Enhancing Student-Instructor Interaction in Asynchronous Teaching through Virtual Office Hours Sessions

A Case Study from Sri Lanka

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Abstract

A key challenge faced by educators during the recent emergency shift to online teaching due to the Coronavirus disease 2019 (COVID-19) outbreak was the lack of student-lecturer interaction, especially in the asynchronous mode. Several studies have revealed that asynchronous teaching lacks student engagement and active learning, the principal components of lifelong and meaningful undergraduate education. In the current study, the concept of "virtual office hours" has successfully been utilised to overcome this challenge. Herein, major theory components were introduced to students using short, pre-recorded lecture videos through a learning management system (asynchronous mode). Then, the lecturer conducted a real-time online session called "virtual office hour", which was designed to answer the questions of students. This was solely a student-driven session and was structured to be different from a typical tutorial session by putting the students in the driving seat of learning. Participation in this virtual session was entirely voluntary, and if students had unclear theory parts, they were encouraged to join and get them clarified. Feedback on virtual office hour sessions was collected from students using questionnaires, resulting in higher student satisfaction. Moreover, the impact of this approach towards the learning process was statistically analysed by investigating the correlation between final exam scores and attendance of virtual office hours. A weak positive correlation (0.3) was observed between final exam marks and participation in this voluntary virtual session. According to the results of this study, it can be concluded that "virtual office hour" sessions are important in improving the quality of virtual teaching because it increases students' trust

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in the teacher's care of their learning, which is crucial in the current online teaching paradigm.

Keywords: online teaching, COVID-19, student-lecturer interaction, asynchronous mode, virtual office hours.

Introduction

One of the key challenges faced by educators in recent years is the emergency and unplanned shift to online teaching in the year 2020 as a consequence of school closures due to the unexpected COVID-19 outbreak. Approximately 1.4 billion students were restricted to their households. At the same time, the entire global education system underwent a rapid paradigm shift from the traditional face-to-face approach to online teaching in which delivering content and evaluating students' understanding is solely done using technology (Jeffery & Bauer, 2020).

During this period, education was mainly provided in two modes: synchronous and asynchronous. Synchronous mode, in which classes are conducted in real-time through a platform such as Zoom or Microsoft Teams, that allows students to interact with the instructor in real-time. In this mode, knowledge transfer occurs in real-time at the instructor's pace, while the sense-making part happens alone at an individual level. In comparison, in asynchronous mode, no real-time interaction takes place between the student and the instructor. The content is usually transferred using pre-recorded videos and uploaded to a learning management system (LMS). Students access learning materials through the LMS at their pace; hence, knowledge transfer and sense-making happen alone at an individual level (Mingzi, Xin & Liang, 2021). Out of these two modes, the asynchronous mode was more popular amongst students than the synchronous mode, especially in developing countries such as Sri Lanka (Yatigammana & Wijayarathna, 2021). This can mainly be attributed to anytime accessibility in the asynchronous mode, where students do not have to join in real-time (Rupasinghe, 2021). They can watch the recorded videos anytime during the day at their own pace in asynchronous mode. Most students tend to watch video lectures at night when mobile data costs are significantly low (Yatigammana & Wijayarathna, 2021; Department of Education, 2021).

Additionally, issues related to network connectivity and lack of device availability are minimised in asynchronous mode learning, as students can go through learning materials anytime they want. Also, asynchronous mode provides the opportunity for the students to go through recorded lectures over and over until they understand the content. Because of the abovementioned reasons, asynchronous mode teaching and learning are more popular in the higher education sector, especially in countries with low income, as it could

be implemented with minimum infrastructure and Internet connection requirements (Kayalar, 2021; Yatigammana & Wijayarathna, 2021).

However, a key drawback of asynchronous mode teaching is the lack of student-instructor interaction, which is a key component in a successful learning process. Since there is minimal interaction between the learner and the instructor, it is a huge challenge for the instructor to gain insight into the level of students' understanding of the content. In comparison, synchronous mode provides the opportunity for the instructor to gain a solid understanding of students' knowledge in real-time through immediate feedback, where the instructor can revisit the concepts based on students' responses providing extra support for the students to understand the content better. In asynchronous mode, different activities such as forum discussions and quizzes can successfully be utilised to gain an understanding of students' knowledge. However, this is much more challenging than the synchronous mode of teaching and requires significant time and training.

Virtual office hours sessions can be named as an approach that can be utilised to overcome this challenge. The purpose of virtual office hours sessions is to provide an opportunity for the learner to interact with the instructor in real-time (Pakala, Bairaktarova & Schauer, 2019). This is an extension of the concept of office hours sessions in a conventional face-to-face classroom which provides an opportunity for students to seek help class time outside of normal hours. A number of studies in the literature have shown that participation in office hour sessions has a positive correlation with higher academic achievement and students' satisfaction in the traditional face-to-face model (Swanson, 2016; Meyers, 2003; Li & Pitts, 2009; Jeremy *et al*., 2022). Although the concept of virtual office hours sessions is fairly new, they are a proven effective method of communication for all course types as they can be implemented in in-person lectures, hybrid courses, or online courses (Pakala *et al*, 2019; Li & Pitts, 2009; Jeremy *et al*., 2022).

Hence, in this study, virtual office hours sessions have been utilised as a method to enhance student-instructor interactions in asynchronous mode learning by bridging the gap and providing opportunities for the students to interact with the instructor in real-time. Herein, students' perception of the use of virtual office hours sessions and its' impact on the learning process have been studied, and this study focuses on the following research questions (RQs):

RQ 1: What are students' perceptions of virtual office hours sessions?

RQ 2: What are students' expectations in virtual office hours sessions?

RQ 3: What is the impact of virtual office hours sessions on students' learning process and understanding of the challenges associated with real-time virtual office hours sessions in asynchronous mode?

Methodology

Participants

This study was conducted at a state university in Sri Lanka for first-year students following the Bachelor of Engineering Technology degree programme. This course, "Chemistry for Technology", was delivered online due to the closure of the university as a result of the COVID-19 pandemic, and the approximate class size was 88.

Procedure

The course "Chemistry for Technology" was delivered via Moodle, the learning management system (LMS), in asynchronous mode using the following model.

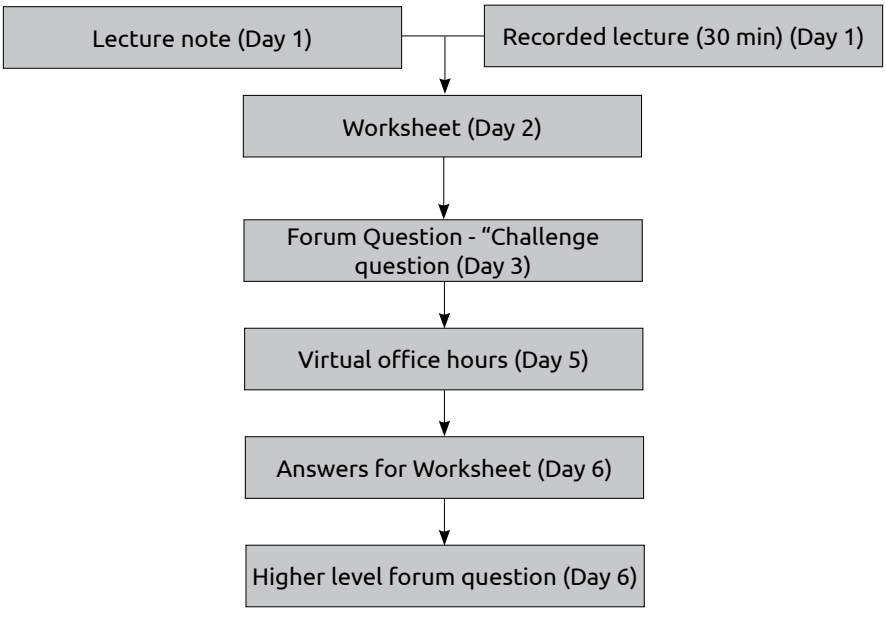

Figure 4.1: Model followed to deliver the module.

Herein, major theory components were introduced to students using short lecture videos (< 20 minutes) developed through the concept of micro-learning, followed by a worksheet related to the theoretical component covered in the video. Questions in this worksheet were mainly at the lower end of Bloom's Taxonomy, such as "remembering" and "understanding", as the sole purpose here was to check whether students have grasped the basic concept. Students were given two to three days to complete the worksheet

and upload it to the LMS. Further, the forum question feature available in the LMS platform was successfully utilised to create a dynamic environment by enhancing students' engagement and participation. Deliberately developed questions covering common misconceptions were posted as forum questions, and the students were given marks for answering these questions. The lecturer was actively involved in the process by providing feedback on their answers. After the submission of the worksheet, the lecturer conducted a real-time online session called "virtual office hours" sessions, which was designed to answer the questions of students. Finally, students were given a challenge question which required higher-order thinking, which allowed the instructor to gain an insight into the level of students' understanding.

The key feature of these virtual office hours sessions was that students were asked to develop questions related to the theory component, worksheet and forum questions. This was solely a student-driven session and was structured to be different from a typical tutorial session by putting the students in the driving seat of learning, thus making it more active learning. Participation in these virtual sessions was entirely voluntary, and if students had unclear theory parts, they were encouraged to join and obtain clarification on them.

The impact of participation in virtual office hours sessions on students' learning process was studied by statistical analysis (correlation analysis) of the relationship between the final examination grade and students' attendance in this voluntary session. Furthermore, students' perception of the virtual office hours sessions was evaluated using a questionnaire of ten items on a five-point Likert scale ranging from 'strongly agree' to 'strongly disagree' and two open-ended questions. The respondent rate was 25% of the total population, and the collected data were summarised and analysed using Microsoft Excel.

Results and discussion

Of the students who responded, 22% were females, while 78% were males in the age group 21 to 23.

What are students' perceptions of virtual office hours sessions? (RQ 1)

Attitudinal questions were given in the survey to check student perception of virtual office hours sessions, and the responses to the questionnaire are summarised in Table 4.1.

According to Table 4.1, most students have indicated a positive impact of virtual office hour sessions in their learning process (Questions 1 to 3). In order to gain further insight into the perception of students, responses

Table 4.1: Summary of questions on understanding students' perception (RQ 1):

Q no	Question	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1	Attending virtual office hours sessions was a good use of my time	50%	43%	7%	0%	0%
2	Virtual office hours sessions were helpful in improving my chemistry knowledge	64%	36%	0%	0%	0%
3	Virtual office hours sessions were useful in understanding unclear theory components in the recorded video lecture	64%	29%	0%	7%	0%
4	I would like to have virtual office hours sessions in future classes	50%	36%	14%	0%	0%
5	I suggest having virtual office hours sessions in other subjects too	43%	43%	14%	0%	0%

Table 4.2: Summary of questions on understanding the reasons for attending virtual office hour sessions voluntarily:

Q no	**Question**	**Strongly agree**	**Agree**	**Neutral**	**Disagree**	**Strongly disagree**
6	I attended virtual office hours sessions to learn course materials/content	43%	36%	21%	0%	0%
7	I attended virtual office hours sessions to get my questions answered	57%	36%	7%	0%	0%
8	I attended virtual office hours sessions to get to know my instructor better	36%	43%	21%	0%	0%

indicated as 'strongly agree' and 'agree' were combined and categorised as 'positive responses', while 'neutral', 'disagree' and 'strongly disagree' were combined and categorised as 'negative' responses (Figure 4.2). As seen in Figure 4.2, the majority of the students have identified virtual office hours sessions as a satisfactory experience in their learning process, with positive responses of 93%, 100% and 93% for Questions 1 to 3. Moreover, 86% of respondents have suggested incorporating virtual office hours sessions in future classes and other subjects.

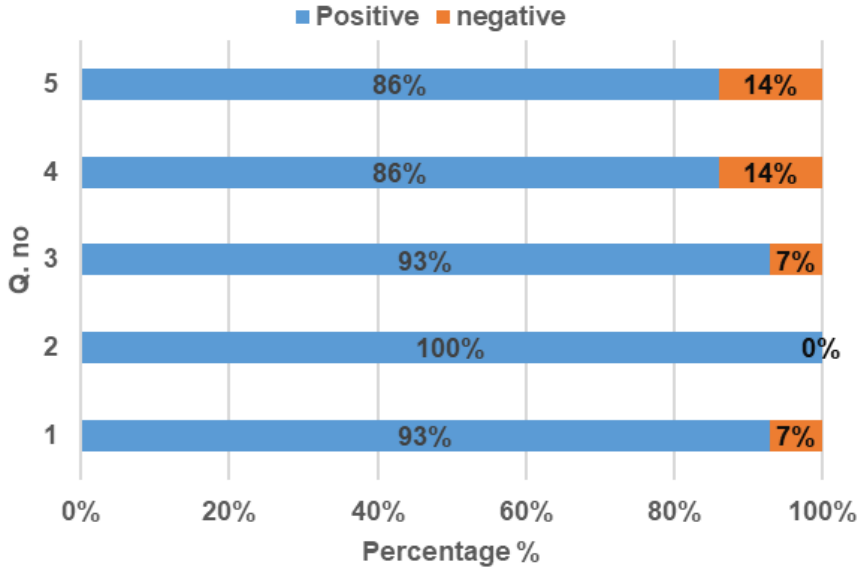

Figure 4.2: Summary of responses on understanding students' perception (RQ 1) after categorisation.

What are students' expectations in virtual office hours sessions? (RQ 2)

Although virtual office hours sessions were not mandatory, students regularly attended virtual office hours sessions. However, this varied according to the topic covered in a given week, where there was high participation when a difficult topic was taught compared to a simple one. Table 4.2 summarises the responses to questions about potential reasons for attending office hours.

According to Table 4.2, the majority of the students have indicated that they attended virtual office hours sessions to have their questions answered (93% positive responses for Question 7), which further endorses the positive impact of virtual office hours sessions in the learning process. Generally, in an asynchronous class, student engagement is considerably low, and students

Table 4.3: Students' responses to open-ended questions on the reasons for attending virtual office hour sessions and the challenges they had to face:

In your own words, why did you attend the virtual office hours sessions?	**What were the challenges you had in attending virtual office hours sessions?**
That's the best way for me to clarify my questions.	Poor Internet connection.
To find answers to the questions that I had in the lecture and worksheets.	I have poor Internet access,
To understand unclear theory parts and to attempt more questions.	Mobile data and Internet connection problem.
To gain a clearer understanding of the lessons which were already covered.	Sometimes Internet signals were lost, and power cuts.
To solve the problems that have arisen.	Connection was not stable.
Because it is good for studies, and it is a new experience for us.	Occasionally there are signal problems in our area.
To understand unclear theory parts.	
To better understand the subject matter.	
To improve my knowledge.	

are in a passive mode where knowledge transfer solely happens through video lectures without interacting with the instructor. However, through the synchronous approach, students are deliberately put in the driving seat of learning through active engagement, where they have to come to virtual office hours sessions with their own questions rather than just passively listening to the instructor.

What is the impact of virtual office hours sessions on students' learning process and understanding the challenges associated with real-time virtual office hours sessions in asynchronous mode? (RQ 3)

In order to gain further insight into this observation, an open-ended question had also been included in the questionnaire, and the responses to this question are summarised in Table 4.3. Students indicated that they attended virtual office hours sessions to understand unclear parts of the video lecture, to clarify their questions and to improve their knowledge. From Questions 6 to 8 and responses to open-ended questions, it can be concluded that students have identified virtual office hours sessions as a way of clarifying unclear theory components from the recorded video lectures. Hence, it can be recommended to include virtual office hours sessions in asynchronous mode modules to provide a high-quality and meaningful education.

Also, another open-ended question was included in the questionnaire to understand the challenges associated with this type of real-time virtual office hour session. The majority of the students have indicated Internet connectivity issues and data affordability as the main challenges.

Finally, the impact of the virtual office hour sessions on the performance of students was studied by investigating a correlation between the attendance of virtual office hours sessions and final examination marks. According to the analysis, a weak positive correlation of 0.3 was observed between the attendance in this voluntary office hour session and the final examination performance.

Recommendations for instructors

After analysing the results, it is clear that incorporating a synchronous component (virtual office hours session) in an asynchronous module has multiple benefits. Importantly, this provides a solution for one of the prevalent issues in asynchronous mode teaching; lack of student-instructor interaction. A robust and effective interaction between students and instructors can be promoted through virtual office hours sessions. Additionally, synchronous virtual office hours sessions facilitate student engagement and peer interactions in an asynchronous module. Notably, as described in the results section, this has also exhibited a positive impact

on students' performances. Therefore, it can be recommended to include a synchronous component such as virtual office hours sessions in modules delivered in asynchronous mode. This can be a real-time session every two to three weeks, and the instructor should structure this session in a way that promotes active engagement and has to be different from a traditional tutorial or discussion session. Students should be advised to bring their own questions related to the lecture video and worksheet or tutorials. A key feature of a virtual office hours session is that the instructor is a facilitator without recreating a traditional classroom setting. The concept of inquiry can be included in the virtual office hours sessions by providing guidance to students to master theoretical components without directly providing instruction. This approach would be highly beneficial for instructors from developing countries where most of the modules are delivered in asynchronous mode owing to issues related to Internet availability, availability of devices, network issues and the high cost associated with Internet connections.

Limitations

This study is limited to one institution with data from one academic year (2020/2021) in a Bachelor of Engineering Technology (BET) degree programme. The study was conducted at a university in Sri Lanka during the university closure period due to the COVID-19 pandemic. Hence, students' perceptions of virtual office hours sessions may be influenced by context-specific social, economic and mental issues during the panemic. Despite these limitations, our study is the first to provide insight into the impact of virtual office hours sessions on students' academic performance and investigate students' perception of virtual office hours sessions in the Sri Lankan context where the utilisation of technology for education is limited. The findings of the study provide significant insight to academics on enhancing student-instructor interaction in an asynchronous teaching environment using virtual office hours sessions.

Conclusion

The current study focuses on exploring the possibility of utilising a new concept called virtual office hours sessions in asynchronous mode teaching. Virtual office hours sessions are a real-time, voluntary, student-driven session promoting student-instructor interaction in asynchronous teaching. Herein, the perception of students of virtual office hours sessions and the impact on the learning process has been investigated. A higher degree of student satisfaction was observed when students clearly indicated that this session helped them improve their subject knowledge and clarify unclear theory components in the recorded lectures. Further, respondents

suggested incorporating virtual office hours sessions in future classes and other subjects. Moreover, a weak positive correlation of 0.3 was observed between the attendance in this voluntary office hours session and the final examination performance, which further endorses the positive impact of virtual office hours sessions for a successful learning process.

Generally, student engagement is considerably low, and students are in a passive mode in asynchronous-mode teaching, where knowledge transfer solely happens through video lectures without any interaction with the instructor. However, through the approach of virtual office hours sessions (including a few synchronous sessions), students have the opportunity to actively interact with their instructor. Further, proposed virtual office hours sessions are structured in a way where students have to come to the sessions with their own questions or unclear parts, rather than just passively listening to the instructor or following the instructions given by the lecturer. This indirectly puts students in the driving seat of learning as they have to go through lecture materials and attempt to undertake tutorials/worksheets before virtual office hours sessions. Additionally, incorporating virtual office hours sessions every two or three weeks in an asynchronous mode module would ensure that all the students are in accordance in terms of course progression. This would also provide students with a sense of their learning progress. Hence, according to the results of the current study, it is highly recommended to include virtual office hours sessions in asynchronous mode modules to provide high-quality and meaningful education in the virtual environment.

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