

Perception of Students on Online Exams and How Sequential Exams and the Lockdown Browser Affect Student Anxiety and Performance

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Abstract: - Online education has become increasingly popular over the past few years, especially with the global pandemic forcing students to learn remotely. Although online education offers various benefits, including flexibility, accessibility, and convenience, it presents unique challenges, including the use of Lockdown Browser for sequential online exams that can increase students' anxiety levels and decrease their performance. In this paper, an empirical study was undertaken to examine the students' preferences for online exams and how the protracting exams impacting on students' anxiety and performance taking into consideration factors such as gender, class standing, and the availability of a personal study space. The finding reveals that sequential exams, errors in questions, use of lockdown browser, writing exams in different time zone, and one question per page increase students' stress and anxiety. The results also suggest that there was a significant difference in anxiety levels between students who received different letter grades, specifically, students who received lower grades reported higher levels of anxiety. However, the gender and delivery of the course did not appear to have a significant impact on anxiety levels.

Key-Words: - Online education, students' stress, and anxiety, online exams challenges, Lockdown Browser, students' performance, gender, class standing, having own room, Chi-square test

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1 Introduction

Online education and online exams have gained significant importance in recent years due to advancements in technology and the global shift towards digitalization, especially with the global pandemic in 2020 forcing students to learn remotely. Online education refers to the delivery of education through digital platforms, allowing learners to access educational resources from anywhere and at any time. Online exams, on the other hand, refer to the administration of exams through digital means, eliminating the need for physical attendance in exam centers. The shift to online education and online exams has led to concerns about student stress and anxiety related to this new mode of learning.

Online education was an alternative to traditional education before the pandemic, however, the start of the pandemic in 2020 led to migrate in-person classes to online classes, [1], so online education was the only option for the education system. This sudden transition brought unique challenges for both students and instructors. Instructors used different delivery methods to teach

the course. Some of them posted pre-recorded lectures to learning management systems like D2L, Brightspace, Moodle, and some of them posted slides and hold online live lectures using Zoom or Google Meet, or other online technologies. The most important challenge that occurred for the online assessments, was how to maintenance of academic integrity, [2]. It was emphasized that "to ensure academic integrity in online exams, universities have adopted a variety of measures, including assessment models and question types that make academic dishonesty less rewarding, the use of normative appeals and honor codes, machine learning approaches to detect dishonest behaviour after it has occurred, and direct online surveillance: 'proctoring'", [3]. It was also stated that in a virtual educational setting, there exists a wide range of methods to engage in dishonest behaviour, such as manipulating data, plagiarizing content, or having someone else take exams on behalf of the student, [4], [5]. Additionally, individuals may resort to hiring a person or a company to act as the student throughout the educational period, as well as copying assignments from both public and private

websites, [4], [6], [7]. Another form of cheating involves sharing questions and answers through unauthorized social media channels, such as WhatsApp, Facebook, and so on, [8]. These tendencies emphasize the importance of upholding academic integrity by implementing proctored online assessments, [4], [8].

Proctoring typically involves scanning the room, verifying student ID cards, constant webcam monitoring, and the requirement of a private room, [3]. While proctoring, like Lockdown browsers, is designed to prevent cheating during exams to uphold academic integrity, it can also create additional stress and anxiety for students. According to reports, it increases students' stress and anxiety levels and decreases their performance. It is believed that the discomfort caused by proctoring may potentially intensify feelings of anxiety, [3], [9], leading to a detrimental impact on students' exam outcomes.

This study aims to explore students' perceptions on online exams and the impact of proctoring exams by Lockdown browser on students' online exam stress and anxiety, as well as on their performance. For this purpose, 313 engineering and business students participated in a volunteer-based survey during the 2020 and 2021 Fall and Winter academic terms. 25-item scale was administered to 313 students for reliability analysis and the Cronbach's alpha value was 0.721. The data were analyzed by Chi-square tests use of SPSS and Excel.

This paper is organized as follows. In section 2, the literature review that this study aims to address is discussed. In section 3, the aim and methodology are described. In section 4 research findings are presented and discussed. Finally, in section 5, the conclusion and recommendations for future research will be provided.

2 Literature Review

In the last few decades, with the growth of technology, online education has become increasingly popular that provides students flexibility and accessibility for learning. After the Covid pandemic started in March 2020, online education is no longer a trend, it became mainstream, [10], due to the lockdown all around the world. The COVID-19 pandemic changed many aspects of education, it has compelled universities to re-evaluate their approaches to both assessment and teaching. Many institutions are now contemplating the implementation of remote exam delivery as a way to safeguard against potential future disruptions, thereby ensuring their preparedness for unforeseen circumstances, [11].

Instructors have made use of diverse technological tools, encompassing a wide range of options such as live chats, threaded discussions, forms, PowerPoint presentations, email, videos, software applications, spreadsheets, word processors, online portals, electronic portfolios/projects, and online exams, [12]. These tools serve as valuable resources to facilitate effective communication and enhance the learning experience for students, [12]. As the transition to remote learning took place, online examinations gained significant popularity as a preferred assessment method among instructors. However, a considerable number of instructors lacked prior experience in conducting online assessments, [1], including new online test environment, technical issues, and academic integrity and anxiety. To facilitate the process, a pool of questions is created within the online platform. These questions are then presented individually, one per page, in a sequential manner, [13]. Students are typically prohibited from revisiting previously answered questions, and to further enhance fairness, the order of questions and their corresponding answers are shuffled. Since cheating is a common phenomenon among students, it is crucial to preserve the trust, honesty, and integrity of online assessments, [14]. This needs for maintaining academic integrity through proctored online assessments, [15]. When students are allowed to take non-proctored online tests, concerns arise regarding the potential for cheating. This is because students may have access to materials that are prohibited during the test or may collaborate with others to complete the test collectively. As a consequence, the resulting grades may not accurately reflect the actual performance of individual students, [16], [17].

Lockdown Browser is one of the proctoring techniques. Proctoring with Lockdown Browser involves several measures such as conducting a room scan, scanning the student's ID card, ensuring continuous monitoring through a webcam, and requiring the availability of a private room. It has been observed that this practice reinforces the well-established inverse connection between students' test anxiety and their performance in exams. This is likely because proctoring introduces a sense of unease and discomfort that can potentially trigger anxiety, [4], [9]. Today, almost all students experience anxiety and fear before or during exams, [18]. Exam anxiety refers to a blend of physical symptoms and emotional responses that hinder one's capacity to perform effectively during examinations, [11]. Several factors contribute to the onset of exam anxiety, encompassing various elements such as the

length of the examination, the number of questions, the specific testing methodology employed, the instructions provided for the test, the testing environment, and proctoring, [18], [19]. In literature, many scholars studied the effects of proctored exam anxiety, [1], [3], [4], [18], [20], [21], [23], [24], and the relation between exams anxiety and academic performance, [2], [9], [15], [16], [25], [26], [27], [28]. The other scholars studied how to reduce test anxiety, [11], [13], [28], [30], [31]. Multiple studies have already presented qualitative evidence indicating heightened levels of anxiety in exams that involve proctoring, [3], [21], [26]. The majority of studies have identified an inverse correlation between exam anxiety and academic achievement, [15], [16], [27]. Specifically, individuals with high levels of trait test anxiety tend to attain lower scores in exams, particularly when taking assessments in an online proctored environment.

3 Aim and Methodology

The rapid advancements in technology and the widespread availability of the Internet have revolutionized various aspects of life, including the education system. These technological developments have paved the way for new educational approaches, blending with traditional methods. Examples of such integration include distance education, web-based (virtual or remote or online) education, and hybrid education. These emerging styles of education have brought about significant changes and opportunities in the field of learning. After the Covid pandemic and lockdown started, most of the education institutions followed online education. The sudden transition brought many challenges to instructors and students, especially online assessments. To maintain academic integrity and to reduce cheating on online assessments, the use of proctoring has increased students' stress and anxiety in addition to their mental issues due to the pandemic. Students' academic performance is the most crucial factor not only impacting their learning of the materials but also their future careers. The objective of this research is to investigate the benefits and obstacles associated with online education while examining the impact of online learning on students' levels of anxiety. Additionally, it will analyse the influence of anxiety on students' academic performance and overall success. Furthermore, the study will explore potential approaches that educational institutions and instructors can adopt to mitigate students' anxiety specifically pertaining to online exams. By

undertaking this investigation, the research aims to gain insights into the complex relationship between online education, anxiety levels, and effective strategies for alleviating student apprehensions in the online learning environment.

This research endeavors to investigate and provide insights into the responses to the following inquiries:

- Perceptions of students on online education
- What are the challenges of online exams?
- How do online exams affect students' stress and anxiety?
- How does Lockdown Browser affect students' anxiety?
- Is there any positive or negative relationship between students' anxiety and performance?
- Is there any gender, class standing, and having own room differences on students' anxiety and performance?

This research constitutes a component of prior studies, [32], [33] that have investigated the perceptions of students on online education during the Covid pandemic. In this study, data were gathered through two distinct methods. The first method involved an online survey that collected demographic information from students, along with their perceptions of online learning, online exams, and online exam challenges. The survey utilized a 5-Likert scale, ranging from strongly disagree to strongly agree. The second method involved utilizing the Learning Management System (LMS) to collect data on students' performance. A dataset comprising information from 2,456 students was obtained from the LMS, aiming to explore potential correlations between performance and variable class standing. Additionally, a second dataset was collected from 313 students who participated in the online survey. This dataset specifically examined students' perceptions of their performance in relation to factors such as gender, class standing, and whether they had their own room. It is important to note that student participation in the survey was voluntary, and their grades and class standings were collected anonymously with their consent, [32], [33].

The data collection process took place during the Fall and Winter semesters of 2020 and 2021, respectively, in mathematics and statistics courses at two universities in Ontario, Canada. All the lectures were presented in an online format. The lectures were recorded and made available on the D2L platform, which is the Learning Management

System (LCM) utilized by two schools. In addition to the recorded lectures, lecture slides were also uploaded to D2L. The assessment for the course consisted of two online tests, 10 assignments based on a weekly schedule on the Mylab platform, a group project, and an online final exam. Before each exam, a practice test was posted on D2L to encourage students and prepare them for the upcoming assessment. To ensure a fair assessment and minimize cheating, the two tests and the final exam were supervised using the "Respondus Lockdown Browser and Monitor" system. It was communicated in advance that students were required to take the test on a reliable computer equipped with a webcam and microphone in a quiet environment. Any noise or presence of another individual in the room would trigger a flag in the system, [32], [33]. Out of the total of 2,456 students, 313 students participated in the survey, comprising 167 (53.4%) male and 146 (46.6%) female students. Among the participants, 167 (53.4%) were first-year students, 93 (29.7%) were second-year students, 36 (11.5%) were third-year students, and 17 (5.4%) were fourth-year students, [32], [33]. Moreover, 259 (82.7%) of the participants had their own room, while 54 (17.3%) did not.

In terms of grades, 95 (30.4%) of the students passed the course with a grade of A, 67 (21.4%) with a grade of B, 78 (24.9%) with a grade of C, 51 (16.3%) with grade D, and 22 (7%) failed the course with a grade F. Among the total 2,456 students, 1,242 (61.0%) were first-year students, 545 (26.8%) were second-year students, 147 (7.2%) were third-year students, and 102 (5.0%) were fourth-year students. Similarly, out of the 2,456 students, 520 (21.2%) passed with grade A, 635 (25.9%) with grade B, 655 (26.7%) with grade C, 379 (15.4%) with grade D, and 267 (10.8%) failed the course, [2], [37]. To simplify the grading system, the categories A+, A, and A- were represented as A (80-100), B+, B, and B- as B (70-79), C+, C, and C- as C (60-69), D+, D, and D- as D (50-59), and failing grades as F (0-49), [32], [33]. The evaluation of the course included two midterm tests, a final exam, 10 weekly assignments, and an online project. The collected data were analyzed using SPSS and Excel software. The study's goals were accomplished using descriptive statistics, a Likert scale with five response options, as well as Pearson's chi-square test.

4 Finding and Discussion

This section presents the findings derived from the analysed data, organized into four subsections:

online learning, online exams, anxiety, and the use of a Lock-down Browser. Within each subsection, the items will be discussed based on various factors, including gender differences, class standings, ownership of a personal room, and grades. The aim is to explore and highlight the observations and patterns that emerged from the data analysis, considering these different aspects and their potential influences on the respective topics.

The survey employed a 5-Likert scale that included response options from strongly disagree (SD) to strongly agree (SA). However, for the sake of simplicity, the negative responses (strongly disagree and disagree) were combined to represent negative perceptions, while the positive responses (strongly agree and agree) were combined to represent positive perceptions. This grouping allows for easier interpretation and analysis of the data by categorizing the responses into broader positive and negative categories.

4.1 Online Education

To investigate students' perceptions of online learning, four specific items were included in the study: An6, Anx7, Anx20, and Anx22. Anx6, which explores the statement "It is very difficult to contact group members for online group projects," aims to assess the challenges students face when communicating with their peers in online collaborative projects. Anx7, on the other hand, asks students to indicate their preference for working on online projects individually, providing insight into their personal work style and inclination towards independent work. Anx20 focuses on the statement "Statistics and mathematics are very hard to learn in an online class," aiming to uncover students' attitudes and tendencies regarding online courses in these specific subjects. This item seeks to understand whether students perceive statistics and mathematics as more challenging when taught online compared to traditional classroom settings. Lastly, Anx22 delves into the statement "I spend more time learning the materials in an online course," aiming to gather information on the amount of additional time students invest in self-directed learning for online courses. This item seeks to explore the time commitment and effort students allocate to effectively grasp the course materials in an online learning environment.

Table 1 depicts data on gender differences and responses to statements related to online group projects, preference for individual work, the difficulty of learning statistics and mathematics online, and the time spent on learning materials in an online course. At a 5% significance level, there is

a statistically significant association between gender and the perceived difficulty of learning statistics and mathematics in an online class. The responses show that more males (23.4%) than females (22.6%) selected SD+D, suggesting that males perceive these subjects as harder to learn online. On the other hand, more females (32.2%) than males (19.2%) responded with N (neutral). This indicates that females might have a less definite opinion or may feel less strongly about the difficulty of learning these subjects online compared to males. However, there is no significant association between gender and the difficulty of contacting group members for online group projects or the preference for individual work in online projects. This suggests that males may perceive more difficulties in contacting group members compared to females. There is also no significant association between gender and the amount of time spent on learning materials in an online course. In terms of spending more time learning materials in an online course, a higher percentage of males (53.3%) than females (45.2%) responded with SA+A, indicating that males tend to invest more time in studying the course materials in an online setting. This finding contributes to the existing literature by demonstrating two significant points. Firstly, it confirms that female students tend to spend more time online compared to their male counterparts. Secondly, it highlights that students, both male and female, who spend less than an average of 15 hours online are less likely to achieve success, [35].

Table 1. Perceptions of students on online learning versus gender

GENDER				
		Male-167(%)	Female-146(%)	Chi-square*
Anx6	SD+D	61 (36.5)	46 (31.5)	0.646
	N	31 (18.6)	29 (19.9)	
	SA+A	75 (44.9)	71 (48.6)	
Anx7	SD+D	39 (23.4)	30 (20.5)	0.640
	N	28 (16.8)	30 (20.5)	
	SA+A	100 (59.9)	86 (58.9)	
Anx20	SD+D	39 (23.4)	33 (22.6)	0.023
	N	32 (19.2)	47 (32.2)	
	SA+A	96 (57.5)	66 (45.2)	
Anx22	SD+D	33 (19.8)	20 (13.7)	0.356
	N	45 (26.9)	41 (28.1)	
	SA+A	89 (53.3)	85 (58.2)	

* Asymptotic Significance (2-sided); SD: Strongly Disagree, D: Disagree, N: Neutral, A: Agree, SA: Strongly Agree

When comparing the items with having own room, it is found that at a 5% significance level, there is no statistically significant association between owning a separate room and the difficulty of contacting group members for online group projects, the preference for individual work in online projects, the difficulty of learning statistics and mathematics in an online class, or the amount of time spent on learning materials in an online course (Table 2). However, a higher percentage of individuals with their own room (59.4%) compared to those without their own room (51.9%) responded with SA+A, suggesting that individuals with their room might allocate more time to learning materials in an online course. Regarding the perception of difficulty in learning statistics and mathematics in an online class, 27.8% of individuals without their own room and 22.0% of those with their own room responded with SD+D. This suggests that individuals without their own room may find these subjects slightly more challenging to learn online. Based on the study's results, it was discovered that having a personal room had a beneficial effect on academic performance, [33]. The failure rate among students without their own room was approximately three times higher compared to students who had their own room, [33]. This contributes to the findings in this work.

Table 2. Perception of students on online learning versus having their own room

		Own Room		Chi-square*
		No-54(%)	Yes-259(%)	
Anx6	SD+D	21 (38.9)	86 (33.2)	0.414
	N	7 (13.0)	53 (20.5)	
	SA+A	26 (48.1)	120 (46.3)	
Anx7	SD+D	14 (25.9)	55 (21.2)	0.736
	N	9 (16.7)	49 (18.9)	
	SA+A	31 (57.4)	155 (59.8)	
Anx20	SD+D	15 (27.8)	57 (22.0)	0.332
	N	16 (29.6)	63 (24.3)	
	SA+A	23 (42.6)	139 (53.7)	
Anx22	SD+D	9 (16.7)	44 (17.0)	0.760
	N	17 (31.5)	69 (26.6)	
	SA+A	28 (51.9)	146 (59.4)	

* Asymptotic Significance (2-sided); SD: Strongly Disagree, D: Disagree, N: Neutral, A: Agree, SA: Strongly Agree

Table 3 shows the perception of students on online learning and class standing. When the class standing was examined with the items, at a 5% significance level, there is no statistically significant association between the class standing and the

difficulty of contacting group members for online group projects, preference for individual work in online projects, and the time spent on learning materials in an online course (Table 3). Based on the findings of an online survey conducted among 307 students, it was revealed that 51% of the respondents expressed that they dedicate more time to their homework in comparison to traditional classroom settings, [36]. Regarding the difficulty of learning statistics and mathematics in an online class, there is a borderline association because the asymptotic significance 2-sided is 0.091. Notably, the percentage of students responding with SD+D decreases as the class standing progresses, while the percentage of students responding with SA+A increases. This indicates that students who are in higher class standings may perceive statistics and mathematics as less challenging to learn in an online setting, in contrast to students in lower class standings. This observation can be attributed to the fact that higher-class students have taken more online courses, with a significant portion of them being course retakes. It is also found that students in higher class standings may have slightly less difficulty in contacting group members for online projects and as students advance in their class standings, they are more likely to prefer individual work for online projects.

Table 3. Perceptions of students on online learning versus class standing

		CLASS				Chi-square*
		1st year-167(%)	2nd year-93(%)	3rd year-36(%)	4th year-17(%)	
Anx6	SD+D	52 (31.1)	36 (38.7)	14 (38.9)	5 (29.4)	0.439
	N	30 (18.0)	16 (17.2)	8 (22.2)	6 (35.3)	
	SA+A	85 (50.9)	41 (44.1)	14 (38.9)	6 (35.3)	
Anx7	SD+D	40 (24.0)	17 (18.3)	9 (25.0)	3 (17.6)	0.463
	N	35 (21.0)	13 (14.0)	8 (22.2)	2 (11.8)	
	SA+A	92 (55.1)	63 (67.7)	19 (52.8)	12 (70.6)	
Anx20	SD+D	32 (19.2)	20 (21.5)	12 (33.3)	8 (47.1)	0.091
	N	40 (24.0)	28 (30.1)	8 (22.2)	3 (17.6)	
	SA+A	95 (56.9)	45 (48.4)	16 (44.4)	6 (35.3)	
Anx22	SD+D	28 (16.8)	18 (19.4)	4 (11.1)	3 (17.6)	0.770
	N	46 (27.5)	23 (24.7)	10 (27.8)	7 (41.2)	
	SA+A	93 (55.7)	52 (55.9)	22 (61.1)	7 (41.2)	

* Asymptotic Significance (2-sided); SD: Strongly Disagree, D: Disagree, N: Neutral, A: Agree, SA: Strongly Agree

Table 4 presents the results of a survey examining the influence of having one's own room on students' perceptions of online exams. When the grade distribution is based on the four online learning items at a 5% significance level, there is no statistically significant association between the grade and the difficulty of contacting group

members for online group projects, preference for individual work in online projects, and the time spent on learning materials in an online course (Table 4). Findings suggest that students with higher grades, particularly those with grade A, tend to find it slightly less challenging to contact group members for online projects. However, there is a statistically significant association between the grade and the perceived difficulty of learning statistics and mathematics in an online class. Regarding the perception of the difficulty of learning statistics and mathematics in an online class, differences were found among the grades. As grades improve, there is a noticeable decrease in the percentage of students responding with SD+D, while the percentage of students responding with SA+A shows an upward trend. This observation suggests that students with higher grades tend to perceive statistics and mathematics as less challenging to learn in an online setting when compared to students with lower grades. Several factors may contribute to this phenomenon, including test mode, exam anxiety, the course delivery method, as well as the students' backgrounds in mathematics and statistics, [37].

Table 4. Perceptions of students on online learning versus performance

		GRADE					Chi-square*
		A-95(%)	B-67(%)	C-78(%)	D-51(%)	F-22(%)	
Anx6	SD+D	28 (29.5)	25 (37.3)	29 (37.2)	15 (29.4)	10 (45.5)	0.514
	N	22 (23.2)	9 (13.4)	18 (23.1)	8 (15.7)	3 (13.6)	
	SA+A	45 (47.4)	33 (49.3)	31 (39.7)	28 (54.9)	9 (40.9)	
Anx7	SD+D	17 (17.9)	13 (19.4)	21 (26.9)	16 (31.4)	2 (9.1)	0.324
	N	18 (18.9)	12 (17.9)	17 (21.8)	8 (15.7)	3 (13.6)	
	SA+A	60 (63.2)	42 (62.7)	40 (51.3)	27 (52.9)	17 (77.3)	
Anx20	SD+D	25 (26.3)	21 (31.3)	12 (15.4)	4 (7.8)	10 (45.5)	0.001
	N	32 (33.7)	11 (16.4)	21 (26.9)	14 (27.5)	1 (4.5)	
	SA+A	38 (40.0)	35 (52.2)	45 (57.7)	33 (64.7)	11 (50.0)	
Anx22	SD+D	16 (16.8)	14 (20.9)	12 (15.4)	6 (11.8)	5 (22.7)	0.207
	N	33 (34.7)	14 (20.9)	17 (21.8)	13 (25.5)	9 (40.9)	
	SA+A	46 (48.4)	39 (58.2)	49 (62.8)	32 (62.7)	8 (36.4)	

* Asymptotic Significance (2-sided); SD: Strongly Disagree, D: Disagree, N: Neutral, A: Agree, SA: Strongly Agree

4.2 Online Exams

To investigate students' perspectives on online exams, a survey was conducted consisting of eleven items. The items included Anx5, Anx8, Anx9, Anx10, Anx12, Anx13, Anx14, Anx16, Anx17, Anx18, and Anx19. Each item focused on a specific aspect of online exams. For instance, Anx5 explored students' preferences between in-class tests and online tests. The coding definitions for these items are as follows: Anx8: "I feel unable to demonstrate my knowledge when taking an online test." Anx9: "I find online test questions to be easier compared to

in-class test questions." Anx10: "I prefer taking tests on the Mylab platform rather than on D2L." Anx12: "I prefer multiple-choice questions in online tests." Anx13: "I dislike multiple-choice questions with multiple parts in online tests because I cannot earn partial credit or marks." Anx14: "I appreciate written answer questions in online tests because I have the opportunity to earn partial credit or marks." Anx16: "Online tests present more challenges compared to in-class tests." Anx17: "Online tests should allow for more time to be given." Anx18: "Due to the lack of a private room, it is difficult for me to concentrate when taking online tests." Anx19: "Cheating is effortless in online tests as I can easily share questions with my social media group and obtain answers." These specific items were designed to gather insights into students' perceptions and experiences related to various aspects of online exams.

Table 5. Perceptions of students on online exams versus gender

		GENDER		Chi-square*
		Male-167(%)	Female-146(%)	
Anx5	SD+D	64 (38.3)	72 (49.3)	0.146
	N	59 (35.3)	43 (29.5)	
	SA+A	44 (26.3)	31 (21.2)	
Anx8	SD+D	68 (40.7)	58 (39.7)	0.221
	N	36 (21.6)	43 (29.5)	
	SA+A	63 (37.7)	45 (30.8)	
Anx9	SD+D	78 (46.7)	69 (47.3)	0.960
	N	56 (33.5)	50 (34.2)	
	SA+A	33 (19.8)	27 (18.5)	
Anx10	SD+D	66 (39.5)	46 (31.5)	0.295
	N	57 (34.1)	60 (41.1)	
	SA+A	44 (26.3)	40 (27.4)	
Anx12	SD+D	16 (9.6)	11 (7.5)	0.661
	N	23 (13.8)	17 (11.6)	
	SA+A	128 (76.6)	118 (80.8)	
Anx13	SD+D	44 (26.3)	40 (27.4)	0.494
	N	40 (24.0)	27 (18.5)	
	SA+A	83 (49.7)	79 (54.1)	
Anx14	SD+D	45 (26.9)	56 (38.4)	0.063
	N	45 (26.9)	39 (26.7)	
	SA+A	77 (46.1)	51 (34.9)	
Anx16	SD+D	52 (31.1)	34 (23.3)	0.239
	N	70 (41.9)	73 (50.0)	
	SA+A	45 (26.9)	39 (26.7)	
Anx17	SD+D	10 (6.0)	14 (9.6)	0.322
	N	38 (22.8)	26 (17.8)	
	SA+A	119 (71.3)	106 (72.6)	
Anx18	SD+D	67 (40.1)	57 (39.0)	0.395
	N	43 (25.7)	47 (32.2)	
	SA+A	57 (34.1)	42 (28.8)	
Anx19	SD+D	113 (67.7)	111 (76.0)	0.258
	N	38 (22.8)	24 (16.4)	
	SA+A	16 (9.6)	11 (7.5)	

* Asymptotic Significance (2-sided); SD: Strongly Disagree, D: Disagree, N: Neutral, A: Agree, SA: Strongly Agree

Table 5 presents the results of a survey examining gender differences in students' perceptions on online exams. The survey findings reveal the following insights regarding gender differences in students' perceptions of online exams (Table 5). The survey included various statements related to preferences, difficulties, and challenges associated with online tests. At a 5% significance level, the data suggests that there are no statistically significant gender differences in most of the responses. For the statement "I prefer in-class tests to online tests," there was a slightly higher proportion of females (49.3%) who preferred online tests compared to males (38.3%), but the difference was not significant ($p = 0.146$). Similarly, for other statements such as "I cannot show my knowledge when writing an online test" and "The questions are easier for online tests than for in-class tests," there were no significant gender differences observed. However, there were some notable trends. Females had a slightly higher proportion (38.4%) who liked written answer questions for online tests compared to males (26.9%), and this difference approached statistical significance ($p = 0.063$). Additionally, more females (76.0%) perceived cheating as easy in online tests compared to males (67.7%), although this difference was not statistically significant ($p = 0.258$). This contributes to the literature finding that a definitive pattern of gender differences in statistics courses has not yet been identified, and it may vary depending on the criteria used to measure course success, such as exam scores versus overall course performance, [38], [39].

When the influence of having one's own room on students' perceptions of online exams is examined at a 5% significance level, the data suggests that having one's own room does not significantly affect most of the responses. The majority of the statements, such as "I prefer in-class tests to online tests" and "The questions are easier for online tests than for in-class tests," did not exhibit statistically significant differences between participants with and without their own room. However, there were a few notable findings. Participants with having their own room had a higher proportion (10.4%) who preferred multiple-choice questions for online tests compared to those without having their own room (0%), and this difference was statistically significant ($p = 0.037$). Additionally, participants without having their own room found it significantly more difficult to concentrate when writing tests compared to those with having their own room ($p = 0.000$). Furthermore, there was a tendency for participants without having their own room to agree more

strongly (73.4%) that more time should be given for online tests compared to those with having their own room (64.8%), although this difference approached but did not reach statistical significance ($p = 0.059$).

When the students' perceptions of in-class exams versus online exams across different academic years are tested at a 5% level of significance, the data indicates several noteworthy findings. Firstly, there were significant differences observed in the statement "The questions are easier for online tests than for in-class exams" among the different academic years ($p = 0.023$). Specifically, students in the 1st year (38.9%) were more likely to agree with this statement compared to those in the 2nd year (55.9%), 3rd year (58.3%), and 4th year (52.9%). Secondly, regarding the preference for multiple-choice questions in online exams, a significant difference was found across academic years ($p = 0.029$). Students in the 1st year (83.2%) expressed a higher preference for multiple-choice questions compared to those in the 2nd year (78.5%), 3rd year (69.4%), and 4th year (52.9%). Additionally, the perception of cheating being easy in online exams showed a significant difference across academic years ($p = 0.028$). Students in the 1st year (67.7%) and 2nd year (74.2%) were more likely to agree with this statement compared to those in the 3rd year (86.1%) and 4th year (64.7%). In contrast, there were no significant differences observed in students' preferences for in-class exams over online exams or their ability to demonstrate knowledge in online tests across different academic years. Therefore, the survey results suggest that there are varying perceptions and preferences regarding online exams among students in different academic years. While students in the 1st year tended to find online test questions easier and prefer multiple-choice formats, they were also more concerned about the potential for cheating. These findings highlight the importance of considering students' academic year when designing and implementing online assessment strategies.

Table 6 presents data on students' preferences and perceptions regarding in-class tests and online tests, along with their corresponding grades. The survey results, along with students' grades, provide insights into their preferences for in-class tests versus online tests (Table 6). Analysing the results at a 5% significance level, several observations can be made. Firstly, for the statement "I prefer in-class tests to online tests," there is a significant difference in the distribution of responses across grade categories ($p = 0.033$). A higher percentage of students in the A grade category (41.1%) strongly

disagreed or disagreed with this statement compared to students in lower grade categories. Similarly, for the statement "I cannot show my knowledge when writing an online test," there is no significant difference across grade categories ($p = 0.791$). Regarding the difficulty of questions between online and in-class tests, no significant difference is observed across grade categories ($p = 0.865$).

Table 6. Perceptions of students on online exams versus their performance

		GRADE					Chi-square*
		A-95(%)	B-67(%)	C-78(%)	D-51(%)	F-22(%)	
Anx5	SD+D	39 (41.1)	29 (43.3)	31 (39.7)	23 (45.1)	14 (63.6)	0.033
	N	33 (34.7)	13 (19.4)	33 (42.3)	18 (35.3)	5 (22.7)	
	SA+A	23 (24.2)	25 (37.3)	14 (17.9)	10 (19.6)	3 (13.6)	
Anx8	SD+D	44 (46.3)	24 (35.8)	32 (41.0)	16 (31.4)	10 (45.5)	0.791
	N	22 (23.2)	18 (26.9)	20 (25.6)	13 (25.5)	6 (27.3)	
	SA+A	29 (30.5)	25 (37.3)	26 (33.3)	22 (43.1)	6 (27.3)	
Anx9	SD+D	45 (47.4)	35 (50.7)	35 (44.9)	21 (41.2)	12 (54.5)	0.865
	N	33 (34.7)	19 (28.4)	26 (33.3)	22 (43.1)	6 (27.3)	
	SA+A	17 (17.9)	14 (20.9)	17 (21.8)	8 (15.7)	4 (18.2)	
Anx10	SD+D	42 (44.2)	24 (35.8)	25 (32.1)	15 (29.4)	6 (27.3)	0.094
	N	32 (33.7)	18 (26.9)	37 (47.4)	22 (43.1)	8 (36.4)	
	SA+A	21 (22.1)	25 (37.3)	16 (20.5)	14 (27.5)	8 (36.4)	
Anx12	SD+D	10 (10.5)	7 (10.4)	7 (9.0)	1 (2.0)	2 (9.1)	0.232
	N	17 (17.9)	6 (9.0)	12 (15.4)	3 (5.9)	2 (9.1)	
	SA+A	68 (71.6)	54 (80.6)	59 (75.6)	47 (92.2)	18 (81.8)	
Anx13	SD+D	26 (27.4)	17 (25.4)	22 (28.2)	16 (31.4)	3 (13.6)	0.400
	N	24 (25.3)	13 (19.4)	20 (25.6)	7 (13.7)	3 (13.6)	
	SA+A	45 (47.4)	37 (55.2)	36 (46.2)	28 (54.9)	16 (72.7)	
Anx14	SD+D	36 (37.9)	22 (32.8)	22 (28.2)	16 (31.4)	5 (22.7)	0.283
	N	24 (25.3)	17 (25.4)	26 (33.3)	8 (15.7)	9 (40.9)	
	SA+A	35 (36.8)	28 (41.8)	30 (38.5)	27 (52.9)	8 (36.4)	
Anx16	SD+D	26 (27.4)	20 (29.9)	22 (28.2)	11 (21.6)	7 (31.8)	0.711
	N	46 (48.4)	26 (38.8)	36 (46.2)	28 (54.9)	7 (31.8)	
	SA+A	23 (24.2)	21 (31.3)	20 (25.6)	12 (23.5)	8 (36.4)	
Anx17	SD+D	8 (8.4)	5 (7.5)	8 (10.3)	3 (5.9)	0 (0.0)	0.443
	N	18 (18.9)	16 (23.9)	11 (14.1)	11 (21.6)	8 (36.4)	
	SA+A	69 (72.6)	46 (68.7)	59 (75.6)	37 (72.5)	14 (63.6)	
Anx18	SD+D	35 (36.8)	34 (50.7)	28 (35.9)	20 (39.2)	7 (31.8)	0.510
	N	33 (34.7)	16 (23.9)	22 (28.2)	13 (25.5)	6 (27.3)	
	SA+A	27 (28.4)	17 (25.4)	28 (35.9)	18 (35.3)	9 (40.9)	
Anx19	SD+D	70 (73.7)	48 (71.6)	54 (69.2)	38 (74.5)	14 (63.6)	0.656
	N	20 (21.1)	12 (17.9)	14 (17.9)	11 (21.6)	5 (22.7)	
	SA+A	5 (5.3)	7 (10.4)	10 (12.8)	2 (3.9)	3 (13.6)	

* Asymptotic Significance (2-sided); SD: Strongly Disagree, D: Disagree, N: Neutral, A: Agree, SA: Strongly Agree

Similarly, for the preference between Mylab and D2L platforms, there is no significant difference across grade categories ($p = 0.094$). However, for the statement "I prefer multiple-choice questions for online tests," there is a significant difference ($p = 0.232$), with a higher percentage of students in the A grade category (71.6%) strongly agreeing or agreeing with this statement. The analysis also reveals that there is no significant difference across

grade categories for the statement related to disliking multiple-choice questions with many parts in an online test ($p = 0.400$). Similarly, for the preference for written answer questions in online tests, no significant difference is observed ($p = 0.283$). Regarding the perceived difficulty of online tests compared to in-class tests, no significant difference is found ($p = 0.711$). However, when it comes to the need for more time for online tests, there is a significant difference across grade categories ($p = 0.443$). A higher percentage of students in the A grade category (72.6%) strongly agreed or agreed with this statement. In terms of concentration during tests, no significant difference is observed across grade categories ($p = 0.510$). Finally, for the statement about cheating in online tests, there is no significant difference across grade categories ($p = 0.656$). Overall, the analysis suggests that preferences for test formats and perceptions of difficulty vary among students of different grade categories.

4.3 Stress and Anxiety

To investigate the factors contributing to students' stress and anxiety during online exams, eight specific items were included in the survey: Anx4, An5, Anx8, Anx15, Anx21, Anx23, Anx24, and Anx25. Each item is defined as follows: Anx4: "Sequential tests increase my stress." Anx5: "I prefer in-class tests to online tests." Anx8: "I cannot show my knowledge when writing an online test." Anx15: "Writing tests in a different time zone increases my stress." Anx21: "Online education and tests increase my mental health problems." Anx23: "Having one question per page on an online test increases my stress and anxiety." Anx24: "The absence of a previous question feature in an online test increases my stress." Anx25: "Errors in the test questions increase my stress and anxiety." These specific items were included in the survey to gain insights into the factors contributing to students' stress and anxiety levels during online exams. By addressing these concerns, it was aimed to better understand the challenges students face in online testing environments and explore potential strategies to alleviate stress and improve the overall experience for students.

Table 7 presents the results of a survey conducted to examine the responses of male and female participants regarding their stress levels and attitudes toward various aspects of online exams. The findings pertaining to the responses of male and female participants to statements regarding their stress and anxiety levels during online exams are summarized below (Table 7). For the statement

"Sequential tests increase my stress," there is a statistically significant difference between males and females ($p = 0.028$), with 11.4% of males and 13.0% of females strongly disagreeing or disagreeing. The findings of a literature study revealed that participants enrolled in a traditional face-to-face classroom setting reported slightly higher levels of stress compared to those taking the same course online, [20]. In terms of the preference for in-class tests over online tests, the difference between genders is not statistically significant ($p = 0.146$). However, a higher percentage of females (49.3%) express a preference for in-class tests compared to males (38.3%). This finding adds to the existing literature suggesting that female students tend to experience higher levels of anxiety compared to their male counterparts, [20], [34].

Table 7. Students' stress and anxiety by gender on online exams

		GENDER		
		Male-167(%)	Female-146(%)	Chi-square*
Anx4	SD+D	19 (11.4)	19 (13.0)	0.028
	N	48 (28.7)	61 (41.8)	
	SA+A	100 (59.9)	66 (45.2)	
Anx5	SD+D	64 (38.3)	72 (49.3)	0.146
	N	59 (35.3)	43 (29.5)	
	SA+A	44 (26.3)	31 (21.2)	
Anx8	SD+D	68 (40.7)	58 (39.7)	0.221
	N	36 (21.6)	43 (29.5)	
	SA+A	63 (37.7)	45 (30.8)	
Anx15	SD+D	35 (21.0)	34 (23.3)	0.884
	N	65 (38.9)	55 (37.7)	
	SA+A	67 (40.1)	57 (39.0)	
Anx21	SD+D	56 (33.5)	41 (28.1)	0.164
	N	31 (18.6)	40 (27.4)	
	SA+A	80 (47.9)	65 (44.5)	
Anx23	SD+D	43 (25.7)	28 (19.2)	0.306
	N	33 (19.8)	36 (24.7)	
	SA+A	91 (54.5)	82 (56.2)	
Anx24	SD+D	12 (7.2)	8 (5.5)	0.638
	N	11 (6.6)	7 (4.8)	
	SA+A	144 (86.2)	131 (89.7)	
Anx25	SD+D	10 (6.0)	6 (4.1)	0.195
	N	13 (7.8)	20 (13.7)	
	SA+A	144 (86.2)	120 (82.2)	

* Asymptotic Significance (2-sided); SD: Strongly Disagree, D: Disagree, N: Neutral, A: Agree, SA: Strongly Agree

Similarly, when it comes to the perception of not being able to demonstrate knowledge in online tests, there is no significant gender difference ($p = 0.221$). However, a slightly higher percentage of females (39.7%) disagree or strongly disagree with this statement compared to males (40.7%). The statement regarding stress caused by writing tests in different time zones does not show a significant gender difference ($p=0.884$), with similar proportions of males and females reporting stress. Regarding the impact of online education and tests on mental health problems, there is no significant gender difference ($p=0.164$). However, a higher percentage of males (47.9%) agree or strongly agree with this statement compared to females (44.5%). When considering the statement "One question per page on an online test increases my stress and anxiety," there is no significant gender difference in responses ($p=0.306$). Both genders reported similar levels of stress and anxiety related to this aspect of online tests. Not going back to a previous question feature in online tests does not significantly differ between males and females ($p=0.638$), with a high percentage of both genders (86.2% and 89.7% respectively) agreeing or strongly agreeing with this statement. This shows that students prefer in-person exams to online exams which contradicts the fact of findings in the literature, [20]. Lastly, for the statement on mistakes in test questions increasing stress and anxiety, there is no significant gender difference ($p=0.195$), although a slightly higher percentage of females (82.2%) express agreement or strong agreement compared to males (86.2%). The level of test anxiety experienced and its impact varies based on individual factors, as well as the interplay of personal, situational, and contextual elements. Extensive research suggests that female students often report higher levels of anxiety compared to their male counterparts, [40].

When the responses of participants based on whether they have their own room or not were examined only a few items showed statistically significant differences. Having their own room appeared to influence the levels of stress and anxiety related to writing tests in different time zones ($p=0.013$) and having one question per page on an online test ($p=0.012$).

When the results of a survey were conducted among students from different academic years to examine their responses regarding various statements, no significant differences were found among students from different academic years for any of the investigated statements. This suggests that academic year progression does not appear to have a significant impact on students' responses

regarding stress and anxiety associated with sequential tests, online tests, time zone differences, online education, test features, and mistakes in test questions.

Table 8. Grade differences in students' stress and anxiety in online exams

		GRADE					Chi-square*
		A-95(%)	B-67(%)	C-78(%)	D-51(%)	F-22(%)	
Anx4	SD+D	17 (17.9)	10 (14.9)	6 (7.7)	4 (7.8)	1 (4.5)	0.364
	N	27 (28.4)	23 (34.3)	31 (39.7)	18 (35.3)	10 (45.5)	
Anx5	SA+A	51 (53.7)	34 (50.7)	41 (52.6)	29 (56.9)	11 (50.0)	0.033
	SD+D	39 (41.1)	29 (43.3)	31 (39.7)	23 (45.1)	14 (63.6)	
Anx8	N	33 (34.7)	13 (19.4)	33 (42.3)	18 (35.3)	5 (22.7)	0.791
	SA+A	23 (24.2)	25 (37.3)	14 (17.9)	10 (19.6)	3 (13.6)	
Anx15	SD+D	44 (46.3)	24 (35.8)	32 (41.0)	16 (31.4)	10 (45.5)	0.182
	N	22 (23.2)	18 (26.9)	20 (25.6)	13 (25.5)	6 (27.3)	
Anx21	SA+A	29 (30.5)	25 (37.3)	26 (33.3)	22 (43.1)	6 (27.3)	0.020
	SD+D	16 (16.8)	18 (26.9)	21 (26.9)	10 (19.6)	4 (18.2)	
Anx23	N	40 (42.1)	19 (28.4)	36 (46.2)	18 (35.3)	7 (31.8)	0.070
	SA+A	39 (41.1)	30 (44.8)	21 (26.9)	23 (45.1)	11 (50.0)	
Anx24	SD+D	36 (37.9)	19 (28.4)	20 (25.6)	9 (17.6)	13 (59.1)	0.131
	N	24 (25.3)	14 (20.9)	19 (24.4)	12 (23.5)	2 (9.1)	
Anx25	SA+A	35 (36.8)	34 (50.7)	39 (50.0)	30 (58.8)	7 (31.8)	0.085
	SD+D	28 (29.5)	14 (20.9)	20 (25.6)	7 (13.7)	2 (9.1)	
Anx25	N	19 (20.0)	19 (28.4)	16 (20.5)	7 (13.7)	8 (36.4)	0.085
	SA+A	48 (50.5)	34 (50.7)	42 (53.8)	37 (72.5)	12 (54.5)	
Anx24	SD+D	10 (10.5)	3 (4.5)	6 (7.7)	1 (2.0)	0 (0.0)	0.131
	N	4 (4.2)	5 (7.5)	7 (9.0)	0 (0.0)	2 (9.1)	
Anx25	SA+A	81 (85.3)	59 (88.1)	65 (83.3)	50 (98.0)	20 (90.9)	0.085
	SD+D	9 (9.5)	0 (0.0)	5 (6.4)	1 (2.0)	1 (4.5)	
Anx25	N	6 (6.3)	11 (16.4)	8 (10.3)	4 (7.8)	4 (18.2)	0.085
	SA+A	80 (84.2)	56 (83.6)	65 (83.3)	46 (90.2)	17 (77.3)	

* Asymptotic Significance (2-sided); SD: Strongly Disagree, D: Disagree, N: Neutral, A: Agree, SA: Strongly Agree

Table 8 displays the results of a survey aimed at examining the responses of students from different grades (A, B, C, D, F) regarding their stress levels related to various aspects of online exams. Concerning the statement "Sequential tests increase my stress," no significant differences were found among the grade groups ($p = 0.364$). All grade groups reported similar levels of stress when faced with sequential tests during online exams. For the item "I prefer in-class tests to online tests," significant differences were observed among the grade groups ($p = 0.033$). Students in grade F expressed a significantly higher preference for in-class tests compared to students in grades A, B, and C. These findings align with prior research indicating that elevated trait anxiety can negatively impact exam performance, resulting in lower scores for students with higher levels of anxiety, [15]. This suggests that students who received lower grades in their studies tended to have a stronger preference for in-class tests over online tests. Similarly, there were no statistically significant differences in responses to "I cannot show my knowledge when writing an online test" among the grade groups ($p = 0.791$). All

grade groups reported comparable difficulties in demonstrating their knowledge during online exams. The statement "Writing tests in a different time zone increases my stress" did not reveal any significant differences among the grade groups ($p = 0.182$). Students from all grades reported similar levels of stress when writing tests in different time zones. Regarding the impact of online education and tests on mental health problems, significant differences were found among the grade groups ($p = 0.020$). Students in grade F reported a significantly higher increase in mental health problems compared to students in grades A, B, and C. This suggests that students who received a lower grade experienced more mental health issues associated with online education and tests as stated in the literature, [15]. For the item "One question per page on an online test increases my stress and anxiety," no significant differences were observed among the grade groups ($p = 0.070$). Students from all grades reported similar levels of stress and anxiety when faced with one question per page on an online test. Not going back to the previous question feature online tests did not show any statistically significant differences among the grade groups ($p = 0.131$). All grade groups expressed a high level of agreement with this statement. Similarly, the impact of mistakes in test questions on stress and anxiety did not reveal any significant differences among the grade groups ($p = 0.083$). All grade groups reported similar levels of stress related to this factor. Literature reveals a negative correlation between performance and anxiety, indicating that lower grades tend to lead to increased anxiety, and vice versa, [40], [41].

4.4 Lockdown Browser

To investigate the effects of the Lockdown browser on students' anxiety levels and academic performance, four specific items were used for measurement: Anx1, Anx2, Anx3, and Anx11. These items were coded and defined as follows: Anx1: "The use of Lockdown Browser alleviates my stress." Anx2: "I would rather participate in a Zoom session with my camera on during the test instead of using Lockdown Browser." Anx3: "I have no preference between joining a Zoom session with my camera on or using Lockdown Browser during the test." Anx11: "I am extremely concerned about experiencing freezing issues during the tests."

Figure 1 presents the responses of male and female participants regarding the statement "Lockdown Browser reduces my stress." Out of the total male participants ($n = 167$), 138 (82.6%) expressed either Strongly Disagree (SD) or Disagree (D), indicating that they do not believe Lockdown

Browser reduces their stress. On the other hand, 15 participants (9.0%) remained Neutral (N), and 14 participants (8.4%) expressed Agreement (A) or Strong Agreement (SA), suggesting that they believe Lockdown Browser helps reduce their stress. Among the female participants ($n = 146$), 123 (84.2%) expressed SD or D, indicating a similar trend to the male participants. Additionally, 16 participants (11.0%) remained Neutral, and only 7 participants (4.8%) expressed A or SA, suggesting a lower percentage compared to the male participants. These findings align with the existing literature, [3], [26], which highlights that remote monitoring during supervised exams has led to increased stress and anxiety among students. Specifically, 40% of participants reported feeling more pressure during the examination due to remote monitoring, while 60% stated that they did not experience similar pressure during traditional testing, [20]. Overall, the majority of both male and female participants expressed skepticism or disagreement regarding the effectiveness of Lockdown Browser in reducing their stress. The percentage of participants who agreed or strongly agreed with the statement was relatively low for both genders.

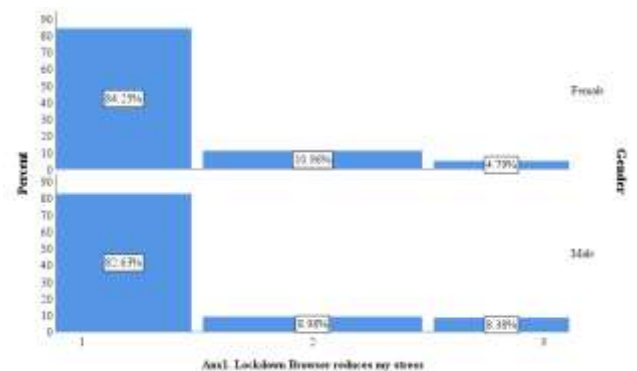


Fig. 1: Gender differences on "Lockdown Browser reduces my stress"

*1 represents SD+D, 2 represents N and 3 represents A+SA

The findings concerning the preferences of male and female participants regarding their choice to join Zoom with their camera on instead of using Lockdown Browser during tests can be summarized as follows. Among the male participants ($n = 167$), 39 (23.4%) expressed either Strongly Disagree (SD) or Disagree (D), indicating that they do not prefer joining Zoom with the camera on. On the other hand, 25 participants (15.0%) remained Neutral (N), and a majority of 103 participants (61.7%) expressed Agreement (A) or Strong Agreement (SA), suggesting that they prefer joining Zoom with the camera on instead of using Lockdown Browser

during tests. Among the female participants (n = 146), a higher percentage of 58 participants (39.7%) expressed SD or D, indicating that they do not prefer joining Zoom with the camera on. Additionally, 20 participants (13.7%) remained Neutral, and 68 participants (46.6%) expressed A or SA, suggesting that a lower percentage of female participants prefer joining Zoom with the camera on compared to the male participants. Overall, the data suggests that a significant portion of both male and female participants prefer joining Zoom with the camera on instead of using Lockdown Browser during tests. However, the percentage of female participants expressing this preference is relatively lower compared to male participants. The findings pertaining to the preferences of male and female participants regarding their choice to neither join Zoom with the camera on nor use the Lockdown Browser during tests can be summarized as follows. Among the male participants (n = 167), 24 (14.4%) expressed either Strongly Disagree (SD) or Disagree (D), indicating that they do not prefer this option. The majority of male participants, 109 (65.3%), expressed Agreement (A) or Strong Agreement (SA), suggesting that they prefer neither joining Zoom with the camera on nor using Lockdown Browser during tests. Among the female participants (n = 146), a lower percentage of 10 participants (6.8%) expressed SD or D, indicating that they do not prefer this option. Additionally, 24 participants (16.4%) remained Neutral, and the majority of female participants, 112 (76.7%), expressed A or SA, suggesting that they prefer neither joining Zoom with the camera on nor using Lockdown Browser during tests. Overall, the data indicates that a majority of both male and female participants prefer neither joining Zoom with the camera on nor using the Lockdown browser during tests. The percentage of male participants expressing this preference is higher compared to female participants.

Findings show the responses of male and female participants regarding their level of worry about experiencing freezing issues during tests. Among the male participants (n = 167), 40 (24.0%) expressed either Strongly Disagree (SD) or Disagree (D), indicating that they are not very worried about freezing issues. On the other hand, a majority of male participants, 107 (64.1%), expressed Agreement (A) or Strong Agreement (SA), suggesting that they are indeed very worried about freezing issues during tests. Among the female participants (n = 146), a lower percentage of 22 participants (15.1%) expressed SD or D, indicating that they are not very worried about freezing issues.

Additionally, the majority of female participants, 100 (68.5%), expressed A or SA, suggesting that they are very worried about freezing issues during tests. Overall, the data indicates that a significant proportion of both male and female participants are very worried about experiencing freezing issues during tests. The percentage of male participants expressing this worry is higher compared to female participants, but the majority of both genders share this concern.

Table 9. Perceptions of students on Lockdown Browser and having own room

		Own Room		Chi-square*
		No-54(%)	Yes-259(%)	
Anx1	SD+D	48 (88.9)	213 (82.2)	0.244
	N	2 (3.7)	29 (11.2)	
	SA+A	4 (7.4)	17 (6.6)	
Anx2	SD+D	17 (31.5)	80 (30.9)	0.748
	N	6 (11.1)	39 (15.1)	
	SA+A	31 (57.4)	140 (54.1)	
Anx3	SD+D	7 (13.0)	27 (10.4)	0.292
	N	6 (11.1)	52 (20.1)	
	SA+A	41 (75.9)	180 (69.5)	
Anx11	SD+D	11 (20.4)	51 (19.7)	0.808
	N	9 (16.7)	35 (13.5)	
	SA+A	34 (63.0)	173 (66.8)	

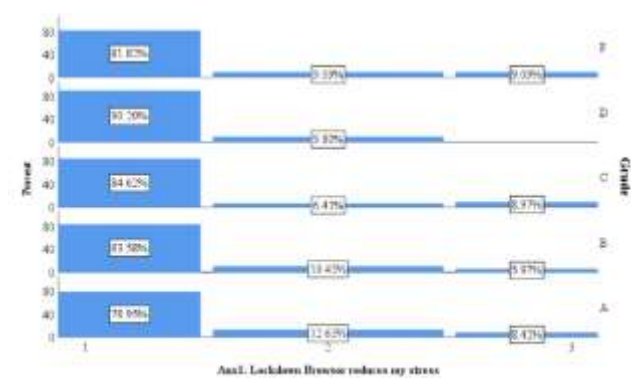
* Asymptotic Significance (2-sided); SD: Strongly Disagree, D: Disagree, N: Neutral, A: Agree, SA: Strongly Agree

Table 9 shows the significance of having one's own room on students' responses to the items related to the use of the Lockdown Browser. When the same items of the survey were examined according to having their own room, the analysis indicates that there is no significant difference in students' responses to the items related to Lockdown Browser based on whether they have their own room or not. Both groups show similar levels of agreement, preference, and concern (Table 9).

Similarly, when the four items related to the Lockdown browser were analyzed, the results indicate that there is no significant difference in students' responses to the items related to Lockdown Browser based on their class year. The agreement, preference, and concern levels were generally consistent across all class levels. However, a noteworthy difference was observed in the preference for neither joining Zoom nor using Lockdown Browser, with first-year students showing a higher inclination towards this option.

Research in the literature reveals that students suffering from depression tend to report higher levels of anxiety when it comes to being required to appear on camera during class, as well as concerns about potential embarrassment arising from their surroundings while being on camera, [29]. A specific interview study conducted with students experiencing depression demonstrated that the obligation to be on camera during online coursework can exacerbate their depressive symptoms. This effect is attributed to the common reluctance among undergraduate students to disclose their depression to peers and mentors, [29], [42]. Consequently, the presence of an active camera may prove particularly detrimental to students when they are feeling sad or disengaged, as it becomes increasingly challenging for them to conceal their depression from others, [29].

Figure 2 presents the responses of participants belonging to different grade categories (A, B, C, D, and F) regarding their perception of whether the lockdown browser reduces their stress during tests. For grade A (n = 95) participants, the majority of 75 (78.9%) expressed either Strongly Disagree (SD) or Disagree (D), indicating that they do not believe that the lockdown browser reduces their stress. Additionally, 12 participants (12.6%) remained Neutral (N), and only 8 participants (8.4%) expressed Agreement (A) or Strong Agreement (SA), suggesting that they find the lockdown browser effective in reducing their stress. Among grade B participants (n = 67), a higher percentage of 56 participants (83.6%) expressed SD or D, indicating their disagreement with the statement. Seven participants (10.4%) remained Neutral, and four participants (6.0%) expressed A or SA, indicating their agreement with the effectiveness of the lockdown browser in reducing stress.



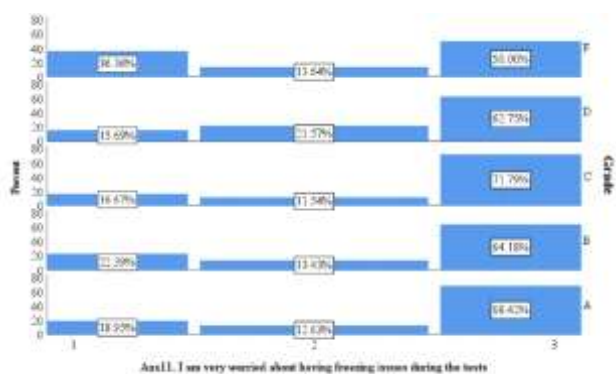
*1 represents SD+D, 2 represents N and 3 represents A+SA

Fig. 2: Grades and students' perception of whether the lockdown browser reduces their stress during tests

Similarly, for grade C (n = 78) participants, the majority of 66 participants (84.6%) expressed SD or D, while seven participants (9.0%) expressed A or SA. Five participants (6.4%) remained Neutral. For grade D (n = 51) participants, the highest proportion of 46 participants (90.2%) expressed SD or D, indicating their disagreement with the effectiveness of the lockdown browser in reducing stress. Five participants (9.8%) remained Neutral. Finally, for grade F (n = 22) participants, a majority of 18 participants (81.8%) expressed SD or D, while two participants (9.1%) expressed A or SA. Two participants (9.1%) remained Neutral. Overall, the data suggest that participants from all grade categories, except grade A, generally do not perceive the lockdown browser as an effective means of reducing their stress during tests. The majority of participants in grade A expressed disagreement, while a small proportion expressed agreement or remained neutral. In the existing literature, while proponents argue that proctoring can effectively reduce cheating, several studies have also highlighted the drawbacks associated with proctoring and the use of online exams in general, [3]. These drawbacks primarily pertain to perceived exam difficulty, student performance, and test anxiety, [3], [43]. Conversely, preliminary results have shown that students express concerns regarding the extent of personal data shared with proctoring software providers, [3], [44]. The use of live remote proctoring has faced criticism for exacerbating test anxiety and infringing upon personal privacy, [45], [46].

When the responses of participants belonging to different grade categories (A, B, C, D, and F) regarding their preference for joining Zoom with the camera on instead of using the lockdown browser during tests were examined it is found that participants from different grade categories show varying preferences regarding joining Zoom with the camera on instead of using the lockdown browser during tests. The majority of participants in grades A, B, C, D, and F expressed agreement or strong agreement, while grades D showed a higher proportion of disagreement or strong disagreement. Neutral responses were observed across all grade categories, suggesting a range of perspectives on this preference. According to the literature, the findings demonstrated that the non-proctored online test resulted in a four-point grade advantage compared to the traditional method, [16]. However, another study also revealed that the group who took exams in the unproctored environment exhibited significantly greater variation in their performance outcomes, [2]. Participants from different grade

categories show varying preferences regarding neither joining Zoom with the camera on nor using the lockdown browser during tests. The majority of participants in grades A, B, C, D, and F expressed agreement or strong agreement, indicating their preference for this option. However, some participants expressed disagreement or neutrality, suggesting a diversity of opinions within each grade category.



*1 represents SD+D, 2 represents N and 3 represents A+SA
 Fig. 3: Grades and students' level of worry about experiencing freezing issues during online exams

Figure 3 shows the grades and students' level of worry about experiencing freezing issues during online exams. Participants across different grade categories exhibit varying levels of concern regarding the occurrence of freezing issues during tests. The majority of participants in grades A, B, C, and D expressed agreement or strong agreement, indicating a higher degree of worry. However, a significant portion of participants expressed disagreement, neutrality, or a lower level of concern, particularly among grade F participants. These findings contribute to the existing research on challenges related to exams, [32]. However, these findings contradict the study focused on experiencing technical failures during the exam submission process, where only 11% of participants reported such inconvenience.s, mainly attributed to internet connectivity issues, while 89% stated that they did not encounter any technical complications, [20]. These contrasting results suggest that the level of concern for freezing issues during tests varies among students at different grade levels (Fig. 3).

Within the literature, it has been identified that a notable portion of students are adversely affected by the absence of reliable Internet connectivity and appropriate electronic devices. This situation places these students at a significant disadvantage when it comes to any testing solution reliant on the Internet, [47].

5 Conclusion

The purpose of this research is to explore students' attitudes toward online education, online exams, the implementation of proctoring during online exams, and how these factors affect their anxiety levels related to online learning. Additionally, the study aims to analyze the impact of online learning on students' anxiety levels based on various factors such as gender, grade, having a personal room, and class standing.

Regarding online courses, a significant correlation is observed between gender and the perceived difficulty of learning statistics and mathematics in an online class. However, no significant relationship is found between gender and the difficulty of contacting group members for online group projects, preference for individual work in online projects, or the amount of time spent on learning materials in an online course. Similarly, owning a separate room does not show any statistically significant association with the difficulty of contacting group members for online group projects, preference for individual work in online projects, the difficulty of learning statistics and mathematics in an online class, or the amount of time spent on learning materials in an online course. Furthermore, weak associations are identified between class standings and the difficulty of contacting group members, preference for individual work, the perceived difficulty of learning statistics and mathematics online, and the time spent on learning materials in an online course. In terms of grades, no statistically significant relationship is observed between grades and the difficulty of contacting group members for online group projects, preference for individual work in online projects, or the time spent on learning materials in an online course. However, a statistically significant association is found between grades and the perceived difficulty of learning statistics and mathematics in an online class.

When it comes to the challenges of online exams, a significant majority of both males (76.6%) and females (80.8%) indicated a preference for multiple-choice questions in online tests. However, participants from both groups expressed concerns about multiple-choice questions with numerous parts, as they believed they wouldn't receive partial credit or marks for their answers. Perceptions of online tests being more challenging than in-person exams varied, with a higher percentage of males (31.1%) finding online tests more demanding compared to females (23.3%). Both male and female participants agreed that more time should be allotted for online exams. While owning a private

room did not significantly influence most perceptions related to online exams, it did have a notable impact on the ability to concentrate during tests. Additionally, participants who did not have their room expressed a stronger preference for multiple-choice questions and a tendency to desire more time for online exams. The findings suggest that students' perceptions and preferences regarding online exams differ across academic years. The observed discrepancies in preferences for multiple-choice questions, perceived question difficulty, beliefs about cheating, and the desire for additional time underscore the importance of considering the distinct needs and perspectives of students at different stages of their academic journey when designing and implementing online assessments.

Regarding stress and anxiety, although there are some variations in responses between males and females, only a few of them reach statistical significance. These findings indicate that gender might have a limited impact on the levels of stress and anxiety experienced during online exams, and other factors may have a more substantial influence. The survey results reveal that there are no significant differences in responses among participants from different academic years. The stress levels and preferences concerning online exams remain generally consistent across all academic year groups. This suggests that the factors examined in the survey are not significantly influenced by the participants' academic year. Moreover, the survey results suggest that students from different grade levels exhibit diverse responses to certain aspects of online exams. Specifically, students who received lower grades demonstrate a stronger preference for in-class tests and experience more mental health issues associated with online education and exams. However, no significant differences are observed in other aspects, such as sequential tests, the inability to demonstrate knowledge, test format, and errors in test questions. These findings indicate that grade level may play a role in shaping students' perceptions and experiences with online exams, but further investigation is necessary to comprehend the underlying factors influencing these discrepancies.

Regarding the relationship between students' anxiety and performance, a majority of both male and female participants demonstrated skepticism or disagreement regarding the effectiveness of Lockdown Browser in reducing their stress levels. The percentage of participants who agreed or strongly agreed with this statement was relatively low for both genders. The data indicate that a significant majority of both male and female

participants do not prefer joining Zoom with their cameras on or using Lockdown Browser during tests. However, the percentage of female participants expressing this preference is relatively higher compared to male participants.

Regarding the ownership of a separate room, the analysis reveals that there is no significant difference in students' responses related to Lockdown Browser based on whether they have their room or not. Both groups show similar levels of agreement, preference, and concern.

In terms of the use of Lockdown Browser in online exams, the analysis indicates that there are no significant differences in students' responses based on their class level. However, there is a significant difference in the preference for neither joining Zoom nor using Lockdown Browser, with first-year students showing a higher preference for this option.

When considering grades, the majority of participants in grades A, B, C, and F expressed agreement or strong agreement, while grades D showed a higher proportion of disagreement or strong disagreement. Neutral responses were observed across all grade categories, suggesting a range of perspectives on this preference. These findings contribute to a quantitative study that highlights the impact of proctoring stress on students, causing them to forget some concepts they have previously learned or studied, [20].

The stress levels related to this factor were similar across all grade groups. In general, the survey results reveal that students from different grade levels display different responses to specific aspects of online exams. Particularly, students who received lower grades expressed a stronger inclination for in-person tests and encountered more mental health challenges associated with online education and exams. However, no significant differences were found in other aspects, such as sequential tests, the inability to demonstrate knowledge, test format, and errors in test questions. These findings suggest that grade level may influence students' perceptions and experiences with online exams.

Regarding the challenges of exams, the data reveals that a significant percentage of both male and female participants express significant worries about experiencing freezing issues during tests. While the proportion of male participants expressing this concern is higher than that of female participants, the majority of both genders share this worry. Furthermore, participants from all grade categories, except grade A, generally do not perceive the lockdown browser as an effective method for reducing their stress during tests. Most

participants in grade A express disagreement, while a small proportion express agreement or remain neutral. Participants across different grade categories display varying levels of concern regarding freezing issues during tests. The majority of participants in grades A, B, C, and D express agreement or strong agreement, indicating a higher degree of worry. However, a notable portion of participants expresses disagreement, neutrality, or a lower level of concern, particularly among grade F participants. These findings contribute to the existing study on exam challenges, [16], [32]. However, they contradict the study on the issue of experiencing technical failures during the exam submission process, where only 11% reported such inconveniences, primarily attributed to internet connectivity issues, while 89% reported no technical complications, [20]. These contrasting results suggest that the level of concern for freezing issues during tests varies among students across different grade levels.

The study suggests that gender may not be a significant determining factor in the reported stress levels and attitudes toward online exams. However, further analysis and investigation may be necessary to explore other potential factors that contribute to these observations.

To alleviate students' anxiety during online proctored exams, the following recommendations can be made based on the existing research: 1- Implement word problems instead of relying solely on multiple-choice questions, [21]. 2- Allow students to review and revisit previously answered questions during the exam. 3- Provide a pilot exam to familiarize students with the format and requirements before the actual exam. 4- Communicate the exam format in detail well in advance, including instructions on how to address any access or internet issues that may arise. 5- Consider incorporating a Paired Adaptive Test (PAT) system, which combines short answer and multiple-choice questions, [11].

However, it is important to acknowledge the limitations of the study. One limitation is the sample size. With a larger sample size, some differences that are currently deemed insignificant may become significant. For instance, a significance level of 0.05 indicates the possibility of statistically significant differences in responses among different class standings, but further analysis is necessary to confirm these findings. Additionally, there may be borderline associations that require further investigation or a larger sample size to draw conclusive results. Another limitation is the focus on

Lockdown Browser and anxiety, which leaves room for additional questions and considerations.

Future studies can explore the use of anxiety tests specifically developed for online exams and investigate alternative methods to reduce anxiety. Furthermore, conducting similar studies comparing online proctoring with traditional or hybrid education formats can provide valuable insights for comparison and analysis.

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