Impact of student-instructor relationships on Academic Performance of Graduate Students during COVID-19

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1 INTRODUCTION

COVID-19 has altered the way people live their lives all around the world. This issue affected a variety of industries, including business, government, education systems and many other industries . Pandemic has had a significant impact on how worldwide education is delivered. Due to the pandemic, millions of students were affected by educational institution closures, resulting in the largest online movement in educational history. We started to see schools, instructors, and students adopting e-learning tools that allow teachers to conduct interactive instruction, effortlessly exchange resources, and enhance student collaboration and involvement. For both on-campus and distant students, learning management systems are already standard in university education. In 2015, the yearly growth rate of online enrolment was over 30 percent per year, and in 2019, the number of students taking at least one online course had climbed to 34.7 percent of the overall learner population globally. Well-planned online learning is not the same as going online in the middle of a crisis, because the speed with which this transition is made could be surprising to instructors and students. As a result, despite the fact that the educational community has long recognized the usefulness of online learning, evidence of its implementation challenges continues to mount. Students struggled to acclimatize to this extraordinary shift from face-to-face classroom methods to 100 percent online learning at home, and it also highlighted the need for teachers to improve their capabilities. This study looks at how students at the university level felt about the challenges they had when switching from traditional to online classrooms, including the lack of face-to-face engagement with the teacher, response time, and typical classroom socialization, as well as the effects on their academic achievement. Now that institutions have shifted to online learning solutions, teachers are scrambling to adapt their teaching methods and processes. The level of teacher-student engagement has been disputed in online classes. When professors take

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the time to listen to their students and are available to answer their questions they fosters a positive environment and students are more inclined to create a conductive learning environment. Students at the university level not only want to discuss their concerns with them, but they also want to receive guidance from them. In most cases, a low degree of interaction has a negative impact on the student-teacher learning process, which can have an impact on their academic achievement as well. Many studies found that the pandemic had a negative impact on students' emotional and behavioral functioning, notably attention and externalizing difficulties (i.e., mood and wellness behavior), which were exacerbated by isolation, economic/health repercussions, and uncertainty. Students expressed their dissatisfaction with the learning and assessment methods used, as well as the excessive task load, technical challenges, and confinement. Students actively coped with the circumstance by seeking aid from their teachers and peers to deal with the issues. However, reaching out to teachers via the online platform was often challenging, and they had difficulties clearing up doubts during online classes. Students were disappointed with online learning in general, particularly in terms of communication and question-and-answer techniques, when it came to the efficacy of different online teaching modes. The findings also revealed that, despite efforts to embrace virtual laboratories, the online learning environment failed to meet the needs of courses that require hands-on practice, and that the lack of presence of instructors made it even more difficult for students. Given the current state of affairs, it's critical to acquire a more detailed knowledge of students' online learning experiences during the COVID-19 pandemic. Despite the fact that numerous research have looked into this topic, there is a scarcity of knowledge about the obstacles students face and the strategies they use to overcome them. As a result, this research aims to fill in the gaps. Our research looked into the pandemic situation, with a particular focus on how it has affected ordinary educational procedures. To do so, the researchers combed through the literature on the consequences of online learning. This aided in the discovery of published sources to investigate the issues students face while conducting online learning sessions and the creation of a survey to gain a better understanding of the student perspective. The research concludes with data indicating the influence of online learning on students' academic achievement due to a lack of engagement with their professors at the university level.

There are two major differences between the current study and the previous studies that should be noted. First and foremost, it throws light on the direct impact of the pandemic on the difficulties that students face as a result of the lack of student-teacher interaction in an online learning environment. Second, the current study investigates students' coping methods in the context of this changing learning environment[10]. If we could address these issues, we could gain a better understanding of the amount of the difficulties that students face when participating in a comprehensive online learning environment, particularly in the context of the pandemic. Meanwhile, our nuanced understanding of the tactics that students take to overcome their obstacles would provide useful information to school administrators and teachers, allowing them to better serve the online learning needs of kids in their classrooms and beyond. When it comes to examining the pattern of tactics in an online learning environment, this knowledge would be crucial as well.

The following research questions are the focus of this study.

(1) What academic difficulties do online classes impose on students as a result of the lack of interaction between teachers, and how has this impacted their academic performance?
(2) In comparison,to traditional vs. online education, which do students prefer and why?

2 LITERATURE REVIEW

The word "online learning" is often used, yet it has several different connotations. For this paper, online learning refers to learning that takes place through the use of the Internet.It is broader than 'networked learning,' which focuses

on human-human connections. (Banks et al. 2003 [2]; De Laat et al. 2007 [7]).Such distinctiveness is lacking in online learning. It is more limited than 'e-Learning' and 'digital education,' which incorporate the complete spectrum of digital tools and resources, not only the Internet, and emphasize the development of digital competencies. Furthermore, online learning lacks the inherent claim to improvement that makes the term "technology-enhanced learning" (TEL) (Laurillard and Masterman 2010 [8]; Kirkwood and Price 2014 [6]) problematic (Bayne, 2015) [4]. In our postdigital reality, one could argue that the term "online" is no longer a useful descriptor for students' actual experiences (Fawns, 2019), particularly in wealthier parts of the world where Internet-connected devices are ubiquitous, and the boundaries between learning and other strands of activity in daily life have become so porous. The same cannot be true about 'online teaching,' which consists of deliberate assistance for other people's learning over the Internet. The quick cessation of face-to-face educational activities in reaction to the Covid-19 outbreak provided instructors with a clear understanding of the distinction between online teaching and their other modes of operation. Many teachers recognize online instruction as a distinct working method category (Goodyear, 2002 [11]). Much of what is taught and learned in an online setting is comparable to what is taught and learned in any other formal educational situation (Anderson 2011b) [1]. Online learning and teaching entail a wide range of technologies, resources, educational techniques, roles, organizational arrangements, and modes of interaction, monitoring, and support—with numerous replacement and integration possibilities (Bates and Poole, 2003) [9]. The Covid-19 problem has resulted in a slew of recommendations for instructors (Bates, 2020) [3]. Much of this advice focuses on tools and resources that teachers may use to supplement their in-person sessions.Furthermore, instructors have been given hundreds of 'tips and tricks,' most of which lack the contextualizing information required to determine which teaching strategy is likely to succeed.

Before COVID-19, plenty of tools were available for content creators to create material for academics but was limited to online delivery. Interactions were clumsy or restricted. The initial cloud-based solutions struggled with the problems of delivering across multiple browsers and browser versions. Students were frustrated with the load time, buffering, and other 'clunky' functions as a result of this. In higher education, e-learning is gaining more and more impact, especially in mixed learning formats. This new kind of traditional teaching and learning can be practiced in many ways. Several studies have compared face-to- face teaching to online learning and blended learning in order to try to define which of the formats provides, e.g., the highest learning outcome creates the most satisfied students or has the highest rate of course completion. However, these studies often show that teaching and learning are influenced by more than teaching format alone.

One of the research paper which was particularly relevant to our study was by Maureen Hannay and Tracy Newvine which was a comparison study between Online and Tradition Learning [5]. This study examined why students chose distance education(Online Learning), as well as student perceptions of the quality and difficulty of those courses as compared to courses taught in the traditional classroom, using a 22-question survey with 217 respondents, the majority of whom were adult, part-time students enrolled in criminal justice(72%), psychology(18%), Computer science(5%), Business(4%) and other(1%). While the ease of taking online courses may attract some students to explore distance learning, they are unlikely to continue taking online learning(DL) courses if they do not believe the courses are of excellent quality. Similarly, if they believe they have not been successful, as measured by their grades and their perceptions of whether or not they "learned something," they are unlikely to return to the online environment. The research questions asked in this study were

(1) Why did students choose distance (DL) rather than traditional learning (TL) formats?

(2) Were the educational outcomes (as measured by grades and perceived "amount" of learning) different between DL and TL?
(3) What were the student perceptions of overall course quality in DL versus TL?

For the first question, the majority of students choose DL. This is because the students couldn't take classes in the traditional format due to other commitments. These extra commitments ranged from extended work hours, shift work, employment travel schedules, and family issues such as obtaining childcare. For the second question, when students were asked to evaluate the learning outcomes between online and traditional format, 59% of them reported that their grades were higher in online learning than in traditional learning. Almost 70% stated that they prefer online learning to traditional learning. And for the third question, there were statistically significant results indicating that students perceive that online learning courses are of higher quality than traditional learning courses.

The results in the study above are entirely different from our study. A few factors might have a significant influence on the results of the study, which might be because of many part-time and undergraduate students who are studying criminal justice (72%). But at the same time, there was no reason why the students of criminal justice would look at the formats and learn differently than students studying other courses.

Another research paper that was interested was studied by Hava Suson and Avichai Kellerman was discussed about Student-Teacher Interaction in Distance Learning [12]. This study aimed to understand the student-teacher interaction during COVID and compare them with the previous study conducted by Kong(2009) and Kang and Im (2013). Student-teacher interaction in distance learning is challenging and can impact students' satisfaction, motivation, and ability to contend with learning assignments. The researchers conducted a qualitative opinion-based survey of 591 undergraduate students. Furthermore, the open-ended and closed-ended questions were based on the interaction between student-teacher.

Their findings describe how students feel there was no interaction or very little interaction with teachers. Students feel that to have good interaction, there needs to be some kind of communication. Students cannot express them self in the email about anything they like in the class or have any difficulty with. The survey had many responses that the researchers got about how students failed or were unable to interact with the teachers and the obstacles that they faced while interacting with teachers. The researchers have studied five different types of interaction between students and teachers.

(1) **Instructional communication:** this communication is most common and focuses on students' questions and doubts that students ask the teacher.
(2) **Guidance and Facilitating Learning:** This type of interaction did not relate directly to the learning material but instead to the teacher's consideration of the students and their individual needs.
(3) **Social intimacy:** This type of interaction between the teacher and the student was mentioned least in the students' reports. Teachers who noticed a change in their appearance or called them by name offered a sense of social intimacy.
(4) **Instructional Support:** Instructional support includes feedback on assignments, corrections, explanations, and summaries, and about teachers who encouraged students who needed help to contact them.
(5) **Instructor's presence:** Another type of interaction reported by the students was the instructor's presence in distance learning.

This research has pinpointed different types of interactions between teachers and students during online learning from the student's perspective. Furthermore, the researchers propose how to make that interaction better and what are the ways for teachers to improve interaction.

3 METHODOLOGY

The present study is conducted as an online survey using the Google Survey platform. Our team members have developed the questionnaire based on the survey's research questions we needed to answer. We adopted some of the questionnaires based on the questions from the paper. We modified the questionnaire accordingly to graduate students and their relationship with instructors before, during Covid-19, and compared online and Traditional learning. This survey was sent out to our class members in the course Computing and Online Relationships HCC 8510 and our friends and others in the social circle of our team members. The approach we used is a conventional sampling approach. This survey addressed questions about the mode of communication, challenges faced, and participants' opinions about both traditional and online learning. Responses were gathered from 20-Apr-2022 to 25-Apr-2022. Our questions addressed mainly student-teacher relationships and the impact of interaction on their academic performance. We have used the Likert Scale for answering questions in the survey. A Likert item is simply a statement that the respondent is asked to evaluate by providing a number value to any subjective or objective dimension, with the most commonly used being the level of agreement/disagreement. Well-designed Likert scale items have "symmetry" and "balance." They are symmetric if they have an equal number of positive and negative spots with bilaterally symmetric distances between them around the "neutral"/zero value. Balance indicates that the distance between each candidate value is the same, which allows quantitative comparisons such as average to be valid across items with more than two candidate values.The options vary from "Strongly Agree," "Agree," "Neutral," "Disagree," and "Strongly Disagree."

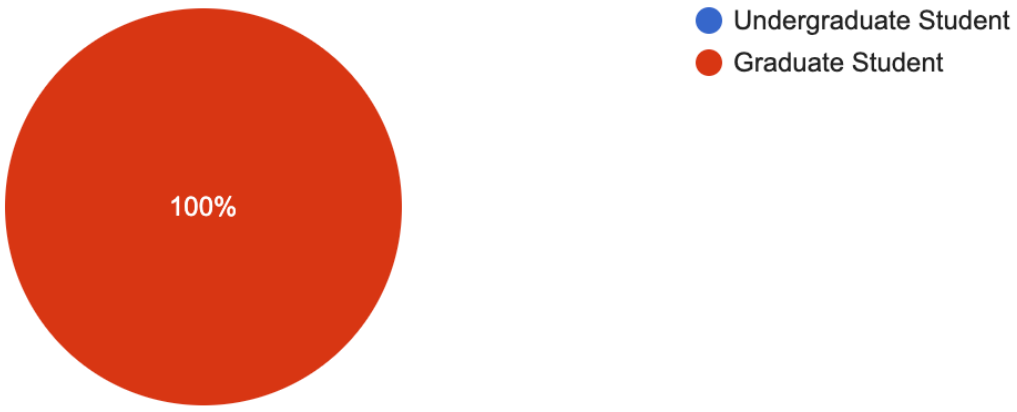

Fig. 1. Participants Education level

3.1 Demographics

Classmates were recruited as participants through email notifications sent out by professor Freeman in Canvas. Other participants in our social circle were recruited through email and messaging applications such as WhatsApp and Teams. Participants are restricted to grad school. All participants are from different graduate schools of Clemson University. This recruitment strategy from a conventional sampling resulted in 30 respondents from various grad schools such as Computer Science, Human-Centered Computing, Industrial Engineering, Mechanical Engineering, Civil Engineering, and MBA. We have received 30 replies from potential candidates as participants with completed survey results from 30 respondents. The final response rate of the survey is 100%. Coming to the age group of the participants, We have used PEW research for categorizing age groups. The following are age groups in the survey. Under 18 years, 18-25, 25- 30, 30-35, 35 and more. 80% of the respondents belong to the age group 18-25. 100% of the respondents are from graduate school. Computer science graduate students contributed to 50 of the respondents.20% of the respondents belong to the Human-Centered Computing department. 1% of the respondents belong to Civil, Mechanical, Business Administration, and Industrial Engineering. All the participants have experienced online classes during COVID-19 and attended traditional classes before COVID-19. Since we have used a conventional sampling approach to get the responses, we feel that survey results may not be 100% accurate. However, at the same time, we feel it is highly diverse data as it includes graduate students of various departments.

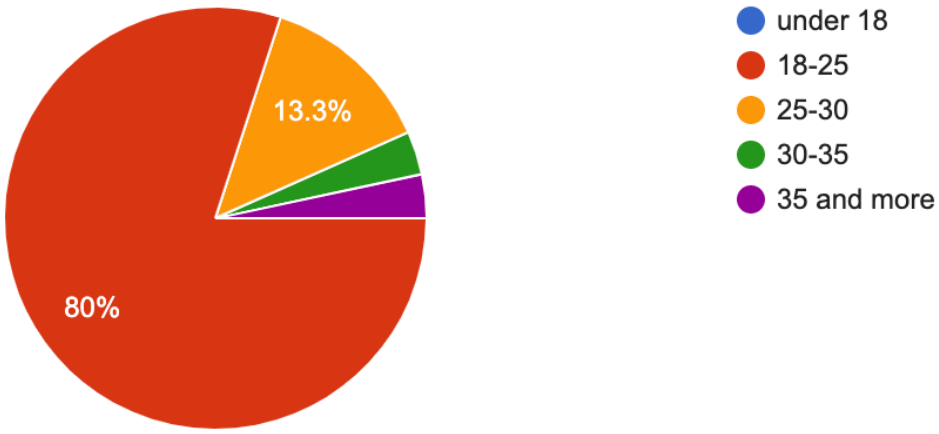

Fig. 2. Age group of participants

The above figure shows the age-group of the participants.

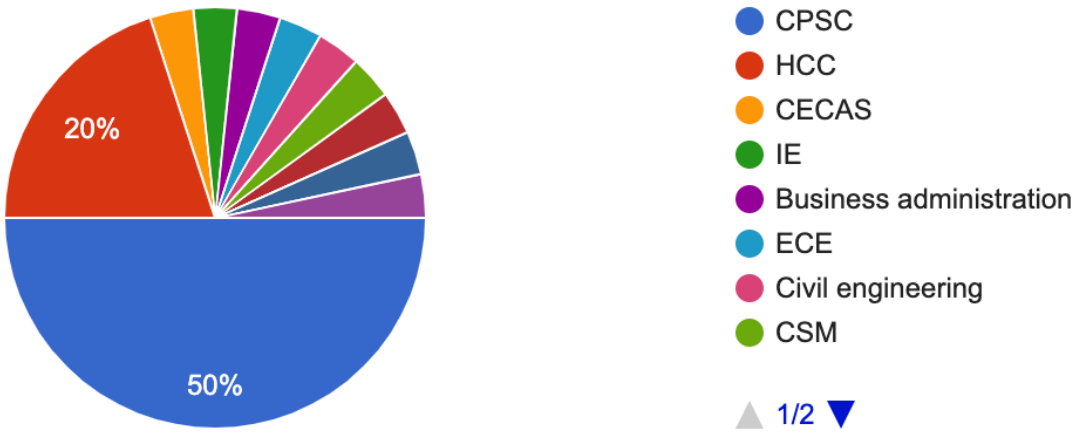

Fig. 3. Departments

The above figure shows the department of the participants

4 RESULTS

4.1 Quantitative Analysis

This section describes the result of the survey. The survey had three parts:

(1) **Before COVID-19: Face-To-Face or Traditional Class Style -**
This section collected data about student-teacher interaction and how their academic performance changes when interacting with teachers, like asking for help in Traditional/Face-To-Face Class Style.
(2) **During COVID-19: Online Class Style -**
This section collected data about student-teacher interaction and how their academic performance changes when interacting with teachers, like asking for help in Online Class Style.
(3) **Comparison or Student's point of view about Traditional/Face-To-Face vs. Online Class Style:**
This section collects data about what students think about Traditional and Online Class styles. What do students prefer and their opinions?

4.2 Before COVID-19: Face-To-Face or Traditional Class Style

In traditional classes style, students interact with teachers more often, and all the student's relationships with teachers are either excellent, good, or average. Here the relationship with the teacher means asking teachers for help or discussing interesting lecture topics with teachers. The survey found that 46.7% of the students had excellent relationships, 50% had good relationships, and 3.3% had average relationships. Moreover, out of those students, 43% felt it convenient to reach out for the teacher's help see **figure 4**.

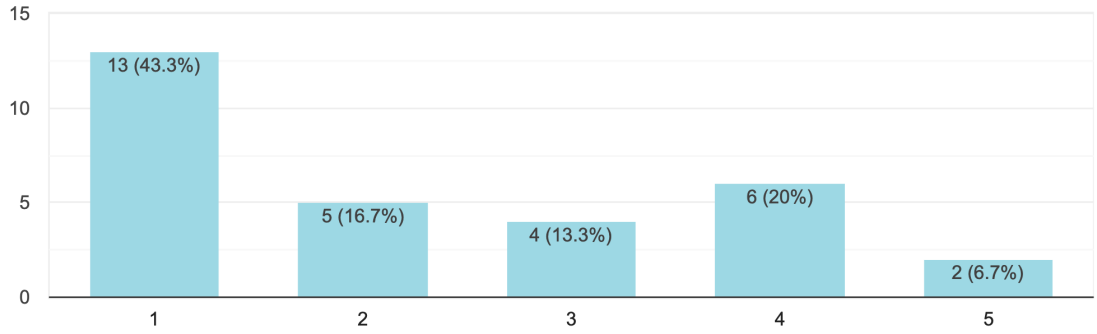

Fig. 4. % of students feel convenient to seek teachers help

Communication:

When discussing a student's academic performance, communication with the teacher is one of the significant parts of a student's good performance. The survey had many questions about communication and collaboration with teachers. The survey shows that 50% of students use email, 13.3% choose Office Hours, and 30% choose it during lectures to communicate with teachers.

We focused on how students communicate with or seek help from teachers in class. The survey shows that 26.7% of students ask questions right away, 26.7% of them ask questions after the teacher finishes the topic, 33.3% ask questions after the class, and 13.3% ask their fellow students or friends see **figure 5**. No students have chosen "Figure out on your own" as an option. When seeking help or general communication with teachers, 96.7% of the students feel comfortable. As a result, 90% of the students feel that teachers are beneficial for clearing doubts and agreed that interacting with teachers impacts their academic performance. Furthermore, of that 90% of the students, 83.3% strongly agreed that interacting with teachers impacts their academic performance positively. Consequently, students are satisfied with the way of interacting with teachers in the Traditional class style.

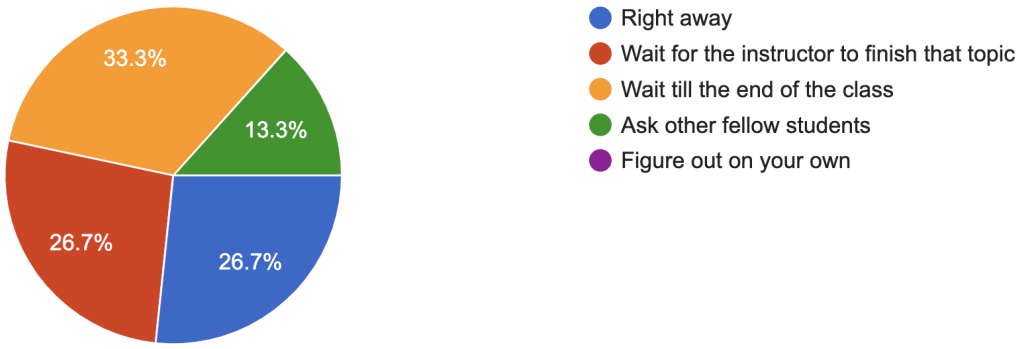

Fig. 5. Way of seeking for help in Traditional Class Style

4.3 During COVID-19: Online Class Style

Since COVID-19, all the classes have become online, and since then, it has disrupted the interaction between students and teachers. From this part of the survey, we collected data to understand how students' communication has changed with their teachers and how it has affected their academic performance.

Communication:

Communication with teachers has become hard since the pandemic online classes. 33.3% of the students feel that their communication has been broken with their teachers since online classes started see **figure** 7. From the survey, 16.7% of the students ask questions right away, 10% of them wait for the instructor to finish the topic, 16.7% of them ask questions after the class, and 36.7% of them ask in chat. The surprising data was that 20% of the students chose to figure out on their own if they had any difficulty see **figure** 6. Furthermore, 36.7% of the students feel uncomfortable talking in online classes, and they feel that it affects their relationship with their teachers because 23.3% of them feel that their relationship decreases to an average level, and 10% of them feel they have a poor relationship see **figure** 7.

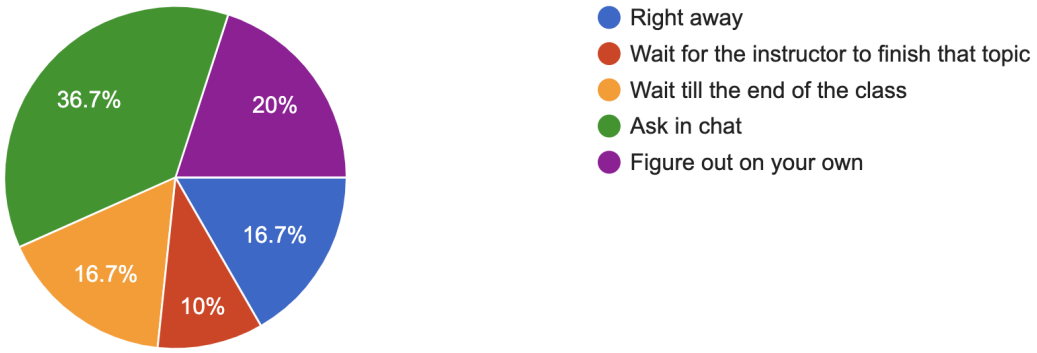

Fig. 6. Way of seeking for help in Online Class Style

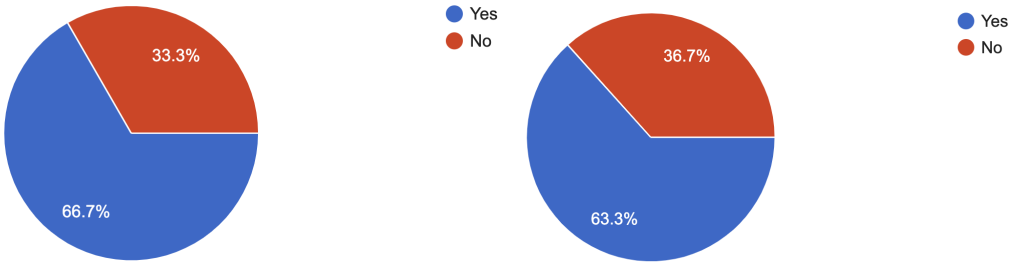

Fig. 7. Broken Communication with teacher and Feeling uncomfortable while interacting with teacher

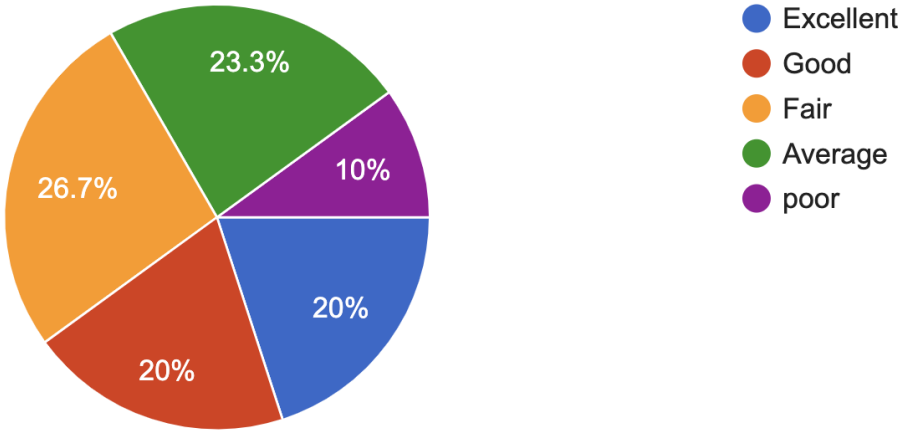

Fig. 8. Relationship status with teacher

As a result, 60% of the students responded that their academic performance has changed during online classes. 26.7% of the students disagreed that interacting with teachers in online classes positively impacts their academic performance. Moreover, Half of the students feel that it is very difficult to reach out to the instructor for help.

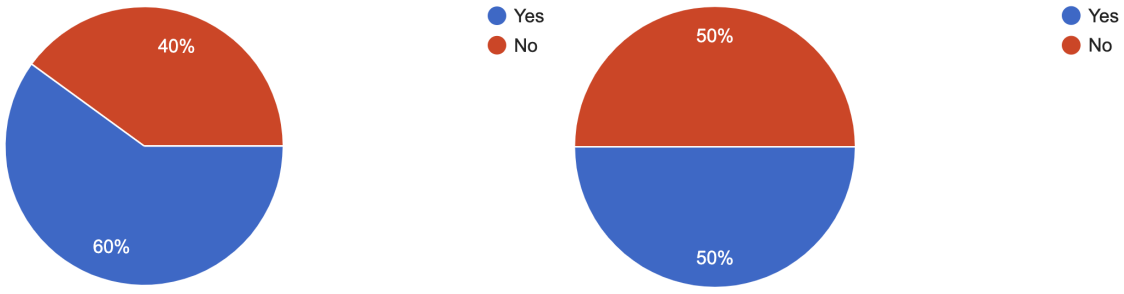

Fig. 9. Change in academic performance and Difficulty of reaching teacher

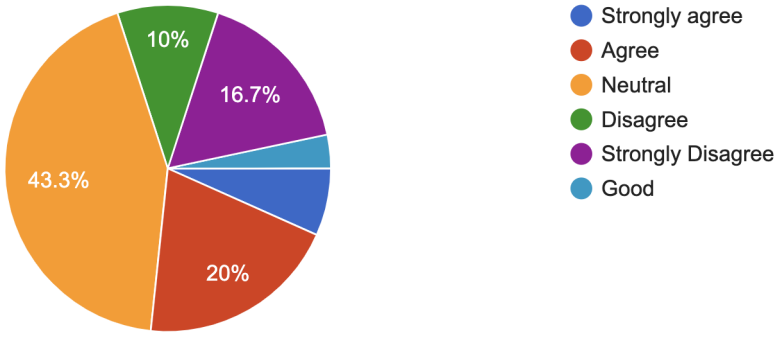

Fig. 10. positive impact on Academic Performance

4.4 Comparison or Student's point of view about Traditional/Face-To-Face vs. Online Class Style:

The Covid-19 pandemic brought about a major change in the global education system. Due to the imposition of lockdown, physical classrooms were closed, and online education became the new norm. Despite the fact that online learning has kept education alive in these difficult times, it cannot completely replace it. Both online and traditional learning have their own set of benefits and drawbacks.

Online Class Style:

The way education is delivered has permanently changed as a result of technological advancements. In fact, online education has evolved into a flexible teaching technique in which students may easily access learning material from the comfort of home. Moreover, online education gives a great opportunity for students who are unable to enroll in regular classes, as well as allowing them to study at their own pace.

Traditional Class Style:

Offline education is the traditional counterpart of online education and the original mode of learning that allows students to engage with their classmates and teachers in a face-to-face environment on a daily basis. Even if online education is anticipated to be the future of education, it will never be able to replace the holistic nature of traditional education. Technical concerns have little impact on offline education, and it gives a wonderful chance for students to develop and stick to a routine.

There were some challenges when the shift happened from Traditional to Online Classes. The relationship between student and the instructor took some of the blow with the shift. From the survey 30% of the students Strongly agreed and 43.3% of students agree that their relationship with their instructor/teacher was better during Traditional Class style see **figure 11**

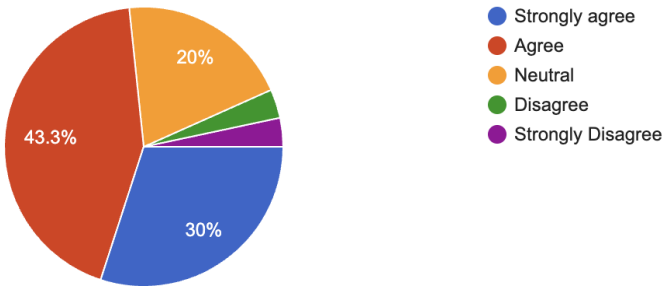

Fig. 11. Better relationship during Traditional Class Style

When asked to choose between Online and Traditional Class style 50% of students chose both, and 33.3% chose Traditional Style and 16.7% chose Online. From this we can see that comparatively many students are inclined towards Traditional Class Style over Online Class Style. But 53.3% of the respondents mentioned that they prefer Traditional Class Style over Online Class Style. 76.7% of students agreed that they were more involved in the Traditional Class style and only 10% of students during Online Class Style. We can say that majority of students were more interested and involved during Traditional Class style when compared to Online Class Style.

5 DISCUSSION

RQ 1: What academic difficulties do online classes impose on students as a result of the lack of interaction between teachers, and how has this impacted their academic performance?

Mode of communication:

Previously, most interactions were done through face-to-face. Students used to wait till the end of the lecture to ask their questions. According to the responses, 30% of respondents used to wait until the end of the lecture to interact with the lecturer. The email was used by 50% of the respondents to communicate with their instructors. To communicate with their instructors, 13% of the respondents used to go to physical office hours. So, prior to Covid, 43% of all interactions occurred in face-to-face communication.

Respondents faced several issues in communicating with instructors once classes shifted to online due to COVID-19. During online classes, 30% of respondents stated there was no communication between them and their instructors. Only 20% of respondents said they had excellent interactions with their instructors. Students began contacting teachers via chat via online communication platforms such as Zoom and Microsoft Teams, a new feature of online platforms. The disadvantage of this option is that the instructor may miss the chat notification and continue the lesson. Respondents felt cut off from the teacher as a result of this. As many as 40% of respondents said they were uncomfortable communicating directly with instructors in online classes. This implies that a communication gap is developed between students and instructors. New technologies must be designed to make online classes more comfortable and interactive for students.

Clarifying Doubts:

Since the introduction of online classes, addressing student doubts has become more challenging. 36.7% of students are hesitant to ask questions in an online class. They are uncomfortable because it is often difficult for them to clarify their questions to the teacher. One of the responders put it this way: *"It's easy and straightforward to clarify the doubts instead*

of communication through zoom. Sometimes it's difficult to point out and ask specific questions from ppt or whiteboard if it's online." and another student quoted - *"I would prefer traditional learning, as the instructor will be physically present and the relationship with the instructor is better so it would be comfortable to talk to instructor in a traditional class."*

Students often have difficulties when it comes to asking questions in online classes. Because it is difficult for the students to clearly ask their questions in chat or to explain the question to teachers in online classes, 20% of students choose to figure out their doubts on their own, and 36.7% of the students who ask their doubts in chat may not receive a response because they did not clearly explain their question. According to one of the students, - *"I always believe face to face learning improves understanding. For example, I took a statistics course. It's was easy to respond back and learn things and ask doubts right away. Since statistics is full of math it's better to have an interactive class rather than online."*

Academic performance:

When asked whether online classes have a positive impact on your academic performance, one student quoted - *" No. I have ADHD and it is so much easier to get distracted and completely ignore >90% of lectures when online. If I were in-person I would almost be "forced" to pay attention so it means I am actually learning the material."* It's really difficult for students with some kind of health condition to focus during online classes.

Another student mentioned - *"I feel traditional classes are better because I feel a certain connection between teacher and students. Professor can better understand whether the students understood the concept or not"*

RQ 2: In comparison to traditional vs. online education, which do students prefer and why?

Mode	Preferred	Recommends	Responses	Comfortable
Online	16.7%	6.7%	30%	6.7%
Traditional	33.3%	33.3%	53.3%	70%
Both	50%	60%	16.6%	23.3%

Table 1. Comparison Between Traditional and Online Class Style

Despite the fact that 50% of respondents preferred both types of Classes and 60% of them recommended both, as seen in the table above. But when asked a question - *"If you could choose between online and traditional learning, which one would you prefer to talk to your instructor comfortably? Why?"* Traditional Class Style was preferred by 53.3%, while 16.6% preferred both. And while 70% of respondents said they were more comfortable in traditional classes, just 6.7 percent said they felt comfortable in online classes, while 23.3% said they felt comfortable in both formats.

What are the new technologies and designs that online classes need to adapt to make them more interactive ?

If there is a checkpoint break for every 20minutes, This checkpoint break may be used for a small quiz or poll so that instructors can get an idea of how much students understand the lecture. Have a 5-10 minutes doubt clarification session after the class. This session will help students who feel uncomfortable talking with instructors during the lecture. Provide a point of contact for reaching out to the instructor. Online classes make communication difficult by default. Without an appropriate point of contact, it will be even more challenging to have good communication with the instructor. Online classes need to have more options to make them interactive. As the internet makes it difficult to show proper emotions while communicating, sometimes instructors may interpret the students' comments differently. A quick and formal response may read as cold or irritated. It takes much patience to phrase all the online communications carefully but giving all emails a careful re-read can help avoid misunderstandings with instructors.

6 CONCLUSION

Covid 19 has significantly changed the education sector. We experienced a significant shift from traditional to online classes. The absence of communication between students and teachers has had a detrimental effect on students' academic achievement. The majority of students prefer traditional classes because they provide a conducive and favorable environment for learning, avoiding the unprecedented difficulties associated with online classes. Additionally, students indicated that they expect improved communication and interactivity from their instructor, and that learning was adversely affected during online classes. We concluded from the survey's statistical analysis that students prefer a hybrid model moving forward because it allows them to maintain control over their schedule while still taking advantage of the benefits of traditional classes.

7 LIMITATION

The limitation is that this is a conventional sampling strategy, which means that more precise results were not obtained in comparison to those that may have been obtained with a more expansive horizon of individuals.Additional participants from diverse educational sectors, aside from engineers, would be added in the future to study additional learning requirements and obstacles associated with it, as well as students in school and undergrad students. Additionally, we would like to obtain the teacher's perspective in this situation to ensure the best results.

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