepared questionnaires were categorized as e-teaching (for lecturers) and e-learning (for students). The e-learning questionnaire consisted of 24 Multiple Choice Questions and 3 essay-type questions. The e-teaching questionnaire consisted of 17 MCQ questions and 7 Essay type.

In a summary, the following aspects were examined in both questionaries as relevant.

- The devices, tools and platforms used in online education.
- Problems related to e-learning and e-teaching (workload comparison between on-campus and online activities, health issues, network/technical/power issues).
- The preference between Synchronous and Asynchronous education.
- Maximum bearable time for an online lecture in students' perception.
- Impression on online examination and lab classes.
- Impression on online education compared to traditional classes.

RESULTS AND DISCUSSION

RESULTS

Idea about the devices, tools and platforms used in online education. Table 1 shows the responses obtained for the above-mentioned point. Here considering the responses since it was a multiple choice question response percentage will not be equal to 100.

Table 1; Perception about the devices, tools and platforms used in online education.

Questions	Responder	Response (%)				
Which of the following device(s) are you using for online education		Laptop / Desktop		Smart Phone		Tablets
	Lecturer	100		20		33.3
	Student	96.7		46.2		8.8
Do you think the quality of the aforementioned devices affects the enhancement of online education		Strongly Agree	Agree	No idea	Disagree	Strongly Disagree
	Lecturer	33.3	53.3	6.7	6.7	0
	Student	31.9	53.8	11	3.3	0
What is/are the platform/s you are using for online education?		Zoom	Google Meet	MS team	LMS (Moodle, Blackboard etc.)	Other
	Lecturer	100	0	20	40	6.7
	Student	98.9	13.2	25.3	36.3	6.6

The problems of lecturers and students related to online education are summarized in Figure 1. In addition to these common problems in Figure 1, 80% lecturers have faced problems due to lack of student interaction and around 51% students faced problems due to distraction for the class due to usage of other electronic devices or other networking platforms such as Facebook, WhatsApp, online gaming, movies etc.
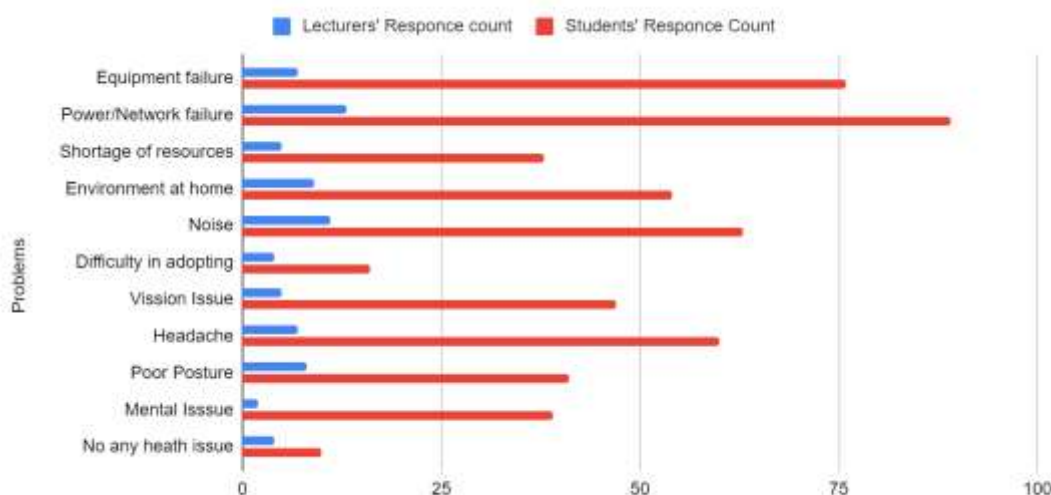
Figure 1; Problems related to online education.

Maximum bearable time for an online session without any distraction was questioned by students and the responses are shown in figure 2.
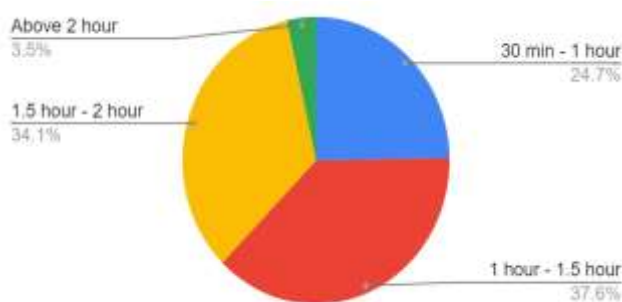

Figure 2; Bearable time for an online session by a student

Opinion about the workload compared to traditional and online education were interrogated. The responses to this question are tabulated in table 2.

Table 2; Opinion about the workload compared to traditional and online education.

How do you feel about the workload during the pandemic situation?	Responder	Same as earlier (%)	Higher than earlier (%)	Lesser than earlier (%)	No idea (%)
	Lecturer	13.3	66.7	6.7	13.3
	Student	18.7	75.8	1.1	4.4

Views on online examinations were collected from both parties. For these two parties, they were questioned using two different approaches and their opinions on this were sorted. When considering the students' problems their responses were as follows.

- Many of them have faced power/network issues when logging/attempting/submitting the answers to the exam,
- Failures of devices
- A considerable amount of time wasted taking images and converting them into the required format such as PDFs.
- The negative effect of background noise when keeping concentration on the exam paper.
- Requirement of accessing previous or upcoming questions in case of online papers, if unable to do the current problem, so that they can omit hanging on to difficult problems and wasting time.

The problems faced by the lecturers in case of online examination are given below.

- Misbehavior practices of students such as impersonation and plagiarism.
- Difficulties in marking/grading the uploaded answer scripts.
- To overcome the plagiarism between the peers, lecturers had to create questions pools with same weight for the same questions. So, it has created extra workload for them.

Another notable point was questioned by both students and lecturers regarding the online lab classes and practical sessions. Some lecturers have commented that by considering the time factor, holding online lab classes and practical sessions as much as possible is needed. In the meantime, to improve the quality and hands-on experience on lab equipment, organizing the on-campus lab classes after this pandemic situation has been suggested by many of the lecturers. Students view on this point was tabulated as in table 3.

Table 3; Students' perceptions on lab practicals

	A recorded video by the lab instructor (%)	An on-campus lab session after normalizing the pandemic situation (%)	A live online lab session where your lab instructor will demonstrate the experiment inside the lab without your presence (hardware basis) (%)	A simulation-based lab session (%)
Electrical Engineering	26.13	19.82	18.92	35.14
Electronic Engineering	23.6	24.72	20.22	31.46
Telecommunication and Network Engineering	29.79	21.28	23.40	25.53
Computer Engineering	31.11	17.78	20	31.11

Similarly, the opinions on synchronous and asynchronous education were collected from both students and lecturers. Firstly, their preference for synchronous and asynchronous was identified. Figure 3 and Figure 4 show the responses obtained from the students and lecturers respectively.
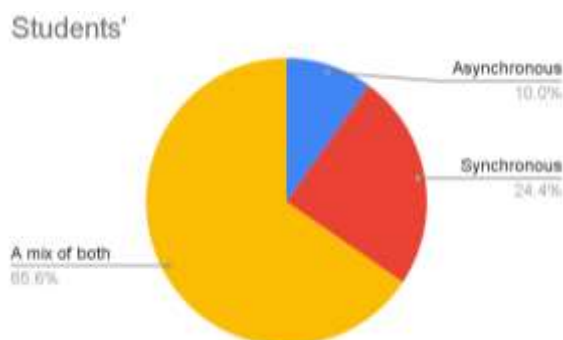
Students'

Asynchronous
10.0%

Synchronous
24.4%

A mix of both
65.6%

Figure 3; Opinions on synchronous and asynchronous education by students
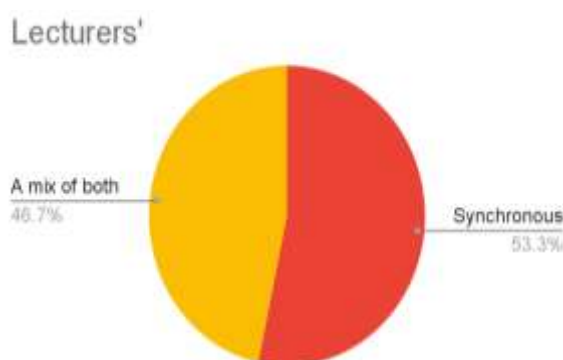
Lecturers'

A mix of both
46.7%

Synchronous
53.3%

Figure 4; Opinions on synchronous and asynchronous education by Lecturer.

In addition to students' preference, the reason for the selection of the above choice was inquired.

The reasons for preferring synchronous learning are listed below.

- The capability of clarifying doubts directly from the lecturer during live sessions
- Ability to attend online sessions according to a timetable.

The selection of asynchronous learning was very low. The minority who preferred asynchronous learning has pointed out the following as their reason for the above preference.

- The ability to watch recorded videos freely rather than continuously maintaining concentration for two- or three hours during an online lecture.
- Absence of interruptions due to network issues during listening to a lecture since they can download and watch it.

The majority have selected the learning method with a mix of both synchronous and asynchronous. That is because it has advantages from both learning methods.

- Students can use the recordings to go through a specific lesson again if it is not clear or if they were distracted at the live sessions.
- Similarly, can ask doubts directly during the live session and can get more information about the subject materials.
- Moreover, since most of the students have to endure up to 3 - 4 lectures on the same day, it is inevitable that the participation in the last one or two lectures will be active.

DISCUSSION

According to the study, for a better performance of the online education, need to look on the following cases,

  a. **Connecting devices and platforms,**

Since most of the students and teachers join with the laptops/desktops, the quality of the devices mentioned must be increased. In the meantime, the government should provide financial support to students to purchase equipment of high quality and should give a data package relief for the mostly using platforms like zoom (Table 1).

b. Common problems related to online education.

It seems that the most critical issues in e-learning are power and network issues (Figure 1). Since this is a pandemic situation, responsible authorities must increase the quality (Bandwidth) of the network and power supply (24 hours) all over the country, regardless of their financial profit.

Both parties have identified on background/surrounding noise as a problem (Figure 1). Therefore, to adapt to this online education system successfully, support from family members are required to keep background noise at a minimum level.

c. Issues related to online lectures.

Student concentration on lectures is also a remarkable factor in online education. The majority of the students' maximum bearable time was 1 hour - 1.5 hours (Figure 2). Therefore, it will be successful, if there is a small break after 1.5 hours from the beginning of lecture time.

The most preferable e-learning method was a mix of synchronous and asynchronous teaching (Figure 3.4). Students will be encouraged to ask questions in the live lecture in a synchronous session, whereas the uploaded recorded video of the lecture will enable further studies asynchronously and will also be helpful for students who missed the lecture due to other reasons.

The opinion on workload comparison in e-learning from students and lecturers was that it is much higher than traditional learning (Table 2). However, to overcome the aforementioned issue, if the scope and learning outcomes were reduced, it will badly affect the quality of the outcome of the module.

d. Perceptions on online examination

To overcome the problems related to the online examination, there should be a mechanism to obtain feedback from both students and lecturers after every examination. From that feedback, data can be collected regarding issues they have faced during the period of the examination, so it will help to successfully adapt to the future online examination.

Student perceptions

Students should be given extra time to do the conversion of the answer script into the required format (pdfs, jpgs, etc.), and for the uploading process. In addition, there should be a secondary link for uploading the answers, so that if there were power or network failures, students can upload the answers to the secondary link. Especially there should be a supportive staff at the time of examination, who is always online, so that students can direct their problems immediately during the time of the examination.

Lecturer perceptions

Most lecturers complained about the students' misbehaviour practices at the online examination. Even though this action cannot be prevented entirely, if different versions of multiple-choice questions were included in the paper, they can randomly be selected from a question pool and can be given to students in a random manner. If different variants of essay/structural essay questions with the same complexity were included in the paper, they can be used to check the knowledge of the students with minimum possibility of cheating. In Addition, small online viva sessions can be conducted regarding the subject material right after the examination to evaluate the knowledge of the students on the subject material. In the meantime, taking advantage of new technologies (LockDown Browser, Web Cameras) will be supportive to eliminate the online examination offences.

e. Suggestions on lab sessions

It is also possible to hold lab sessions in a variety of ways, depending on the requirements of the subject. They favoured simulation-based labs in large numbers (Table 3). A pre-recorded hardware-based lab or live-streamed lab, where the lab instructor does the experiment within the lab without the presence of students, will be more fruitful in the current situation than performing solely a simulation-based lab. Even if the topic prerequisites are satisfied, students will still suffer from a lack of hands-on expertise when participating in simulation-based lab activities.

CONCLUSION

As Sri Lanka is still a developing country, 100% online education is not widespread throughout the country. Hence, when establishing this system, it must consider about the lessons learned.

From this study, it can be concluded that the most effective way to conduct online lectures is delivering the lessons synchronously and upload the recorded video of the lecture at the end of the lecture.

Then, regarding the online examinations, there are some limitations in both student and lecturer perspectives. However, if we can adapt to new technologies like Lock Down Browser, Zoom, usage of Web Cameras, generating questions from Question pool and conducting small viva sessions after the examination, online examination process will also be more productive. In terms of online lab classes, conducting simulation lab sessions with synchronously a recorded/live stream hardware basis lab will provide more knowledge on subject materials.

In the meantime responsible authorities have a commitment to established well developed power and telecommunication systems throughout the country. Therefore, it can establish a well prepared online education system.

In conclusion, even though a considerable number of higher study institutions conduct online lectures, practical sessions and examinations, there are some limitations and drawbacks in this online education system.

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