THE IMPACT OF ONLINE ASSESSMENT ON STUDENTS PERCEPTIONS AND PERFORMANCE

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ABSTRACT

One of the most sensitive changes faced by technical colleges due to the COVID-19 crisis was the remote assessment of student learning. This study analyzed the case of massive online learning institutes that rapidly changed the final assessment (Technical students in 2020) from face-to-face exams to entirely online exams. This study focused on the influence of online assessment on academic activities and students' perception about the new methodology. Two data sources are proposed used for this assessment: A comparison of academic performance indicators (assessment, success and achievement rates, and average marks obtained) between the online examination call and previous face-to-face examinations; and a questionnaire to a sample of students (n number of students) regarding their perception of the online assessment experience. A comparison of academic performance indicators (assessment, success and achievement rates, and average marks obtained) between the online examination call and previous face-to-face examinations; and a questionnaire to a sample of students (n number of students) regarding their perception of the online assessment experience. The results show that all the academic performance indicators in the Department Courses offered at the institute increased when the final assessment method turned to online due to the pandemic crisis; and that a majority of students are more favorable to online assessment methods. The discussion places these findings in a context of rapid change, and concludes by identifying the possible implications of online assessment for student retention, organizational challenges, as well as the feasible solutions for further studies.

Keywords*: e-learning, technical education, online exams, online assessment, students' performance.*

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1. Introduction

The approach to learning assessment is a key aspect in the pedagogical model of higher education institutions. Therefore, technical institutions are very cautious about moving towards digital assessment methods. Changes are usually made with appropriate timing, allocating the necessary resources and valuing their contribution to the quality of education. But the context for introducing digital innovations in technical institution was altered by COVID-19 [1,2,3] so at that time the transition from campus-based methods to remote teaching practices took place without having time to plan and evaluate the impact of the changes.

There is much evidence to suggest the influence of using different assessment methods face-to-face, online or blended on the learning cycle of technical education students [4, 5, 6, and 7]. And therefore it is to be expected that a change in assessment format from a face-to-face to an online method will have some impact on students' performance.

Considering these reflections, in this paper we analyze the impact on students' performance of introducing an accelerated change in the final assessment of students in the case of a massive online examination, which moved from a face-to-face examination-based system to a fully online mode in June 2020, as a consequence of the pandemic. It is worth to notice that the only change was in the assessment system, as the courses were already taught at a distance before, and during, the pandemic. We aim to answer the following research questions:

- Research question 1 (RQ-1). Has the new online final assessment method had any influence on students' performance?
- Research question 2 (RQ-2). How has the sudden change resulting from COVID-19 influenced students' perceptions towards assessment?

In the first place, we introduce the background to the reasons that make it difficult for universities to implement digital assessment systems. We also explore the literature on the relationship between digital assessment and performance in technical education. This is followed by a case study at the TPEVRGPTC, VELLORE-2, where a final online assessment system was applied due to the COVID-19. We aim to provide evidence about the impact of the rapid adoption of online assessment that can inform further reflection and decision-making about assessment methods that can be used.

II. Barriers to Digital Assessment in Technical Education

Examples of digital assessment include proctored exams, multiple-choice digital tests, and virtualrealitySimulations, standardized tests, video performances, and digital portfolios. There is a lot of research on digital assessment, focusing on the application of some of these variants in different contexts [8, 9, 10, 11, 12, and 13]. In general, the results point to the integrity of remote assessment processes and a number of associated advantages [14, 15, 16]: better engagement from students; staff can choose the timing for their assessments; students can choose when and where to undertake assessments; more efficient management of assignment submissions, marking and moderation; better storage and archiving of student attainment records; ability to improve existing "human" or solely paper-based methods of marking. But, in the case of technical education and despite the abundance of evidence, most of the technical colleges have implemented any online assessment system. It has been mainly in the open and online that most pilot tests have been implemented while face-to-face institutions are reluctant to overcome the many obstacles to digital assessment. In any case, a recent study about assessment in mega technical institutions shows that "online assessment is reported to be applied all level.

III. Methodology

The main objective of the study is to determine the influence on students' performance of the change in the final assessment system at technical education, from a face-to-face to an entirely online examination system. To better understand the impact of this change on students, the study also aims to understand the influence of the speed of change, since the online assessment system was suddenly introduced as a result of the COVID-19 crisis.

Normally, the final assessment at the technical education was based on face-to-face examinations held in the colleges located in technical institutions (polytechnic- 45 centers) and others non technical institutions (19 centers). The change in assessment method meant that teachers had to convert their final face-to-face examination into a digital web-based examination. To this end, the technical institutions offered two digital assessment systems. One of these was applied mainly to courses with a low number of students enrolled, and consisted of using the assessment facilities available in the college's learning management systems (LMS). This solution involved adapting a digital infrastructure that was already in use. The second option was a new digital assessment system on which we focused on this work. This is a proctored testing platform created by technical institutions in order to scale up the large number of tests that had to be taken online due

to the pandemic. The number of online exams that took place in the new e-assessment proctored platform was about 88,000. Table 1 presents the characteristics of the final assessment methods before and during the pandemic. We remind that the only change was in the assessment system, as the courses were already delivered at a physical mode before the pandemic.

Table 1: Final assessment methods in Technical Education before and during the COVID-19 crisis

Key issues	**Usual Scenario**	**COVID Scenario**
Delivery of the Courses.	• Face-to-face exams. • Teachers prepare exams that students take in the technical education in respective regional centers.	• Proctored online exams. • A cloud-based application was designed with user access via the web. • Teachers prepare • exams, and students take them online from • anywhere.
Type of exams.	• Different types of exams can be prepared (MCQ, essay or open-ended questions, or mixed).	• Different types of exams can be configured (MCQ, essay or open-ended questions, or mixed).
Time to complete Exams.	• The examinations were conducted Synchronously. • Limited response time control (maximum 3 hours, minimum 1 hour).	• The examinations were conducted synchronously. • limited response time control (maximum 3 hours, average 1 hour).
Resources allowed in the Exams.	• Normally students cannot introduce or use any material (books, class notes) in the exam classroom.	• Normally students used books, electronics gadgets. • Some teachers designed open-book online exams.
Integrity of the assessment process.	• The integrity of the process was guaranteed by the exams being invigilated (by teachers and support staff from the regional examination centers). • No electronic devices are permitted.	• Integrity was ensured through control procedures that prevented students from cheating. • Camera shots during the exam, no copy and paste in the application, reduced time to complete the exam compared to the time available in the face-to-face mode.
Examination Control	• Examinations are controlled by the invigilator and strictly follow the examinations reuses and regulations.	• Examinations are not in our control and violate the examination rules and regulations

To clarify and monitor (for quality assurance purposes) the academic aspects associated with the transition from an analogical to a digital assessment system on a mass scale, the technical education designed a protocol that included guidance for the teaching staff. The technical institution's premise for its teaching professionals was to apply the same academic criteria established in the study guide for each course, making the least number of changes to the structure of the assessment, even though it was now online: i.e., if the original classroom exam was MCQ, essay or open-ended questions, or mixed to be completed in one hour, the online assessment should be similar; if the classroom exam included a MCQ, essay or open-ended questions, or mixed to be completed in 3 hours, the online exam should have the same scheme.

The transition from one system to another did not cause any organizational difficulties, although the context of the COVID-19 led to a consensus among the teaching staff that the design of the new online exams would not lead to increased difficulty. The aim was to avoid greater stress for students, considering the difficult situation associated with the pandemic.

In terms of the availability of technological infrastructures and the digital skills of students, teachers and support staff, the context of a online teaching means that these needs are essentially covered. During the enrolment process, students are asked about the need for connectivity to access online learning. Similarly, teachers and support staff are trained to operate in fully online contexts.

IV. Results

The results derive from the analysis of data from the two statistical data sources. Firstly, data on student performance over the past six years measure the impact of the change in assessment method during COVID-19.As described below, the analysis of these data in response to RQ-1 takes two forms: aggregating all Technical Diploma Degrees and measuring the variability of performance indicators in the last six years; and disaggregating each Diploma's Degree and performance indicators into these degrees.

The second analytical framework concerns data from the survey of Diploma Degree students who participated in the new online assessment. In response to RQ-2, only the items referred to students' perceptions of the sudden change in the final assessment method because of the COVID-19 have been considered.

A. Overview: general evolution of academic performance indicators

The information in **Figure 1** provides an overview of the evolution of four academic performance indicators in the cycle over the last 6 years, aggregated for all Technical education Degree courses. The data for the year 2021 correspond to the online assessment method, whereas the usual face-to-face examinations at Technical Education were used in the previous 5 years, from 2015 to 2021. In 2020 to 2021the academic performance of students increased in all 4 indicators by between 15% and 20%.

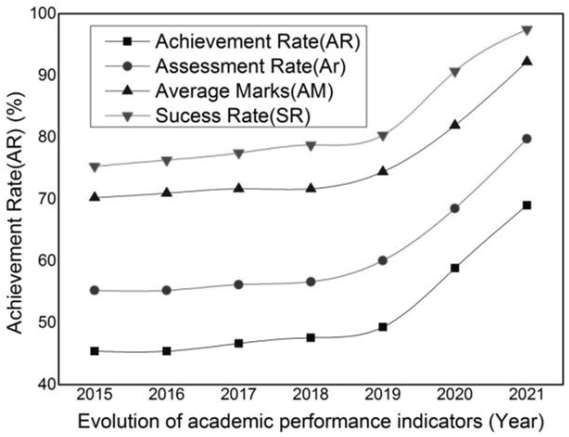

Fig 1: Evolution of academic performance indicators in Diploma. Aggregated data from all courses between 2015 and 2021

(Source: Diploma Student Data Base)

The data from the survey on students' perceptions provide a complementary view related to the Achievement Rate (AR). Students were asked what influence the fact that the method used was online had on their decision to participate in the final assessment (**Figure 2**). A majority of students said it had no influence at all (60.89%), followed by those who felt encouraged to participate (25.71%), and a minority felt discouraged (13.4%). This is directly related to students' perception of online assessment, with a positive impression (predominantly "no influence" or "positive influence" responses). Eventually, this could explain in academic terms the higher participation rate in the exams. However, the possible projection of these results to other domains should consider the context of the research, as well as the possible biases of a sample composed mainly of students who took the exams and excluding those who did not, who may also have been discouraged by the newonline exam format.

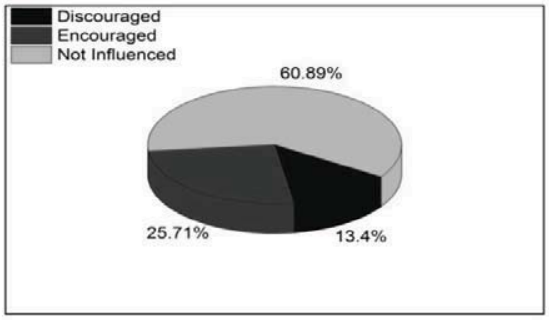

Fig 2: students' perceptions provide a corresponding view related to the Assessment Rate (RA)

Figure 3 also shows the data from the survey items on students' preference between online and face-to-face exams. The majority of Technical students prefer online exams (54.3%) to face-to-face exams (39.9%), with a small percentage expressing other preferences (5.8%). Although this is significant, it should be noted that the context is that of a online examination for diploma engineering, where there is a clear preference for digital methodologies.

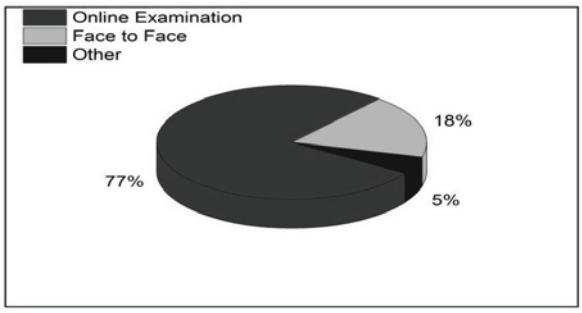

Fig 3: Assessment Method for Final Examinations

The improvement in grades is paralleled by students' perception of the online assessment method as difficult. This would be adding value to the improvement in scores, in terms of the reliability of the examination system. The data from the Lakers scale in **Figure 4** show that most students consider online assessment to be no easier than face-to-face assessment (39.5% strongly disagree; 24.3% disagree), with 25.7% thinking it is the same. In addition, the effect of a possible use of the survey by students to condition the difficulty of exams in the future could also be considered.

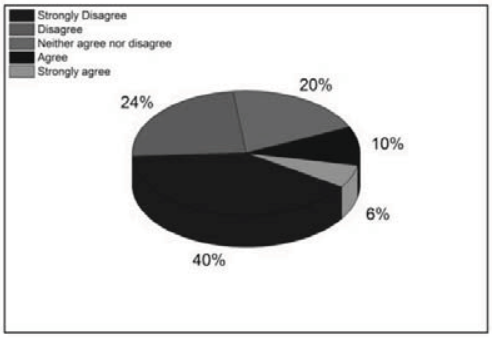

Fig 4: Online Exams Vs Face-to-Face Ones

(1) Strongly disagree; (2) Disagree; (3) Neither agree nor disagree;

(4) Agree; (5) Strongly agree

Also, the time variable is one of the most mentioned in the scientific literature on the integrity of proctored exams. It is also stressed that more time in exams does not improve student performance in terms of higher scores [17]. On this occasion, **Figure 5** shows a clear majority of students who stated that the time available was short (61%), followed by those who had sufficient time (29%) and, residually, those who claimed to have more time than necessary. These results indicate that the high-performance scores were achieved under conditions of time constraints.

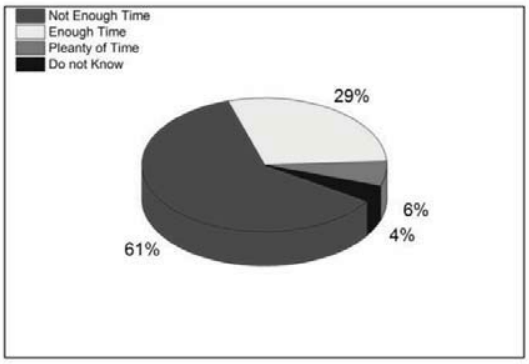

Fig 5: Examination Time Schedule Vs Students Feed back

V. Discussion

Digital learning assessment methods have proved to be useful in improving teaching, mainly because of their flexibility and ability to adapt to individual student situations [18, 19]. However, studies on its impact on academic performance have been inconclusive, and the only common element in the scientific literature is the strong link between performance and the academic conditions that frame online assessment i.e., rapid organizational change, prior training of students in assessment, circumstances in which exams are held, etc,. In the study presented here, the positive

effect of online assessment on student performance is clear. And eventually, analysis of the findings must also consider the impact of academic conditions on outcomes.

Most of the evidence found is in response to RQ-1, since the results suggest a direct correlation between the usage of an online evaluation technique and the improvement in performance across all the indicators. Therefore, the academic design of online assessment should be addressed in the response to RQ-2.

In the case of Technical Education, the academic issues that conditioned the online assessment revolved around the emergence of change because of the COVID-19. In addition, the speed of change also affected the type of technology and the assessment process in each case.

The results show that the improvement in performance indicators coincides with a high appreciation of online assessment by students; there are a residual number of students discouraged from taking exams when the system changed from face-to-face to online (Figure 2). The research suggests two factors that may explain the improvements, and these are provided below.

- The online assessment under analysis took place in June 2020 during the COVID-19 crisis that, in the case of Tamilnadu, India, led to a situation of population confinement. In this context, many Technical Students may have taken advantage of the slowdown in socio-economic activity to spend more time on academic activities. This situation may have altered the results, making it necessary to further study the impact of online assessment under "normal" circumstances.
- Another circumstance that can explain the positive results in performance is the protocol applied to design the exams. Due to the rapid change, teachers simply replicated the face-to-face exams in the online format, and tried to avoid extra difficulties for the students. It is possible that the online exams that were finally designed were less difficult than the original face-to-face version. Again, this possible bias calls for alternative research on successive cohorts of students and also adding analysis of the process of test design by teachers.

The fact that research is contextualized in a Technical Colleges also has an impact on the acceptance of online assessment, as students eventually appreciate the ease of not having to travel to the examination centers. In this sense, the results are consistent with previous studies that highlight

the preference of Technical students for online exams [20, 21, 22], and specifically in the context of Technical Learning Colleges.

Another topic of discussion is the influence of online exam time on performance. According to the results of previous studies, this research also points out that students attach great importance to the time available. Here their perception is that examination time has been low (Figure 4), although, contrary to the results of other studies [23], the scores of average mark, have been higher than in face-to-face exams with the same time available. Previous research relates time available to anxiety levels, and indicates that perceived negative factors about the dynamics of an online exam decrease after students have tried the system [24] . While this study does not address the anxiety variable, it does reinforce students' concerns about the apparent lack of time to take exams and the difficulty that comes with it.

Finally, it is worth discussing the role of cheating in research results. The scientific literature highlights doubts in the integrity of online assessment due to the possibility of cheating, among other factors. In the study, this weakness attempted to be controlled by looking at the different control mechanisms (technological, time, question focus, process monitoring, etc.) that were applied in the online exams. Table 1 shows the control technologies employed, and evidence was also collected on the difficulty of limiting the time available to take the exams (see Figure 5), which affects the intentionality to cheat in online performance situations [25,26].

Conclusion

The aim of the study is to take a broader view than the purely technical one of the consequences on academic performance of changing the assessment format use of an online versus a face-to-face system, incorporating academic factors organizational context and students' perception of rapid change which, according to the literature review, are also decisive in explaining student performance. To this end, data were collected from the technical students using an online assessment system at the Polytechnic Colleges.

The first study question focuses on the influence of the new online examination system on student performance. The study concludes that there is an increase in the academic performance of students who have taken the online exams in all the indicators analyzed, and that the differences are statistically significant, especially in Assessment and Achievement rates. Success rate and Average mark have also increased with the online assessment that was in place in 2020, but the differences were statistically significant in 50% (AM) and 35.7% (SR) of the Diploma Degree. The second

study question focused on the possible change in students' perceptions of online examinations after experiencing the new method. And the study concludes that improvement in academic performance also coincides with a better perception by Technical Students of online assessment as opposed to face-to-face assessment. In addition, the online format encouraged them to take the exams, although they did not perceive the online version to be easier and found the short time available a particular difficulty.

The contribution of the study to the issue of the integrity of the online assessment process is limited. However, the results of the survey on students' perceptions of online assessment point to a more difficult, time-sensitive and generally more complex system than face-to-face examinations. In this sense, the data indicate that students do not perceive online assessment as easy, with lower quality and less control. And in the specific case of technical learning colleges, the most relevant academic aspect resulting from students' acceptance of the online method is the increase in Assessment Rate(Ar), considering that in Technical learning College education the number of students enrolled who pass the course is usually lower than in face-to-face College Educations.

There are also limitations when it comes to attributing a motivational capacity to online exams. In the study, students expressed a favorable tendency towards online exams, insofar as they had no influence or minimal incentive to take them (Figure 2) and are preferred over face-to-face exams (Figure 3). However, this effect seems to be more related to the context of technical learning colleges where students are more likely to opt for any non-face-to-face alternative than for online exams. So, based on the data from this study, a conclusion on this aspect would require further inquiry in conventional face-to-face learning situations.

A possible implication of the implementation of the online assessment and the increase in academic performance is an expected reduction of dropout in the medium term. The significant increase in the achievement rate, which means that a higher percentage of students pass a course, can positively lead to a higher enrolment in the next year. This impact on retention has a great significance in Technical Education, where dropout has been a permanent challenge [27].

The findings show that the students' academic performance in all the indicators and all the Technical Degrees has improved, and that the general opinion of the students who responded to the survey is good about the online system. The question then is how this experience will inform and drive long-term organizational change. In the case of Technical Education, the online final assessment system was also implemented in the September 2020 call and throughout the 2020-2021 academic year. But is this still an emergency solution, and will exams be held again face-to-face as

long as the pandemic allows? Will online exams continue to be the main final assessment system after the COVID-19 crisis? Will online and face-to-face exams coexist in the future?

On the horizon, organizations are faced with questions about improving the reliability of online examinations, and administrative barriers related to agencies and quality standards. How to overcome these barriers and take advantage of the benefits of digital assessment will be factors to be analyzed in the near future.

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