

# Assessment Modality Preferences in Informatics Engineering: Before, During, and After the Pandemic

Anabela Gomes<sup>1,2</sup> and Cristina Chuva Costa<sup>2</sup>

<sup>1</sup>Polytechnic Institute of Coimbra, Coimbra Institute of Engineering, Coimbra, Portugal

<sup>2</sup>CISUC— Department of Informatics Engineering, University of Coimbra, Coimbra, Portugal

## ABSTRACT

This paper analyzes how the COVID-19 pandemic has affected higher education, focusing on the move to remote learning and the difficulties that come with implementing this kind of instruction. The case study, which examined the preferences and experiences of students in a technology course in Portugal with various assessment methods, is the main focus of the paper. Although difficulties and drawbacks surfaced, students responded well to certain approaches and techniques, suggesting that they might be appropriate in a post-pandemic setting. The focus of the paper is on assessment type preferences, including time allocation, difficulty levels, online and in-person assessments, as well as ethical considerations. The results highlight the necessity for reflection on the primarily face-to-face teaching system and adaptation to current expectations, as they indicate that students encountered difficulties but overall expressed satisfaction with the assessment process. Students also valued aspects like time and cost savings, exam duration, appropriateness of assessment types, and fraud prevention.

**Keywords:** Assessment preferences, Online assessments modalities, Covid-19

## INTRODUCTION

The United Nations Educational, Scientific, and Cultural Organization (UNESCO) reported in March 2020 that lockdowns and massive school closures had affected 87% of the world's students (UNESCO, 2020). In July 2020, it increased to 98.6% - 1.725 billion children and youth, from pre-primary to higher education, in 200 countries that suffered educational disruptions (United Nations, 2020). In higher education, the closure of institutions forced the majority of their academic activities (e.g., teaching, assessment, and services) to be delivered online (Marinoni and van't Land, 2020). This temporary shift of instructional delivery to an alternative mode due to crisis circumstances is designated by Emergency Remote Teaching (Hodges et al., 2020), (Cowden et al., 2020). These authors highlight that this is not the same as well-planned and designed online learning, as it involves a rapid response to a crisis without prior preparation.

In Portugal, the first wave of the pandemic forced all schools to suspend face-to-face classes on March 12, 2020. In the span of a single week, the education system was compelled to undergo a complete transformation, successfully providing digital alternatives for the originally planned in-person academic activities. The on-campus lectures were mainly offered as live-streamed plenary lectures and most institutions used the video conferencing tool Zoom or Microsoft Teams to support their activities. The first lockdown lasted until the end of the 2019/2020 academic year, and the 2020/2021 school year began with a series of constraints. However, due to the high spread of the disease, a second confinement was decreed on January 15 and the remote/hybrid model ended up being adopted by most institutions until the end of the 2nd semester. During the pandemic, the students experienced several remote assessments supported by platforms like Zoom, Microsoft Teams, and Moodle. This shift was common to many High Education Institutions around the globe and increased the interest on the topic (Guangul et al., 2020).

Despite assessment practices in higher education have been largely discussed, conceiving a suitable strategy remains a challenge (Akimov and Malin, 2020). Due to development of Information and Communication Technologies, it was possible to implement electronic assessment, which allows for the development of artifacts, their publication, and the quick, easy, and valid provision of meaningful outcomes. Electronic assessment usually includes item banking (authoring and review), online test delivery, remote proctoring, adaptive testing, and essay scoring.

Literature has shown several advantages of electronic assessments and examinations. These benefits encompass enhanced accessibility, as educators can easily create questionnaires, assign grades, distribute invitations to participants, and tailor assessments to specific learning objectives and individual needs (Sindre and Chirum). Digital assessment systems support a wide array of question types, including multiple-choice, essay, interactive, and multimedia questions (Montenegro-Rueda et al., 2021), (Nguyen et al., 2017). Furthermore, these can be accessed from any location with an Internet connection, providing convenience and flexibility. They offer time savings for both educators and students by providing instant feedback and automated grading (Tuah, 2020), the identification of areas for improvement, and the formulation of instructional decisions. While there may be initial setup costs, digital assessments can result in long-term cost savings, particularly in large-scale exams, through reduced paper usage (aligned with environmentally friendly practices) and diminished logistical and administrative requirements (Ilgaz and Afacan Adanır, 2020).

The implementation of electronic assessment in higher education encounters numerous challenges. Different studies have delved into technological issues, such as Internet connectivity problems and software glitches, which can result in unequal access opportunities. Additionally, usability concerns, including login difficulties, overloading situations, and submission problems, have been identified as significant obstacles (Khan and Khan, 2019). During electronic assessments, students often encounter difficulties navigating

through multiple exam questions and harbor concerns about potentially losing their previously recorded answers (Ilgaz and Afacan Adanır, 2020).

Formulating an effective assessment strategy remains a persistent challenge (Stassen et al., 2001). Specifically, the choice of assessment methods can wield a substantial influence on students' learning outcomes. Therefore, when deliberating on the most effective evaluation approaches, it is crucial to self-reflect on how to align them with the students' level of knowledge and the subject matter being addressed. For instance, practical laboratory work or hands-on tasks may present challenges in terms of effective assessment in an electronic format. Additionally, a notable concern that has emerged in the context of the shift to online examinations is the heightened potential for academic dishonesty (Chirumamilla et al., 2020). The transition to online assessment formats has raised questions regarding the ease with which students may access unauthorized materials, online resources, or collaborate with peers during exams.

Despite the challenges brought about by pandemic-related restrictions in higher education institutions, namely the abrupt change from the face-to-face model to the remote model and the consequent need to carry out remote assessments, positive aspects worth considering were revealed. These experiences should prompt a deep reflection on educational system design, with the goal of formulating strategies that harness technology's potential in student assessment.

The students addressed in our study were enrolled in the bachelor's degree program in Informatics Engineering (2nd year) and answered the survey in the 2nd semester of 2020/2021 after experiencing two confinements. Obviously, this population has a bias towards students in general. However, for this very reason, it is important to understand the specifics of their profile.

The remainder of this paper is structured as follows: Section 2 describes the research methodology adopted. Then, in Section 3, we analyse the research results. Finally, in Section 4, we present the conclusions and discuss future research.

## THE STUDY

In June 2021, we conducted a survey among students aimed at understanding their preferences regarding different educational scenarios. This paper specifically focuses on their assessment type preferences during periods of confinement, like the one they experienced, as well as their projections for a 'normal' future situation. For that, we questioned students and analysed the following aspects: online and presential assessment, the type of test (multiple-choice, open-ended questions, filling in blanks, or other modalities), the adequacy of the time allocated to the duration of the online tests; their difficulty level when compared to face-to-face test and fraud issues. For each aspect, the reasons behind them were analysed.

The sample consisted of 116 students from the bachelor's degree program in Informatics Engineering (102 from the general regime and 14 from the post-work regime), in a total of 107 males and 9 females. The student's

enrollment years vary substantially from 2009/2010 to 2019/2020. However, approximately 70% of the students are from 2019/2020 and have an average of 2 enrollments.

## ANALYSIS OF THE RESULTS

Looking at the question “**What type of assessment do you prefer?**” most students indicated a preference for face-to-face assessments (63%), while the remaining 37% favored online assessments. Even a little more pronounced, the majority (67.2%) consider that they are more affected by the online assessment than the face-to-face (32.8%).

Regarding the typology of tests in online assessment supported by a platform, most students expressed their preference for multiple choice assessments (51.7%), followed by open answer tests (19.8%), filling in the blanks (13.8%), or other modalities (14.6%). In the latter, the answers combine the preceding options. Some students refer “Open answer” and “Multiple choice”; others “Open answer,” “Multiple choice,” and “Fill in the blanks” questions. Others mention their preference for evaluations that are as close as possible to face-to-face tests, some don’t know, and others say they have no preference. The students also mentioned that their preference for the type of test depended on the specific curricular unit and the subject under assessment. Some say they prefer online assessment as long as it is well done, as there were some situations that were highly harmful. Others emphasized the suitability of “Multiple Choice” or “Fill in the Blanks” questions for theoretical aspects, along with one or two “Open Answer” questions. However, for more practical aspects, they favored “Open Answer” questions, as they believed these questions provided a more effective assessment of problem-solving abilities.

Regarding the question “**What type of online assessment do you prefer?**” The overwhelming majority of students (77.6%) indicated a preference for submitting their responses directly on a platform, while 22.4% of students responded preferring to write the response on paper and send a photo of the answers.

Considering the question “**Did your technical knowledge in information and communication technologies benefited or hindered you in the evaluation moments? Why?**” All students replied that they benefited from their technical knowledge, which would be expected of undergraduate students in Computer Engineering. Their reasons included experiencing a less disruptive transition due to their technological expertise, the ability to solve technical problems that arose during the assessments, and a better understanding of the technology employed (e.g., “In exams requiring scanned answer sheets, I already knew how to use the OneDrive mobile application to scan and automatically upload it to the cloud”). Additionally, they found it faster and easier to use familiar applications, devices, or platforms, which help them to improve time management during exams.

In response to the question “**What type of tests do you prefer in face-to-face assessment?**” most students favored “Multiple Choice” (39.6%), followed by “Open Answer” (35.3%). Other test modalities were indicated by 17.2% of students, while 7.8% preferred “Fill in the blanks”. In response to the

question “**Do you think the time allocated for the duration of the online tests has been adequate? Why?**” the majority (63.8%) of the students think that the time has been insufficient, while some (16.4%) consider it adequate, and others (19.8%) say it depends on the curricular unit. The reasons given by those who found the time adequate included the prevention of fraud and well-organized topics, although they noted occasional time constraints for reviewing questions and answers. In addition, they found the submission process complex and time-consuming.

The student who did not find the time adequate believe that to reduce the attempts of fraud the teachers reduced examination time, which adversely affected those who had more difficulties in interpreting questions. They also believed it was unfair to students who have studied. Students also expressed concerns about the insufficient time for thoughtful and rigorous responses. They found it challenging to concentrate when juggling multiple tasks, such as simultaneously writing on paper while trying to view the statement on the monitor, positioning the camera correctly, and keeping the microphone on with the potential for inadvertent input. Students also mention that electronic assessment is a source of additional stress for fear that the technical component may fail. In addition, not all students have adequate technical conditions. In face-to-face exams, there is the advantage of being able to choose and transition between questions, allowing for better time management. Students often feel pressured to act like robots, having a set of tasks to operationalise and leaving little time for thinking about the answers. This stress often leads to frequent mental blocks, despite their familiarity with the subject matter. They also mentioned that exams divided into several parts contribute to the student losing focus. In addition, there were too many rules to follow, which may vary among different curricular units. Students who responded “it depends” based their reasoning on factors such as the limited time allocated for assessments in specific courses, unadjusted question formats (e.g., “questions with multiple options to complete a blank space, often disordered, making the search difficult and tiresome”), complex submission processes, or excessive division of exams into various components or parts.

In response to the question “**Do you think the difficulty level of online tests has been higher than that of face-to-face tests?**” The majority of students (50.9%) believe that online tests were more difficult, while 40.1% considered it to be equivalent, and 9% of students found that the degree of difficulty of the online tests has been lower.

Regarding the question “**Do you feel disadvantaged compared to your peers because your ethical principles prevent you from cheating in online exams? Why?**” the majority of students (59.5%) did not feel disadvantaged. Still, a significant amount (30.7%) did and 9.8% gave answers that did not allow for classification. Those who did not feel affected provided the following reasons: cheating in the present has future implications; each one does what his/her conscience dictates; the grades correspond to the study carried out; the fact that peers copy in no way affects the individual’s performance; ethics is the reward itself. Those who felt affected provided the following reasons: the reduction of online exam time unfairly impacts honest students; the perception of unfairness when individuals pass exams without genuine

knowledge due to cheating while hardworking students didn't pass; measures implemented in online mode have affected all students, whether they took part in fraud or not; and a sense of missed opportunity, feeling they should make the most of it but are unable to do so.

## DISCUSSION OF THE RESULTS

### Reasons for the Type of Assessment Preference

Students prefer face-to-face assessments for several reasons, including their familiarity with traditional assessment techniques, the value they place on in-person interactions, the perception of improved evaluative accuracy, particularly about practical considerations and problem-solving skills. They also have preferences for particular exam formats, such as multiple-choice or open answer (based on the subject matter or individual learning preferences), the flexibility to switch between questions during the test, better time management in traditional exams, concerns about fairness, and the effect of time constraints on assessments that required deeper reflections. Students primarily prefer online examinations due to the ease and flexibility of remote completion, the availability of resources, and the ability to use technology for problem-solving. They also have preferences for specific online assessment modalities, such as multiple-choice, open answer, or fill-in-the-blank. However, challenges related to technology, time constraints, and adapting to new exam formats are crucial factors for ensuring fair evaluations in well-designed online tests. Time management becomes essential due to imposed time limits and technical submission procedures. Some apprehensions over the likelihood of fraud and the effects of cheating on objective evaluation are also present. Understanding these causes can lighten the students' viewpoints and assist in guiding decisions on assessment modalities and procedures.

### Reasons for the Preferred Online Assessment Modalities

Next, we present the reasons given by students for the different types of online assessment modalities. **Multiple-choice assessments:** allow students to divide their time effectively among different questions and cover a wide range of material in a convenient amount of time. Additionally, these assessments are typically more objective. **Open-ended questions:** demand a greater understanding of the subject matter and enable them to express their knowledge in a more complete and original manner. Students find open-ended tests useful for problem-solving or applying their academic knowledge to real-world circumstances. This format can also encourage critical thinking. **Filling in the blanks:** provide opportunities for practice and help reinforce learning, assisting students in retaining specific material and appropriately applying it. These assessments encourage attention to detail and are effective in reducing cognitive overload. **Other modalities:** depending on the type of examination or its specifics, some students prefer a combination of assessment modes. They understand that the curricular unit or subject being tested may influence the choice of assessment method. Students value evaluation methods that closely

mirror real-world circumstances, especially when it comes to practical or applied components of the topic.

These explanations highlight students' online assessment preferences. By considering these preferences, teachers may design tests that foster engagement and comprehension, while aligning with students' learning requirements.

### **Reasons for the Preferred Method of Responding to Assessments**

The justifications provided by students for the preferred ways to respond to assessment in an online platform are then presented. **Responding directly on a platform:** they find it easy to answer questions directly on the online platform. They appreciate features like input fields, dropdown menus, and automated grading. This method is considered efficient and quick. Students believe that responding directly on the platform reduces the likelihood of mistakes. They trust in the online platform's security and integrity. **Writing responses on paper and sending a photo:** some students prefer to write their comments by hand because handwriting allows for more expressivity and clarity. In addition, they are usually more familiar with the conventional pen-and-paper method.

### **Reasons for Online and Face-to-Face Assessment Methodologies**

**Multiple choice assessments:** students appreciate multiple-choice assessments online because they provide immediate feedback, allow for efficient grading, and can cover more content within a given time frame. They find it helpful for testing factual knowledge, recall, and comprehension. In face-to-face assessments, multiple-choice questions are also convenient for testing accurate knowledge. However, students may feel that other assessment modalities allow for a more comprehensive evaluation of their understanding and analytical skills. **Open answer:** students perceive online open answer assessments as an opportunity to express their understanding elaborately, appreciating the flexibility and time for thoughtful responses with explanations, examples, and arguments. In face-to-face assessments, open answer questions are valued for demonstrating the depth of knowledge, critical thinking, and articulation of ideas. **Fill in the blanks:** while this option is not specifically mentioned in the context of online assessments, they are considered useful in face-to-face assessments, especially for testing specific knowledge or concepts. **Other modalities:** students prefer mixed modalities, such as a combination of multiple-choice and open-answer questions, in online assessments. They believe it provides a balanced evaluation, allowing them to demonstrate both factual knowledge and critical thinking skills. Some students also point out that the preferred modality depends on the curricular unit and the nature of the subject being assessed. In order to completely assess students' knowledge and abilities, they emphasize the importance of using a variety of question types.

### **Adequacy of Online Test Duration**

Due to perceived time limits, students typically have concerns about the duration of online tests. They think that the shorter time will have a detrimental

effect on their performance, particularly in terms of interpretation, technical difficulties, and fairness in comparison to their peers. A smaller percentage of students, on the other hand, believe the time allotted is sufficient and that it is both manageable for completing the questions and required to avoid cheating. The particular curricular unit and the type of questions asked on the online exams have an impact on how acceptable something is perceived to be by students.

### **Difficulty Level of Online Tests Compared to Face-to-Face Tests**

Nearly half of students (50.9%) find online examinations more challenging than in-person ones. Among the causes for the perceived increased difficulty are the technical challenges, the limitation of resources, and the need for more feedback. Technical difficulties are one of the reasons. Another reason is that online exams may limit access to materials like textbooks or notes, increasing reliance on memorisation and comprehension of the subject. On the other hand, face-to-face exams, which may not provide rapid feedback, allow students to ask questions and get answers from the teacher to clarify their doubts. On the other hand, a considerable percentage of students (41.4%) believe that online examinations' difficulty level is comparable to in-person tests. The reasons for considering equivalency include (1) the fact that online tests are created to evaluate the same knowledge as in-person exams, resulting in similar degrees of difficulty; (2) Online learning and evaluation have become more commonplace for students, which may help to lessen the perceived difficulty discrepancies; (3) online and in-person assessments have time limits, guaranteeing a comparable amount of pressure to finish the test within the allotted time.

Only an insignificant percentage of students (8.7%) think online examinations are simpler than in-person exams. This perception is attributed to several factors. Some students may believe that online exams provide more chances to access outside sources or cheat, making the examination more straightforward for those who want to participate in academic dishonesty. Another reason is that students who are computer proficient and at ease with online environments may find online assessments simpler to access and finish quickly.

It is essential to remember that students' perceptions of difficulty might change depending on past experiences, technological proficiency, and subject content. The degree of preparation, the nature of the test, and the unique circumstances of each student can all impact how tough they perceive online examinations to be.

### **Analysis of Ethical Principles and Cheating in Online Exams**

The students' opinions on ethical principles and plagiarism in online tests are divided. Most students (59.5%) reported that their moral convictions against cheating on online tests do not place them at a disadvantage. This opinion is supported, in part, by aspects such as personal integrity (regardless of the situation, students think it is crucial to uphold their moral principles and academic honesty), self-confidence (even if others use cheating, students feel



confident in their talents to produce fair outcomes), and long-term repercussions (students are aware that cheating might have a negative effect on their future academic and career success). However, a minority of students (3.4%) have expressed frustration because they view online exams as an opportunity for cheating and are frustrated at those who take advantage of this situation or because they themselves are not able to do this. A small percentage of students (7.8%) provided responses that did not allow for a precise classification regarding their viewpoints. Many students (29.3%) feel that their ethical values impact their thoughts about cheating on online examinations. This opinion is supported, in part, by concerns related to unfair advantages (students think that dishonest peers have an unfair edge over honest students), the effect on grades (students believe that students' ability to display their knowledge and skills may be adversely affected by the shorter testing period or different testing settings in online tests). Furthermore, they think cheating damages the integrity of the educational process and diminishes the accomplishments of those who work hard to get their marks honestly.

It's important to acknowledge that students' perspectives can vary based on their values, educational background, and the context of online exams. These viewpoints highlight the range of attitudes towards academic integrity and its impact on students' perceptions of fairness in the online exam environment.

## CONCLUSIONS

During the lockdowns, most classes in higher education transitioned to a remote/hybrid mode. In this paper, we present a study that addresses this transition, particularly focusing on the type of assessments students prefer before, during and after the pandemic in a higher education institution in Portugal. Our research focuses on students enrolled in a technological program, specifically the bachelor's in informatics engineering. This deliberate selection is aimed at understanding the perspectives of this unique group of students, who typically possess advanced digital skills and, for the most part, have access to technological resources. This enables us to direct our research towards the assessment process itself, rather than potential limitations that might affect their academic performance.

Students have preferences for different assessment types, with a tendency toward face-to-face assessments due to familiarity with traditional methods, appreciation for in-person interactions, perceived evaluative accuracy, and flexibility in choosing exam formats. Online assessments are favored for their ease and flexibility, but face challenges related to technology, time constraints, and adapting to new formats. The study suggests that understanding these preferences and concerns can inform decisions about assessment modalities and procedures.

This study shows that students have preferences for various forms of assessments, but they tend to favor in-person evaluations because they are accustomed to using traditional methods, value face-to-face interactions, believe that this type of assessments are accurate, and give more freedom to students to manage their answers. Even though some students prefer online assessments because they are more flexible, they recognize some issues

related with technology, time constraints, and format adaptation. Additionally, students' preferences for online assessment modalities vary. Namely, fill-in-the-blank tests aid in learning reinforcement and lessen cognitive overload; multiple-choice tests provide efficient time management and objectivity; and open-ended questions foster deeper comprehension and critical thinking. Depending on the nature of the subject, some students prefer a combination of assessment modes.

Students also mentioned that they have different preferences when it comes to answering online tests. Direct platform responses are preferred due to their effectiveness and simplicity. Some students prefer sending a photo of their responses on paper because they are accustomed to using traditional pen and paper methods.

Concerning the duration of online assessments, the majority of students believe that they are too short and insufficient. A small percentage of students think the time is adequate, emphasizing the importance of preventing cheating. Some students think that the length of the exam should be conceived depending on the subject. However, the subject and question types have an impact on students' opinions of how adequate an online test is.

Students' opinions are divided regarding the degree of difficulty of online and in-person exams. Some consider the former more difficult because of technical problems, lack of resources, or the requirement for feedback. Others consider online exams to measure the same knowledge and skills as in-person exams, therefore they are just as difficult. Due to perceived opportunities for academic dishonesty or technological proficiency, a minority of students find online exams easier. The experience of the students may alter these perceptions.

Different students have different opinions about ethics and exam cheating. The majority believe that cheating doesn't prejudice them and defend strong moral principles against it. Other students express their frustration at the possibility of cheating on online exams. Concerned about unfair advantages, grade effects, and the integrity of the educational process, some feel that their perspective is influenced by their ethical values. These divergent opinions reflect differences in backgrounds, values, and of the online exam environment. These preferences can guide teachers in designing assessments that enhance engagement and comprehension.

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