

# Online assessment: more student cheating than on-site?

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## Abstract

This paper discusses online student assessment which is one of the major concerns of higher education institutions during these pandemic times, forcing teachers to teach and assess in different ways and conditions than when using regular methods. Online assessment brings more challenges for the teachers and the fear that students could cheat more than in on-site or face-to-face conditions. More than a surveillance task, it is a question of having justice among different students' socio-economic and learning conditions. Ethical issues, respect for the colleagues and trust in their own work and more suitable learning assessment methods could be strong reasons for the students not to cheat. For the teachers, this is a complex and controversial issue. Finding the best ways to prevent this from happening is not easy. This could demand a balance between less time and more complex online tests that require a lot of imagination and creativity. This paper gives some examples of face-to-face written tests and online tests, comparing grades of two cohorts of students (2019\_20 and 2020\_21) from three different courses. Those courses are lectured in the first and third year of Industrial Engineering and Management (IEM) Integrated Masters degree and the first year of the Masters in Engineering Project Management, at the University of Minho. Some practical tips and suggestions will be given to prepare online tests (e.g. diversity of assessment methods, type of questions included in the tests, tests could not be the only assessment method ...).

**Keywords:** Engineering Education; online assessment; assessment methods; student cheating; academic dishonesty; COVID-19 pandemic.

## 1 Introduction

The radical change imposed by COVID-19 pandemic since 11<sup>th</sup> March 2020 (WHO, 2020) turned our world around totally. Nothing was kept equal to the way before that. Life at work, in the community, in school, they all changed. The computers and phones in our houses become our windows to the world and our means to reach Education. Students and teachers in the world become connected through the technology, discovering a completely new world of collaborative platforms and virtual learning environments. Nevertheless, it is necessary time to adapt and to adopt such technologies, fitting in it the traditional lectures and assessment methods that have been in use for centuries. On-site and face-to-face written tests become online digital tests and students are far away from teachers' "eyes". This creates doubts and the fear of students being able to cheat as they reach all the information that they need through internet or could order a service (Dawson & Sutherland-Smith, 2018; Silva, 2021).

Student academic dishonesty can take many forms, according to different authors: cheating on tests and assignments, falsification of data, plagiarism, inappropriate use of resources, taking credit for the work done by others and manipulation of academic staff (Park, 2003). According to Thomas and De Bruin (2012), in some cases, student academic dishonesty is not addressed by educational institutions for many reasons like psychological discomfort and also high workload and time needed to plan assignments focused to minimize cheating. Despite these issues, it is important to study the factors that lead students to cheat, since it may negatively interfere with the work of the learning environment as well as the process of student learning. For this reason, many teachers' concern is to find ways to prevent this, as has been reported, reason why there are a lot of options to prevent students from cheating (Dawson, 2021). Instead of focusing on ways to prevent it, maybe teachers need to learn how to use alternative assessment methods and understand the purpose of assessment methods according to the intended learning outcomes of the course and develop more effective student assessment.

Assessment can be defined as a feedback message about how students should fit into the learning (Uebemansur & Alves, 2018). According to Earl and Katz (2006), the purpose of assessment practices can be viewed from three different perspectives: *assessment of learning*, *assessment for learning*, and *assessment as learning*. The first is, mostly, related to summative assessment and the latter two on formative assessment practices.

Attending to this context, this paper aims to analyze student assessment in the context of three different courses at the University of Minho, undertaken in 2019\_20 and 2020\_21. Also, it is intended to compare the classifications achieved by students in tests which occurred before COVID-19 pandemic (on-site assessment in 2019\_20) and during the COVID-19 lockdown (online/hybrid assessment in 2020\_21), discussing its implications for teachers and students, including academic dishonesty, in the form of cheating.

This paper is structured in five sections. This introduction presents the aim of the study and its theoretical background. Section two describes the context of the study. Section three presents the comparison of test grades in the three courses. Some suggestions for online assessment are presented and discussed on section four. The last section of the paper presents the conclusions and final remarks.

## 2 Study context

This section gives an overview of the two cohorts 2019\_20 and 2020\_21 of the three courses analyzed and compared in this study. Two of the courses are from Industrial Engineering and Management (IEM) Integrated Masters: first and third year (IEM11 and IEM31); and the third course is from the Engineering Project Management Master (EPM). The IEM of University of Minho is an Integrated Masters degree program of five years, 10 semesters. Each semester has 5-6 courses with five European Credit Transfer System (ECTS) each in a total of 30 by semester. At the end of the program, students obtain 300 ECTS. EPM is a second-cycle master with two years in a total of 120 ECTS.

### 2.1 TIEM & PSOI courses of the Industrial Engineering and Management program

The IEM first year course is called "Topics of Industrial Engineering and Management" (TIEM), which is the first curricular unit related with IEM program. Mainly, TIEM is an introduction to the design of production systems involving introductory contents such as teams formation, project management, IEM history and work organization models (e.g. principles of Scientific Management, Toyota principles as Lean Production roots, socio-technical systems and main industrial psychologists such as Elton Mayo, Herzberg, Maslow, Schein among others), design of production systems principles and tools, layouts, production dynamics and performance measures, sustainability and eco-efficiency measures and Lego Mindstorms for production systems prototypes. It is important to highlight that TIEM is integrated in a PBL learning environment as all Engineering and Sciences courses of the first year and first semester of a course called Integrated Project of Industrial Engineering and Management (IPIEM) (Alves et al., 2019). Normally, this course is lectured by three teachers, each one lecturing different modules of the TIEM contents.

The IEM third year course is Production System Organization I (PSOI) that is lectured in the first semester. It deepens the contents given in the TIEM, mainly explores Lean Production, Lean Thinking principles and methodologies to design production systems in the context of reducing wastes. Then, it is lectured a methodology to design or reconfigure production systems focusing contents such as production families formation following Group Technology and clustering methods, balancing methods and operation modes, standard work, layout methods among others (Alves et al., 2015; Alves, 2018; Alves, 2007).

Table 1 presents the number of students, number of teams and assessment elements in 2019\_20 and 2020\_21 cohorts.

Table 1. Cohorts' characterization of IEM's TIEM and PSOI.

Course	Cohort	Number of students	Number of teams	Assessment elements
TIEM	2019_20 on-site	84	13	3 team tasks (50%) + <b>2 on-site tests (60 min. &amp; 75 min.)</b> (50%)
	2020_21 Hybrid	76	10	4 team tasks (55%) + <b>1 online test &amp; 1 on-site test (40 min. &amp; 75 min.)</b> (45%)
PSOI	2019_20 on-site	96	11	3 quizzes (5-minute) (15%) + 2 team tasks (10%+(40%+5%peer)) + <b>2 written tests (60 min. &amp; 50 min.)</b> (30%)
	2020_21 Hybrid	98	11	3 quizzes (5-minute) (15%) + 2 team tasks (15%+45%) + <b>1 online test (30 min.)</b> (25%)

In TIEM cohort of 2019\_20 the tests were exclusively on-site (in a traditional approach). For the cohort of 2020\_21, the first test was already online and the second was on-site (a hybrid approach according to the teachers' choice due to the pandemic situation). The teacher who lectured the first module of the TIEM course had the will, since a long time, to have online tests and saw in the pandemic situation the opportunity to explore this way of assessment. During the semester, the university regulations related to tests (online/on-site) changed and the teacher who lectured the second module of the TIEM course returned to the on-site tests.

The on-site written tests could include true/false questions, select the right answer, direct questions for short answers, exercises, fill in the blank spaces, descriptions and interpretation of situations and cross arrows selection in a total of 25 questions. The online test was developed using Google Forms through the quiz functionality, had 20 questions of different types (short and long paragraph, drop-down, multiple choice grid, description of situations and interpretation, check-boxes, multiple choice, interpretation of images). These questions are divided by section according to the content and appearing to the students' section-to-section. The students can always go back and correct anything. All team tasks are reviewed by the teachers and then delivered to the teams for improving for the IPIEM report and presentations. This course is totally aligned with the team projects developed in the context of PBL (Alves et al., 2017; Alves et al., 2019).

In the PSOI cohort of 2019\_20, the tests were on-site (following a traditional approach). Due to pandemic reasons, the duration of the first semester of 2020\_21 was shorter, so the PSOI lecture decided to have only one test. The on-site tests followed the same format of TIEM tests including different types of questions. Students' opinion was collected to know whether the test should be on-site or online. Most of the students preferred the test online. Even in 2019\_20 (without COVID-19), all tests/quizzes were carried out online. Along with the PSOI tests, two tasks were assigned to the student teams. The first team task had less weight because it was considered easier. It consisted in giving the team an assignment aimed to search, analyze and interpret a published case study in an indexed journal that reports a design/redesign of a production system in a lean context (Alves, 2020). In the cohort of 2019\_20, the second team task of PSOI had a weight of 45%, being 5% given by peer assessment. In the cohort 2020\_21, this 5% weight was removed as the teams presented one at each time in the classroom, due to the pandemic situation. It is a hands-on activity developed in the context of two courses of the third year (Alves & Soares, 2020; Soares & Alves, 2019) but, attending to the restrictions of the room capacity, the teams were not all allowed to be in the room. Competencies developed by the students within these specific courses are explored and presented in the study of Alves and Soares (2020).

## 2.2 DPS course of the Engineering Project Management program

The course from EPM is an optional course called Design of Production Systems (DPS) lectured in the first year, of the first semester. The contents of this course are similar to the first part of the contents of PSOI but the second part is more basic as these students have a very heterogeneous background (i.e. some are not even from Engineering, but, for example, Journalism). At the same time, they are mostly all professionals working in companies. Table 2 presents the number of students, teams and the assessment elements.

Table 2. Characterization of the DPS cohorts.

Course	Cohort	Number of students	Number of teams	Assessment elements
DPS	2019_20 on-site	24	5	2 (5-minute) quizzes (10%) + 2 teams tasks (10%+(35%+5%peer)) + <b>1 written test (60 min.) (40%)</b>
	2020_21 Hybrid	30	6	2 (5-minute) quizzes (10%) + 2 teams tasks (10%+40%) + <b>1 online test (60 min.) (40%)</b>

As related to IEM’s TIEM and PSOI, the DPS 2019\_20 cohort tests were exclusively on-site and in 2020\_21 were on-line as desired by the teacher.

### 3 Comparing tests grades results

This section is divided in two subsections, according to the results analyzed in the IEM and EPM courses.

#### 3.1 IEM tests grades results

The graph of Figure 1 below is related to the analysis of grades achieved in the tests (0-100%) of IEM’s Topics of Industrial Engineering and Management (TIEM) students.

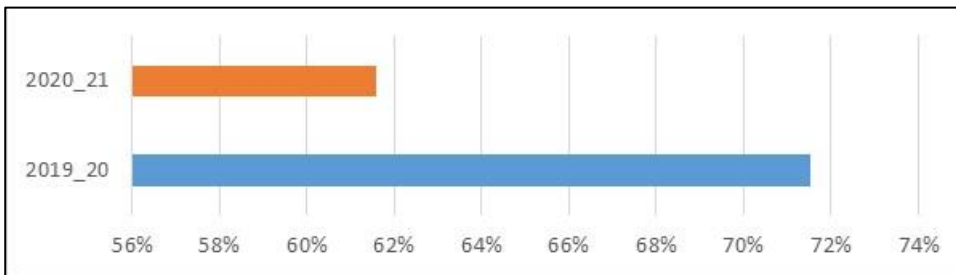


Figure 1. TIEM grades average of tests by cohort.

The same analysis from students’ tests (Table 1) of IEM’s Production System Organization I (PSOI) is presented in the Figure 2.

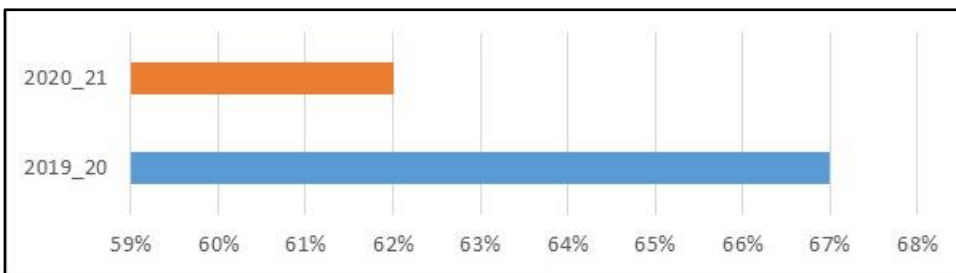


Figure 2. PSOI grades average of tests by cohort.

Based on these results, one of the first evidence that could be drawn is that the average of student classifications in the tests is lower in the online/hybrid assessment (2020\_21) learning environments compared to the on-site assessment (2019\_20). This is an interesting finding as one of the most common concerns about online assessment is that students will be able to cheat or employ other dishonest or unethical practices to achieve higher grades.

#### 3.2 EPM tests grades results

The grades average of tests obtained for the course EPM’s Design of Production Systems (DPS) were also analyzed, resulting in the Figure 3.

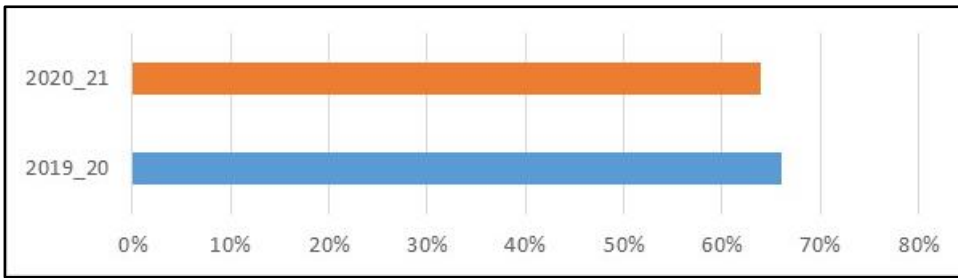


Figure 3. DPS grades average of tests by cohort.

In the same way, the two cohorts of students from the EPM course analyzed in 2019\_20 and 2020\_21 do not present hardly any differences in the grades average achieved by students in the tests. In this case, the formal assessment elements included in the course, in both years, were basically the same, which shows that, despite the fact that the students performed the test on-site or online, the learning outcomes of the course seem to be effectively achieved.

### 3.3 Discussion

There are a lot of variables that could influence the obtained test results (e.g. more difficulty, less time) but the teacher made an effort to balance those. For example, removing more practical exercises that are more difficult to do in a computer, like design a network or a Gantt diagram for a Project Management exercise in the case of TIEM course. Furthermore, the tests completed by the students during the semester and reported on Table 1 and Table 2, were summative assessments. Nevertheless, tests are not the only assessment component. Quizzes, held along the semester, and team tasks are some of the other components. Team tasks are mainly based on formative assessment, with a higher weight for this reason. For the PSOI, team tasks progress are monitored by using the Padlet tool (visual computer platform) (Alves & Soares, 2020; Soares & Alves, 2019). Figure 4 presents the Padlet, in this case, used by the teams of 2020\_21. The Padlet is not part of student assessment.

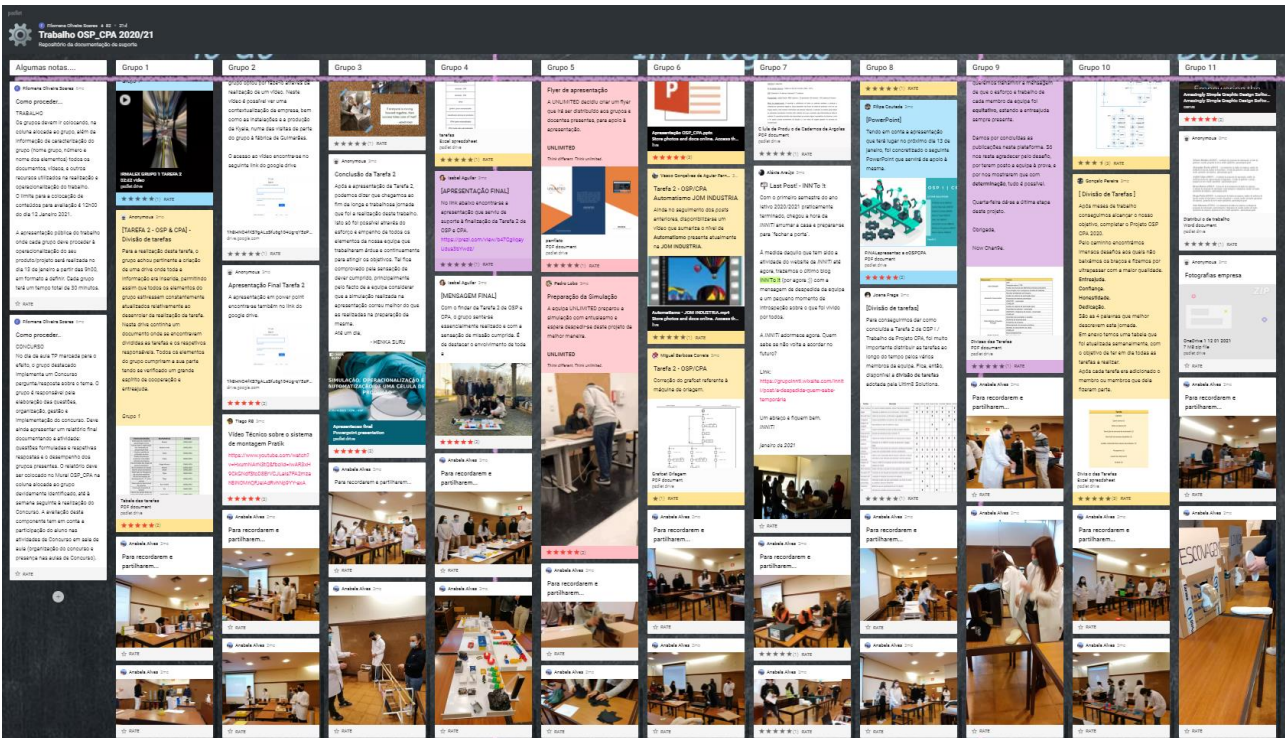


Figure 4. Teams work and progress shown through the Padlet (PSOI cohort 2020\_2021).

In this pandemic time, it is even more critical that tests should not be the only assessment component because students are completely dependent of the technologies that they possess and many students do not have the

desired conditions. Furthermore, house conditions (e.g. noise, one division, brothers that want to play or use the same computer, pets, among others) create constraints for student concentration and attention. This, as noticed by some students, could create unfair and unequal situations among the students.

The feedback of students obtained through the University Quality System (UQS) revealed some concerns related to the Google platform because of the limitation in reading the whole question (in a few cases). Students did not realize that this could be solved by pulling the scroll. A solution could be to use another tool or having shorter questions. Other concerns are common to the on-site tests, namely, the complaint about ambiguous questions. One student considered that the tests should be always on-site because of the stressful situation of on-line tests but this also could happen in on-site.

#### **4 Suggestions for online assessments**

Based on this study, a set of suggestions can be pointed out, for university teachers and educators, on how to prepare and deliver online assessments, taking in mind that assessment is also an opportunity for student learning, self-assessment and self-regulation (Earl & Katz, 2006). The first recommendation is the importance of using a diversity of assessment methods, which means that tests and examinations should not be the exclusive or single type of assessment method included in the formal assessment method of the curricular unit. Aligned with this assumption is the importance of using digital formative assessment tools, for monitoring student learning and providing feedback and interaction with students. Some examples of these tools may include self-test quiz and discussion forums (Google Forms, Kahoot, Quizziz, Miro, Padlet, Mentimeter, Slido, etc.).

Also, diagnostic assessment, before the start of the learning process, allows teachers to know where their students are at that moment. Formative assessments during the learning process allow teachers and students themselves to adjust the teaching and learning process according to that and to drive instruction practices centered on student growth, self-regulation and understanding (Barton, 2018; Maier et al., 2016). These approaches support the existence of a variety of learning styles, learning levels, recognizing differentiation in the classroom. It helps improve student growth by providing relevant and timely feedback.

Last, but not least a constant interaction from the teacher to the students is mandatory, as shown in PSOI cohort of 2019\_20 (subsection 2.1). This allows students to be inquired about their assessment preferences, assuring confidence and commitment in the learning environment. This interaction could also take the form of promoting more moments for students to study small batches of contents by the short-duration and frequent quizzes, , adopting a one-piece flow strategy like in the production organization (Sekine, 1990), instead of having only one single test (production in batches).

Despite the advantages and the role of formative assessment for student learning, students are greatly concerned with summative assessment, usually focused in content-centered assessments, this is, the quantitative results achieved based on a classification scale. This type of assessment is mostly related to traditional forms of assessment, which are often highly content-driven and based on paper and pencil and, usually, focused on content-centered tests.

According to recent literature on online assessment in Higher Education in the time of COVID-19 (García-Peñalvo et al., 2020, 2021; Tuah & Naing, 2021), several recommendations for online assessment practices and measures should be considered. These recommendations include, for example, considering student diversity when selecting online assessment methods, assuring institutional and educator readiness for online assessment, using digital tools already available at higher education institutions, etc. In sum, we agree with Tuah and Naing (2021), who recognize that there is no cheat-proof online and paper-based examinations. In the rapidly shifting situation of COVID-19 pandemic and global uncertainties, educators in HEIs must explore the best approaches to reduce disruptions on students, teaching, learning and assessment (Tuah & Naing, 2021).

## 5 Final remarks

This paper analyzed three courses (TIEM, PSOI and DPS) of two master programs (EMI and EPM) of the Department of Production and Systems, School of Engineering of University of Minho that were offered in 2019\_20 (before COVID-19) and 2020\_21 (during pandemic situation) with slight differences. The paper discussed the average grades obtained in the summative component of the assessment (written and online tests). The teacher sought to maintain the same test conditions, introducing some slight differences due to the difficulty that students could have in doing online tests. The average grades in two of the courses was lower in 2020\_21 than in 2019\_20 and in the third course it was very similar. Of course, this could not mean that students did not cheat because a lot of variables influenced this process. Nevertheless, the average was not higher.

With this study, the authors recommend and alert that teachers need to diversify assessments components and approaches, and, in turbulent times, it is the opportunity to reflect upon the learning process. Students that like to learn and are self-regulated by nature continue learning, if they feel the assessment is fair. If not, they will feel disappointed and, even, demotivated. Otherwise, they could feel compelled to do what others do and be tempted to cheat. In this case, the problem is related to the student or to the method employed by the teacher? Is it an ethical problem or of motivation? And, for instance, when a student is integrated in a team (e.g. in a PBL project) is it a motivation or integration problem? Or a team problem? Is the grade important for PBL teamwork? A lot of questions remain without answer and could be interesting questions for deeper studies.

Limitations of this study are related to the reduced sample and the impossibility to isolate the variables that could influence the student grades, including that they are different students with different profiles and learning styles.

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