

Stress by Design? The Influence of Online Exam Interfaces on Student Anxiety

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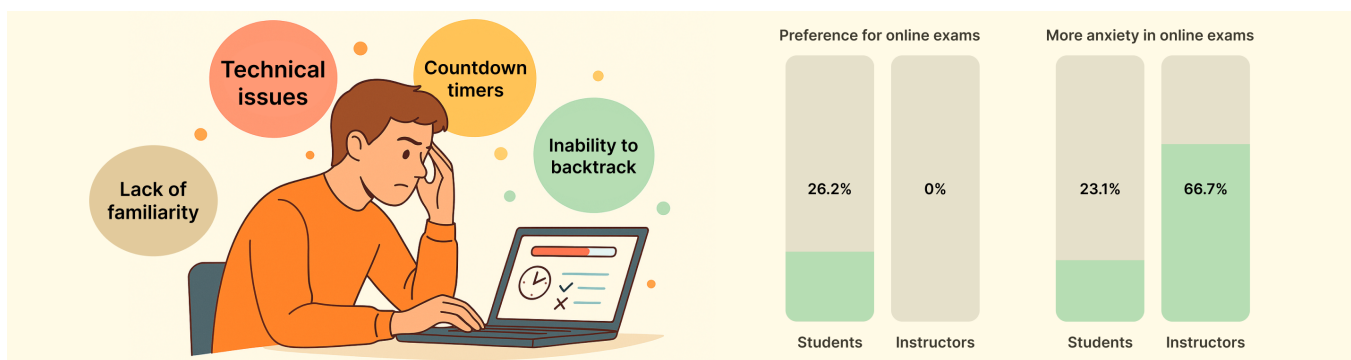


Figure 1: Stressors and preferences in online exams from students and instructors

Abstract

Online exams gained prominence during the COVID-19 pandemic and continue to be used in various educational contexts. This study investigates how university students and instructors perceive online assessments, with a focus on stress and interface design. Two online surveys were conducted: one targeting students ($N = 65$) and the other targeting instructors ($N = 9$). The findings reveal a preference for paper-based examinations among both participant groups. Around 72% of the students found online exam platforms easy to use and visually comfortable. However, 30% of the students reported that the interface design did impact their performance negatively. One-third of the students reported experiencing anxiety before and during online exams. Factors contributing to reducing stress included the ability to familiarize oneself with the exam platform beforehand and having simpler, uncluttered visuals. The surveys provide valuable insights from both students and instructors, offering guidance on points of improvement regarding the design of online examination platforms.

CCS Concepts

• Human-centered computing → User studies; Empirical studies in HCI.

Keywords

Online Examination, Exams, Stress, Performance, User Interface Design, UI, Education

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1 Introduction

Online exams became the standard during the COVID-19 pandemic, giving nearly all students firsthand experience and sparking increased interest among professors and universities. As a result, research into online exams has expanded in recent years [4], driven by the idea that the future of learning is digital [21]. Online exams offer several benefits, including ease in editing responses and accessibility from remote locations with minimal technological requirements [19]. However, anxiety remains a major challenge. It has the highest impact among behavioral issues in e-assessment systems [10] and negatively affects student success in online learning environments [16]. Interestingly, the design and type of online



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exams significantly influence students' anxiety levels [17]. Studies suggest that the user interface plays a crucial role in determining whether students perceive the examination environment as an enabler or barrier [1].

This study examines how user interface design influences student anxiety during online exams, based on survey data from students and instructors. It identifies key stressors, and features that impact stress, aiming to guide improvements in exam platform design. Specifically, the paper offers an empirical evaluation of online exam perceptions, identifies UI elements perceived as stress-inducing or stress-reducing, and provides actionable recommendations to reduce stress and enhance the exam experience through interface design.

2 Related Work

Stress and anxiety in exams. Test anxiety is a common challenge faced by students worldwide, with female students being particularly affected [3]. Various factors contribute to test anxiety, including fear of failure, limited preparation time, family pressures, instructor characteristics, and perceived exam difficulty [13, 15]. Among these, time constraints have been identified as a significant source of stress [11]. Stress manifests through both emotional and physiological symptoms, such as muscle tension, accelerated heart rate, nervousness, perspiration, dry mouth, and muscle spasms [12]. These physiological and emotional responses significantly influence academic performance, with cognitive test anxiety accounting for approximately 7–8% of the variation in student outcomes on course examinations [5].

Stress in online exams. Stressful emotions such as anger, frustration, and anxiety, which can arise before, during, and after interacting with technology, negatively impact productivity, learning, social interaction, and system use [9]. According to Novick et al. [17], nothing causes students more stress than the inability to back-track. The second most reported stressor for students is the time constraint [17]. Olipas and Luciano [18] found that while a countdown timer can positively impact productivity and motivation, it causes many students to experience nervousness or even panic. Students also report that dealing with technology issues during exams adds to their stress [2]. Replacing proctored in-class exams with online proctoring was reported to increase nervousness and intensify the exam experience. Students perceive question order randomization as the most effective logistic to reduce cheating and report that it is one of the least stress-inducing methods [17].

Stress and user interfaces in online exams. In online exams, the interface of a system plays a significant role in determining whether students perceive the environment as supportive or obstructive [4]. Usage comfort and perceived practicality are critical factors in e-assessment adoption, as they directly influence students' behavioral intentions, productivity, and information system adoption [10, 14]. Further research indicates that navigation between exam questions can be confusing and time-consuming, contributing to student stress [8, 22]. Additionally, interfaces with large blank spaces for responses can intimidate students, increasing uncertainty about expected answer length, whereas smaller, structured input fields may reduce anxiety [22]. Abdel Karim and Shukur [1]

identified specific interface preferences, such as grouping questions by topic and type, using readable fonts, and incorporating countdown timers with sound alerts. Thus, software developers and university Information Technology teams must prioritize ease of use and comfort while addressing anxiety during the development and implementation of e-assessment systems [10].

Collectively, this body of research provides valuable insights into the impact of interface design on the exam experience. However, these works focus on specific platforms or localized contexts and rarely consider instructors' perspectives. To address this gap, our surveys gather insights on stress-inducing and stress-reducing design elements in a platform-independent manner and incorporate both student and instructor perspectives.

3 Methodology

The full list of survey questions is available in the supplementary material. To conduct this research, two anonymous surveys were distributed: one for students and one for instructors. The surveys were created using Google Forms, with no financial or academic incentives offered for participation.

3.1 Student Survey

Survey content. The student survey aimed to gather insights into online exam experiences through 33 questions spread over 7 sections. We used a mix of Likert-scale, yes/no, multiple-choice, and open-ended questions to capture both quantitative and qualitative data. Topics included demographics, exam experience, UI design, anxiety and stress, performance, content and interface preferences.

Participants. The survey was distributed via the Ludwig Maximilian University of Munich's information distribution system to 6,175 individuals, yielding 80 responses. Students first reported whether they had prior experience with online exams: those who answered "yes" proceeded to the full survey ($N = 65$), while those who answered "no" exited after providing only demographic details ($N = 15$). For the remainder of the paper, we will focus exclusively on the results of the 65 students who had prior experience with online exams. **Major subjects:** Participants represented a variety of academic disciplines. (72.3%) studied STEM fields, i.e., in the fields of science, technology, engineering, and mathematics. Others majored in Law, Medicine, Business Administration, or Political Science. **Last Affiliated University:** The participants were affiliated with universities in Germany, France, Tunisia, and Spain, with the majority affiliated with Ludwig Maximilian University of Munich and the Technical University of Munich. **Age:** Ages ranged from 18 to 66 (mean: 27); 67.7% were aged 20–25, 15.4% aged 26–30, and 16.9% were outside these ranges. **Gender:** Among those who reported their gender, 50.8% identified as male, 47.7% as female, and 1.5% as non-binary.

3.2 Instructor Survey

Survey content. The instructor survey addressed two groups: those who had previously offered online exams and those who had not. It explored satisfaction with the process, adaptation of paper-based exams to the online format, perceived impacts on student stress and performance among instructors with online exam experience, and gathered perspectives on the potential advantages

and challenges of adopting online exams from those without such experience.

Participants. A total of 9 complete responses were received. Due to the branching structure of the survey, there were two groups of respondents: instructors who have offered online exams ($N = 3$) and instructors who have not ($N = 6$). Respondents represented various academic departments, including American Studies, Business Administration, Computer Science, Educational Sciences, Literature, and Human-Computer Interaction. Seven were affiliated with the Ludwig Maximilian University of Munich, and two with the Faculty of Sciences of Tunis. Ages ranged from 26 to 62 years, with a relatively balanced distribution between younger and older participants. The gender breakdown was 66.7% male and 33.3% female instructors.

4 Results

4.1 Student Survey

In this section, we present the results of the 65 complete responses. Figure 2 summarizes the results of the Likert-scale questions, using ordinal 5-point scales (1-Strongly Disagree to 5-Strongly Agree), median, and mean absolute deviation (MAD). The results for non-Likert scale questions are as follows: **Q6** Number of online exams taken: 27.7% took 1–2, 36.9% took 3–5, 21.5% took 6–10, and 13.8% took more than 10. **Q8** Platforms used (multiple choices allowed): Moodle¹ (70.8%), TUMexam² (18.5%), Artemis³ (13.8%), Google Forms⁴ (12.3%), and others (e.g., Zoom⁵, email). **Q9** Types of questions in exams (multiple choices allowed): multiple choice (89.2%), short answer (69.2%), yes/no (63.1%), numerical input (49.2%), coding (41.5%), and essay (35.4%). **Q14** Presence of countdown timers: 70.8% reported having one, 29.2% did not. **Q20** Frequency of technical issues: 9.2% never, 35.4% rarely, 49.2% sometimes, 6.2% often, 0% always. **Q27** Impact of design on performance: 30.8% said yes, 69.2% no. **Q29** Preferences for question arrangement (multiple choices allowed): grouped by topic (78.5%), by difficulty (20%), no preference (15.4%), and random (9.2%). **Q33** Interface preference (5-point scale): 47.7% preferred minimalist (clean and simple), 21.5% were indifferent, while 30.7% preferred feature-rich (with additional tools and options). **Q17** When asked how to improve the interface design of online exams, students suggested enhancing platform stability, such as ensuring input safety during internet or power issues, continuous exam state saving, and providing clear indicators of server connection. Other suggestions included offering options for exam structure visibility, simplifying visuals, and allowing question navigation flexibility. A thematic analysis of the responses showed the most frequently mentioned improvements were timer visibility and control (5 mentions), UI simplification (4 mentions), anti-cheating and privacy concerns (4 mentions), navigation and layout (3 mentions), and system reliability (3 mentions). All responses to the open-ended questions can be found in the supplementary material. **Q28** Thematic analysis of responses on how interface design affected performance showed that the most mentioned issue was

visual clarity (5 mentions); students reported that clear layouts helped them focus. Others referred to technical issues (3 mentions) such as bugs and unreliable functionality. Navigation problems (2 mentions) caused confusion, and minimal designs (2 mentions) and visible timers (2 mentions) were described as helpful. One student noted problems with input placement, which caused uncertainty. We also compared Likert-scale responses across users of Moodle, Artemis, and TUMexam, as these were the three most selected platforms in our survey. Results were generally consistent, with most items showing similar medians. Moodle users' responses closely aligned with the overall sample, showing no notable deviations. TUMexam users showed the lowest satisfaction and preference for online exams (median = 2), but rated interface usability higher (median = 4). Artemis users reported more varied opinions, especially on satisfaction and stress, with higher MAD values.

4.2 Instructor Survey

In this section, we present the results of the instructor survey. We summarized the results of the Likert-scale questions in Figure 3. **Q1.10** The instructors who had offered online exams before ($N = 3$) preferred paper-based exams. When asked about their preference for paper exams, they stated that they value reduced opportunities for cheating, found them more student-friendly and conducive to focus, and expressed concerns about fairness, privacy, and stress caused by digital proctoring methods. **Q1.9** When selecting an online exam platform, instructors prioritized availability (2 responses), followed by reliability, cheating prevention, familiarity, and ease of use for students (1 response each), while user interface design was not among their criteria when selecting exam platforms. **Q1.17** When deciding on the number of questions to display per page, most pay attention to grouping similar topics on the same page (2 responses), while others aim to reduce scrolling or consider question complexity (1 response each). **Q1.18** All instructors allowed backtracking in online exam navigation.

Instructors who had not offered online exams ($N = 6$) indicated in **Q2.12** that the main reasons for not offering exams online were lack of familiarity and concerns about cheating (3 responses each), followed by limited technology access, preference for paper-based exams, and policy restrictions (2 responses each). **Q2.14** When considering an online exam platform for future use, instructors would prioritize reliability, cheating prevention, and ease of use (4 responses each), while flexibility in exam design (2 responses) and familiarity (1 response) were also mentioned.

5 Discussion

The results indicate a mixed attitude towards online exams. While almost all instructors are dissatisfied with creating and offering online exams, a majority of the students express satisfaction. However, a significant portion remains dissatisfied. Interestingly, even among those students satisfied with online exams, a significant number still prefer traditional paper-based formats. This is in line with feedback from instructors, who show a strong preference for paper-based exams.

Stress. Our findings show that around 45% of the students experience anxiety before and during exams, with 23% feeling more anxious during online exams than paper-based exams. One major

¹<https://moodle.org/>

²<https://www.tumexam.de/>

³<https://www.edtech.tum.de/artemis/>

⁴<https://docs.google.com/forms>

⁵<https://zoom.us/>

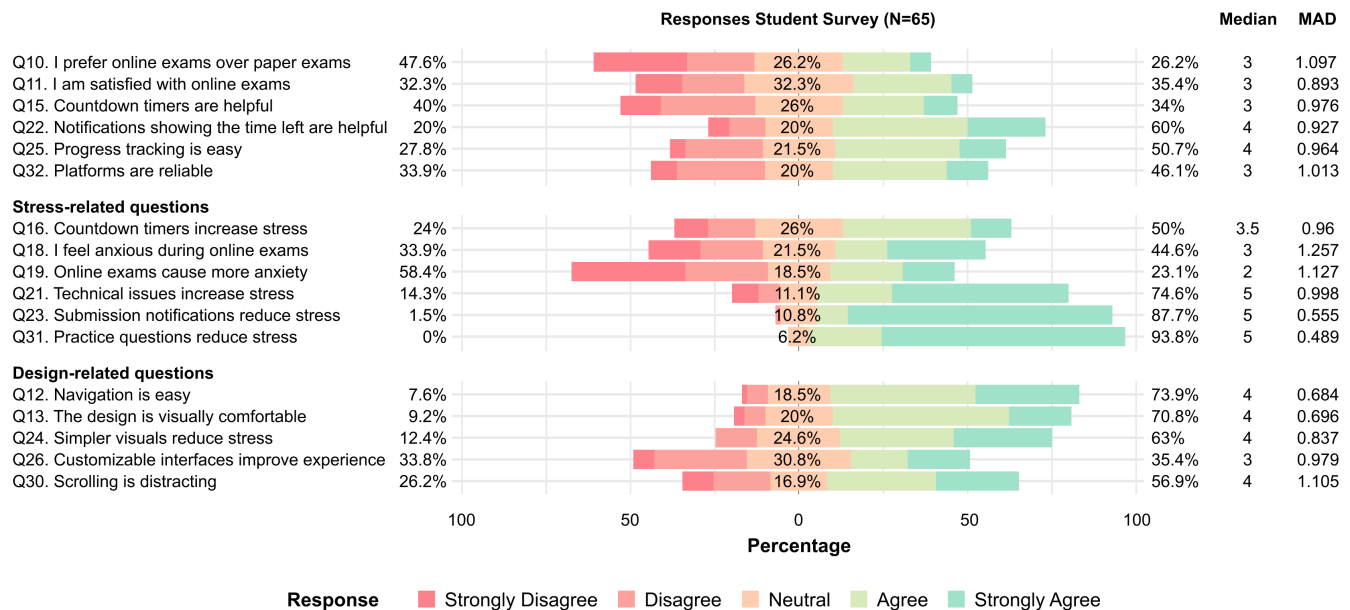


Figure 2: Student Responses to Likert Scale Questions from the Student Survey

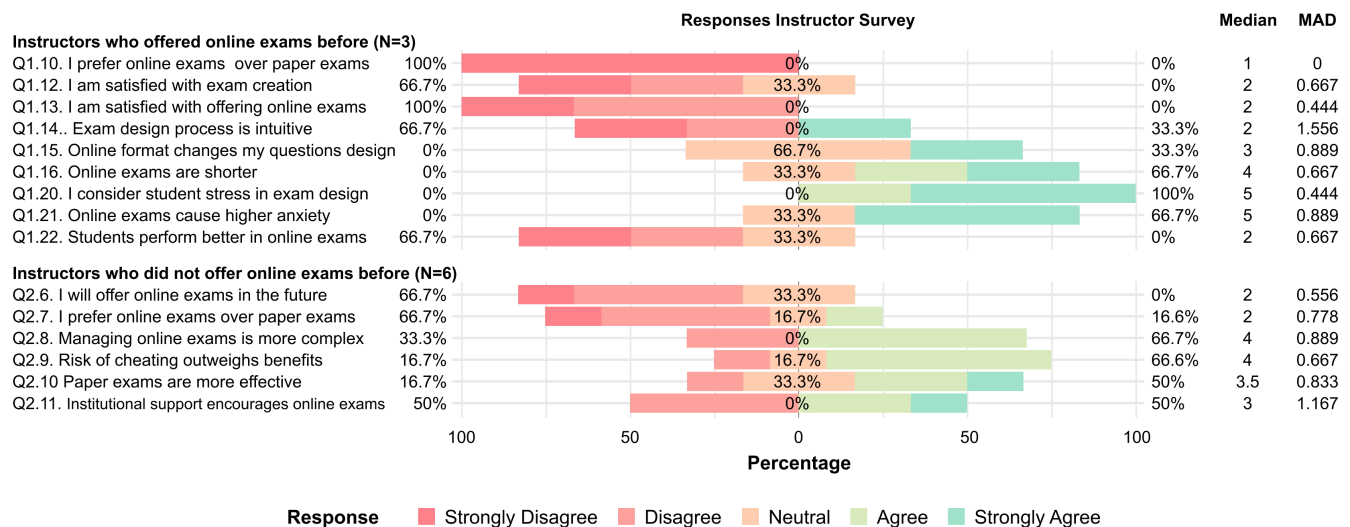


Figure 3: Instructor Responses to Likert Scale Questions from the Instructor Survey

stressor during online exams is **technical problems**. Only 6.2% of students have never experienced technical issues, while the rest have faced them at least once. The results clearly show that technical problems increase stress (median = 5). Therefore, when designing exam platforms, a specific focus should be put on creating stable solutions that do not demand intensive performance or high bandwidth. One-third of students doubted the platform's reliability, leading them to suggest features like auto-saving, saving during outages, and submission confirmations. Results of Q23 from the

student survey support this, as nearly all participants (median = 5) strongly agreed that submission notifications provided reassurance. Consequently, we believe that implementing effective user feedback mechanisms could help reduce stress and improve the user experience. Another significant stressor in online exams is the **inability to backtrack questions**. While this feature is often implemented to reduce cheating, it significantly increases stress levels among students. Unlike paper-based exams, where students have complete

freedom to decide on the order of answering questions, online platforms with rigid navigation limit this flexibility, which can add to the overall anxiety. **Familiarity with the platform** is another key point. Not knowing how to navigate or use the platform during an exam can be stressful. Over 90% of students agreed that testing the platform with simple practice questions before the actual exam would be helpful. Therefore, we recommend allowing students to test the platform beforehand as a standard practice. Finally, **time-left notifications** during exams were considered helpful by the majority. Allowing students to customize these notifications based on personal preferences could further enhance their usefulness.

Design. The user interface-related results show that students find online exam platforms easy to navigate and visually comfortable (median = 4). While satisfaction with the interface design is relatively high, around two-thirds agreed that simpler, uncluttered visuals would reduce stress. Additionally, one-third of participants stated that the design of the platform affected their ability to perform in the exam. This suggests that current user interface designs may still introduce unnecessary complexity and ambiguity, leaving room for improvement. A simpler design with customization options could address this. Customizable elements might include layout, colors, fonts, and light/dark modes, giving students more control. The timer is another important aspect of the design. Some participants found it helpful, while many found it stressful and distracting. Offering the option to show or hide the timer could solve this issue. Scrolling to view all questions and tracking progress were also reported as distracting and difficult. To solve this, exam platforms should offer better progress tracking, such as displaying answered, skipped, and questions to revisit, or providing an overview of the exam structure.

6 Limitations and Future Work

The student survey focused on participants from a single city, which may limit the diversity of experiences. The instructor survey included only nine participants and only three with online exam experience, reducing the generalizability of results. This low number can be attributed to the limited availability of instructors compared to students. While students without prior online exam experience were excluded due to their unfamiliarity with these platforms, instructors without such experience were included to uncover reasons and hesitations for refraining from adopting online tools. Both surveys were voluntary, introducing potential selection bias. Stress was assessed through self-reported feelings and memory rather than quantitative data, e.g., via physiological measurements, such as electrodermal activity [6, 7] or pupillometry [20]. Lastly, we did not use a standardized questionnaire to measure UI-related stress. While relevant questions were selected and grouped, they were not based on a validated instrument specifically designed for this purpose.

Despite these limitations, the study provides valuable insights into stress factors and design preferences, offering a foundation for future research. Future work could implement proposed design changes and evaluate their effects on stress, performance, and user experience. Co-design sessions with students and instructors may help tailor exam platforms to both groups' needs. In addition, both

students and instructors raised privacy concerns during online exams, e.g., related to video surveillance. Therefore, future online exam platforms should be designed with careful attention to preserving privacy for both user groups. Developing or adapting a validated tool to systematically measure UI-induced stress could also be a valuable direction for future research.

7 Conclusion

This study examined online exam experiences, focusing on stress and interface design. Student and instructor surveys revealed key stressors such as technical issues, lack of backtracking, and difficulty tracking progress. Students preferred cleaner, minimalist designs with customizable interface elements and enhanced system feedback on answer saving. These insights highlight the need for stable, user-friendly platforms that reduce stress. Further research can test the recommended design changes in real-world settings to assess their impact on user experience, stress, and performance.

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