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A Survey-Based Study of Students' Perspective on Different Remote Teaching Styles During COVID-19

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Abstract

After the outbreak of the coronavirus in early 2020, most educational institutions worldwide had to rapidly switch to online learning as a precautionary measure. The sudden change in the teaching style had left both the instructors and the students with a lot to do in just a short period of time. Many challenges and obstacles in the new learning environment hindered the educational process flow. In this work, we present a survey-based study of the students' opinions and perspectives on three different remote teaching techniques, practiced in the school hosting this study. The study takes place during spring and summer of 2020 and more than 500 students participated in it. The factors affecting the students' experience in each method will be identified, and, accordingly, best practices for the instructors will be recommended to ensure students' engagement and satisfaction.

1. Introduction

Since COVID-19 [1] was declared a pandemic in March 2020, normal life as we knew it was disrupted. Many universities across the US and worldwide were forced to either end their spring semester early or switch to remote learning for what was left of it, depending on their capacities and facilities [2, 3]. Most instructors were not well prepared to deliver their course contents remotely. They had to improvise their own remote teaching style, depending on the course type and the remote learning platform provided, which created extreme inconsistency among instructors and across universities. Students were obliged to adapt this new learning environment and reported that they were overwhelmed with all its unprecedented challenges [2-4].

Different remote teaching styles can be categorized into two main categories, synchronous and asynchronous teaching styles, where for the former, the instructor can either opt for recording the lecture meetings for later review by the students or not. Each one of these learning styles possesses its own challenges, for the instructors and the students [4]. For example, while the synchronous style may seem to be the closest to a normal classroom, both instructors and students need to have a stable and fast internet connection, and a distraction-free environment to ensure everyone's engagement in the class [5]. Another challenge would be for students located abroad in different time zones, who might not be able to attend the online meetings synchronously [4, 5]. Alternatively, the asynchronous style may help solve some of the aforementioned challenges, however, it manifests its own. Since it is very close to the flipped classroom style [6, 7], it can help students go each at their own pace, but the lack of immediate interaction while watching the recording may affect their understanding for the remainder of the recorded lecture. Consequently, this might lead to doubling the amount of time and effort dedicated for each class.

In this work, we study the students' perspective on different remote teaching styles and the challenges they face in remote learning. The results were analyzed to understand students' preferences and struggles. Accordingly, we recommend the best approaches that help most students achieve their learning objectives in the discussion section.

The rest of the paper is organized as follows: section 2 illustrates the lecture delivery methods, along with details about the courses under investigation. The survey questions and method of data collection will also be discussed in this section will also be discussed in this section. Section 3 discusses the results obtained, analyzes the student responses, and recommend best practices accordingly. Finally, section 4 concludes the paper.

2. Assessment of Students' Perspective on Different Remote Teaching Styles

2.1 Lecture delivery methods

Three lecture delivery methods were adopted in the courses covered in this survey, namely: Live (synchronous) Lecturing, without recording the meeting; Live (synchronous) Lecturing, with the meeting recording uploaded after; Asynchronous (pre-recorded videos) Lecturing, with live discussion during lecture time. For the synchronous method, both the instructors and students would meet over any online-meeting platform, during the scheduled lecture time. The instructors would then proceed with the lecture as they would in a traditional in-person classroom. One variant of the synchronous method is to record the meeting and make it available to the students right after the lecture for later review. Some instructors opted not to record the meeting at all. For the asynchronous method, the instructors would pre-record the lecture materials and make the recording available to the students prior to the scheduled lecture time. Then, during the lecture time, they would meet only for discussion, questions, and some exercises.

2.2 Methodology and Survey Structure

Over spring and summer 2020, 815 students were invited to participate across the Freshmen Program and the sophomore; junior; and senior years of the Electrical and Computer Engineering (ECE) department of the school hosting this study. About 63% of the invited students (519 students) actually filled in the surveys. Students were surveyed to gather and assess their perspective on different remote teaching styles they had encountered during this period of time. The study involved 12 courses, eight of them were taught during spring 2020 and four were taught in summer 2020. The courses covered a large variety of topics and fields, including: Electronics and Devices; Microprocessors; Programming; and Machine Learning; and Signal Processing. Three courses were lab-based and nine were regular book courses. Seven instructors helped in teaching those courses over the period of this study.

Towards the end of each semester, and before the final examination period, students were asked to voluntarily take a Qualtrics-based survey. Human subjects' approval (PRO18060710) was secured for these various forms of assessment. As shown in Table 1, the survey was designed to collect students' perspectives on the three aforementioned lecture delivery methods. In the school hosting this study, the instructors and students switched to remote-only classes by mid-spring 2020. Both the students and instructors had no time to prepare for this new teaching style. However, during summer 2020, the school also offered remote-only classes, but we were better prepared. Therefore, we introduced a new question for all the surveys conducted during summer 2020 to capture the students' experience regarding remote classes versus traditional in-person ones, as shown in Table 2.

Table 1. Survey questions

Lecture Delivery		
What is the lecture method chosen by your instructor?	o Live (synchronous) Lecturing, without recording the meeting o Live (synchronous) Lecturing, with meeting recording uploaded after o Asynchronous (pre-recorded videos) Lecturing, with live discussion during lecture time	
How do you think this lecturing method has helped you in achieving the learning objectives of the course?	o Completely helpful o Somehow helpful o Neutral	o Somehow unhelpful o Completely unhelpful
How would you rate the chosen remote lecturing method?	o Completely satisfied o Somehow satisfied o Neutral	o Somehow unsatisfied o Completely unsatisfied
Why did you give this rating? Please choose all that apply.	□ Multiple choices, removed for conciseness	
If it were up to you, what would you have chosen as a remote lecturing method?	o Live (synchronous) Lecturing, without recording the meeting o Live (synchronous) Lecturing, with meeting recording uploaded after o Asynchronous (pre-recorded videos) Lecturing, with live discussion during lecture time	

Table 2. Overall Satisfaction with Remote Learning Experience (Summer 2020)

Overall Satisfaction	
Judging by your overall experience with in-person lecture meetings during Fall 2019 or and your experience with remote lecture meetings in this class, which of the following statements best describe your experience.	o I prefer remote class to in-person labs o I have found the remote class to be comparable to the in-person classes o I would have preferred an in-person class to remote class o If I go back in time, I would defer my enrollment in this class until in-person classes are resumed

3. Results and Discussion

3.1. Lecture delivery method

Figure. 1 depicts the students' perspectives on how each lecture delivery method helped them achieve the corresponding course's learning objectives. Out of all the students surveyed, 124 of them had the synchronous method without recording, 209 had the synchronous method with recording, and 186 had the asynchronous method with live discussion during lecture time. From Fig. 1, it is inferred that more than 70% of the students found that having recorded materials, whether for synchronous or asynchronous, had helped them in achieving the learning objectives. This percentage dropped down to about 56% for the synchronous method without recording, which indicates that students like to have video recordings to refer back to, as opposed to just having their own taken notes. This result suggests that irrespective to the delivery method chosen, the students consistently like to have a recorded video component.

Figure 2 backs the results concluded from Fig. 1, by measuring the students' overall satisfaction from the corresponding lecture delivery method. These results take into consideration other factors for their overall satisfaction, not just the method's ability of helping them in achieving the learning objectives. Convenience, engagement, reliability, and interactivity are some of the factors that helps maximizing students' satisfaction. For the methods with a recording component, about 72% and 73% of the students are satisfied with the synchronous and asynchronous methods, respectively, which is very close to the percentage obtained from Fig. 1. For the synchronous method without recording, the number of satisfied students was approximately 58%, which is slightly higher than percentage depicted by Fig. 1.

To have more context and in-depth analysis, we used the third question in the survey, where the students provided the factors made them give the above ratings in questions 1 and 2. Two sets of factors, totaling 11, are presented in Fig. 3 and 4 for the negative and positive factors, respectively. The percentage shown in Fig. 3 is the total number of students who chose each reason, in all three lecture delivery methods, referenced to the total 519 students. "Different time zones" and "recorded materials being unhelpful" minimally impacted the students' satisfaction with the lecture delivery methods, while "increased workload"; "slow internet speed"; and "no participation during live lectures" were the main factors for students' dissatisfaction.

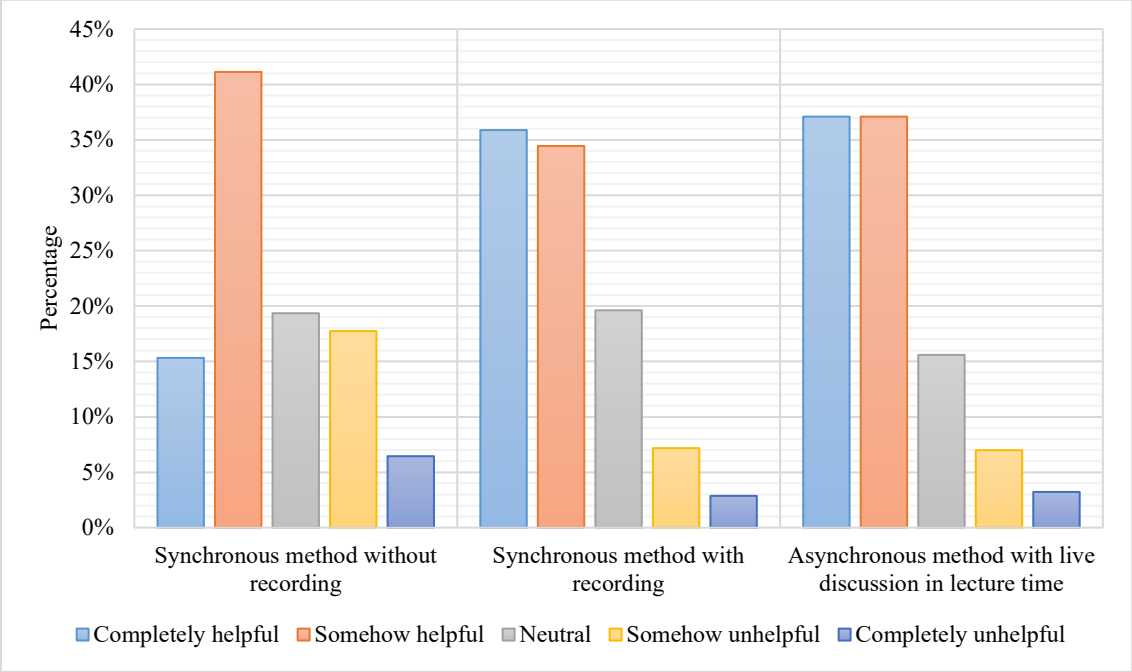

Figure 1: Students' perspective on different lecture delivery methods

Between these three factors, not participating during live lectures was the counter-intuitive reason that the authors didn't anticipate. It seems like in a remote setup, students tend to participate less than a traditional in-person classroom. The authors believe that one of the reasons that may contribute to this behavior is feeling disconnected by not actually being in a physical classroom.

The positive set of factors for student satisfaction can be seen in Fig. 4, where the percentage of each factor, in each method, is calculated by referencing to the total number of students who chose this factor across all methods. The main factors for student satisfaction with the synchronous method with recording are having the same lecture schedule as they would have had for traditional in-person classes and the recorded video component. On the other hand, the asynchronous method with live discussion was appreciated by the students for being flexible in term of a student's schedule, because they can watch the recorded video materials any time before the lecture.

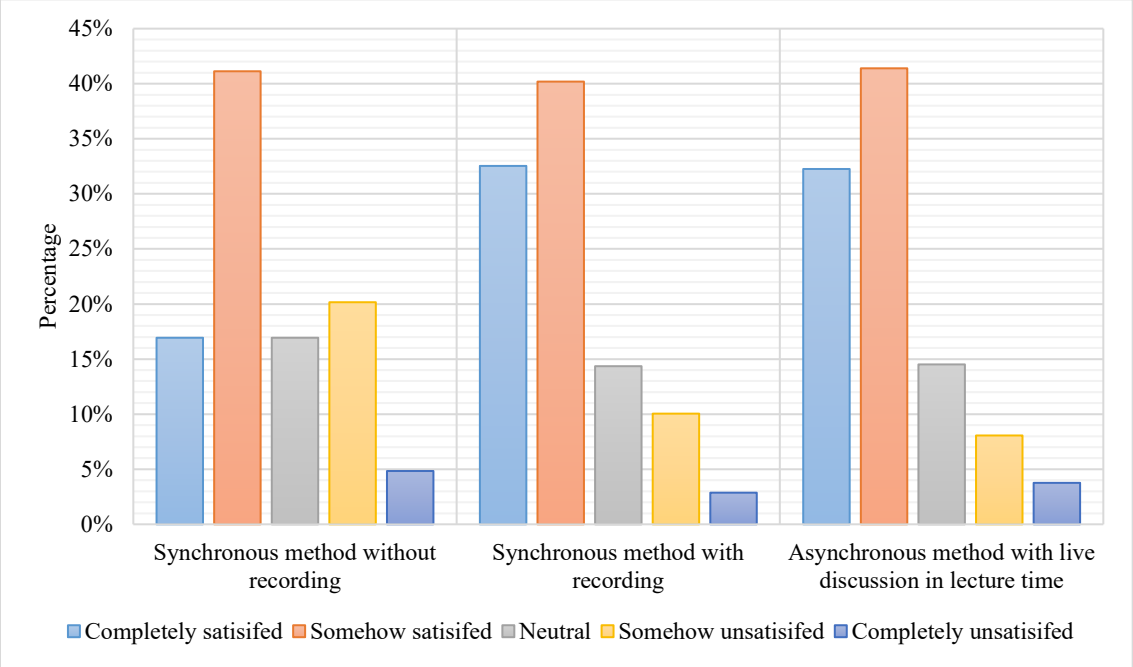

Figure 2: Students' overall satisfaction with the different lecture delivery methods.

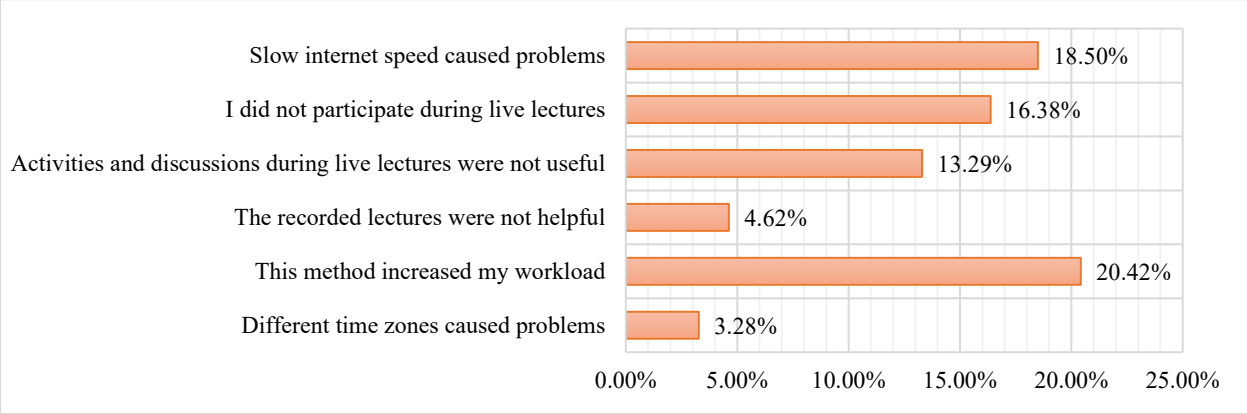

Figure 3: The negative factors correlated with the student dissatisfaction with lecture delivery methods

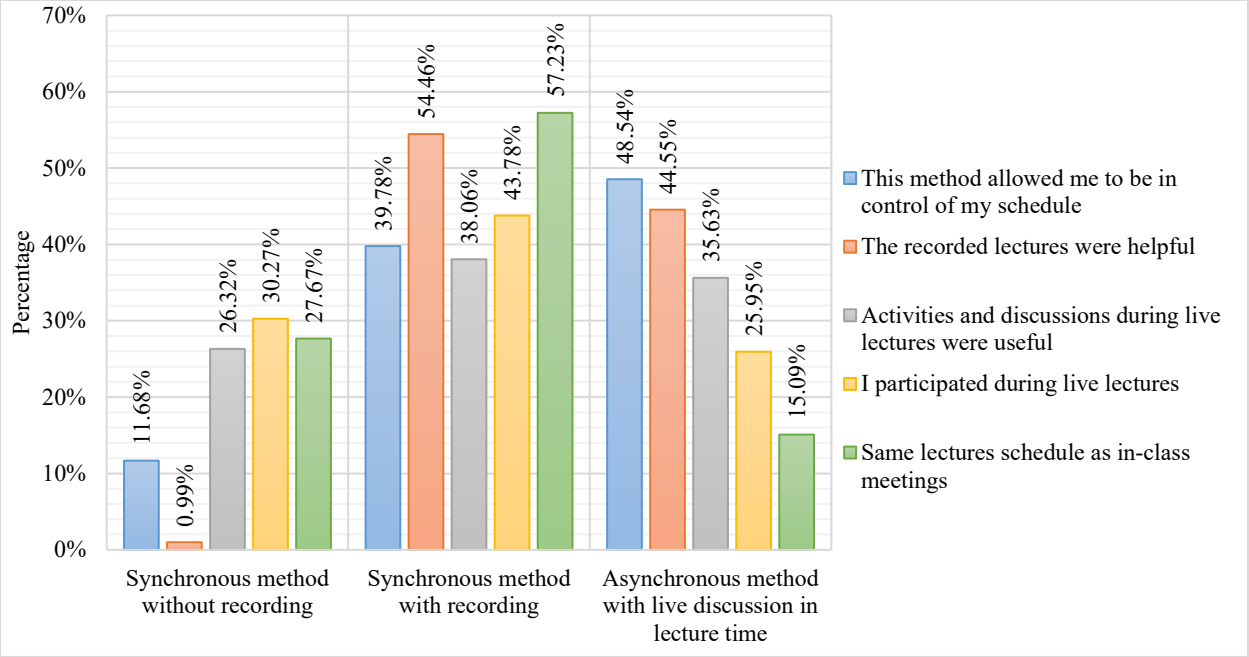

Figure 4: The positive factors correlated with the student satisfaction grouped by lecture delivery method

When comparing the synchronous method without recording to the asynchronous method, all the percentages seemed to be intuitive, except for participation during live lectures which was about 4% higher for the former. It seems like students who were presented with this lecture delivery method had no other choice than to actively participate as much as they can, because they don't have any other recorded component to refer to.

Table 3: Students' preferred lecturing method versus the one they experienced

		Lecture delivery method provided			
		Synchronous method without recording	Synchronous method with recording	Asynchronous method with live discussion in lecture time	Total (%)
Lecture delivery method preferred	Synchronous method without recording	10 (8.06%)	4 (2.02%)	4 (2.03%)	**18** (3.47%)
	Synchronous method with recording	**77 (62.10%)**	**140 (70.71%)**	82 (41.62%)	**299** (57.61%)
	Asynchronous method with live discussion in lecture time	37 (29.84%)	54 (27.27%)	**111 (56.35%)**	**202** (38.92%)
	Total (%)	**124** (23.89%)	**198** (38.15%)	**197** (37.96%)	**519**

Lastly, the students were asked to indicate their preference for one of the three methods, given the method they encountered in the corresponding class. The results are shown in Table 3, where the columns represent the method, they encountered and the rows represent the method they preferred. The red percentages shown in each cell are referenced the corresponding total at the end of each column, while the blue percentages are referenced to the total number of students. The leading preferred method was the synchronous method with recording (57.61%), followed by the asynchronous method (38.92%), then the synchronous method without recording (3.47%). Perhaps the reason behind this result is that the former method combines the traits of the asynchronous method, by having a recording component, and it is as close as remote learning can get to a traditional in-person classroom. The diagonal cells represent how many students were presented with a method and had preferred it, which again certify that the synchronous method is the most preferred, leading by about 14% than its runner-up.

3.2. Remote versus Traditional in-person Classrooms

The students from summer 2020 classes were surveyed with an extra question, shown in Table 2. These students totaled 124 in four different classes, where 70 of them had the synchronous method without recording, 40 of them had synchronous method with recording, and 62 had the asynchronous method. The rationale behind this question was to reflect on remote classroom experience and indicate if it can be related to a traditional in-person experience, given that by the end of summer 2020, the students have experienced at least two semesters of fully remote classroom experience. Figure 5 shows a summary of the results for the four given options. While the traditional in-person classroom experience is the most preferred among the students (59.88%), a decent number of them thought that they had the same experience in both (22.67%). Only 9.88% preferred remote learning experience over the traditional in-person one.

A detailed representation of this comparison in shown in Fig. 6, where the student responses is grouped by the method of delivery they experienced. This figure shows that the major portion of students how preferred the in-person experience were those who enrolled in courses that offer synchronous delivery without recordings. More than half of the students who experienced the synchronous method with recording either preferred or were neutral with this method over the traditional in-person experience.

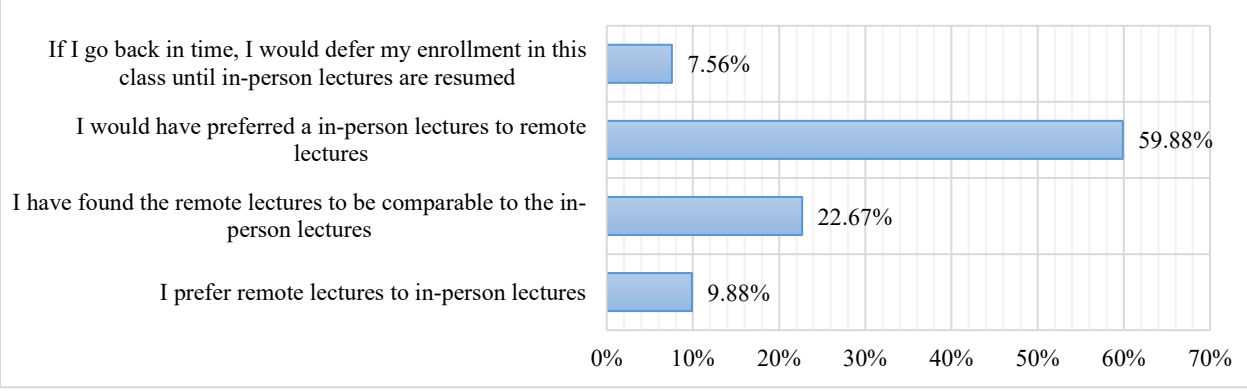

Figure 5: Comparison between remote and in-person learning experience for summer 2020 students

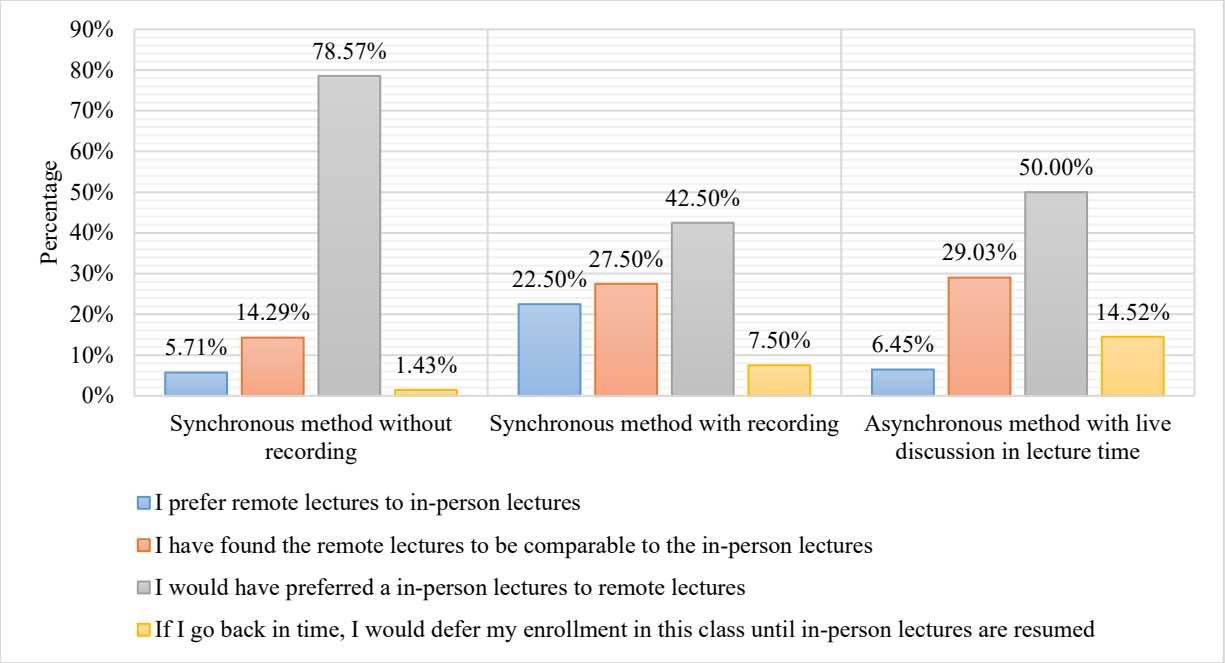

Figure 6: Comparison between remote and in-person learning experience for summer students, grouped by lecture delivery method

4. Conclusion and Future Work

In this work, we presented a detailed survey study for the students' perspectives on three different remote teaching styles. Five hundred and nineteen students were surveyed during spring and summer semesters of 2020, over 12 different courses and spanning all the four years of the engineering program at the hosting school. Based on our results, we find that the synchronous lecture delivery method with lecture recording is more convenient for student learning. The analysis suggests that the students preferred this method because of its close resemblance to a traditional classroom experience. Therefore, we encourage instructors to synchronously deliver their class while recording each lecture session. However, if this method cannot be adopted, then the authors recommend the asynchronous approach with live discussion during the lecture time, albeit the effort needed to flip the course materials and design in-class activities.

Future work will include a more detailed study on what is the best remote teaching style depending on the course type and field in the ECE majors.

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