

Online assessment and proctored testing through a biometric system. Experiences and challenges of university teachers

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Abstract– *Currently, online assessments are booming. However, not everything is perfect. It is known that not having the possibility to supervise them has created a dilemma for teachers. The research describes university teacher’s experiences with virtual assessments, therefore, investigating biometric systems used as a remote proctoring system that verifies and monitors the student body while taking online exams is important for improving educational processes. The research with a qualitative approach interviewed ten university professors with more than five years of experience. A duly validated interview guide was prepared, meeting the quality criteria, in order to deepen the teachers’ answers. The quality criteria included credibility, transferability, reliability-confirmability and reflexivity. A mandatory inclusion criterion was to have experience in the use of systems such as Procterizer during online evaluations. The interview guide was distributed in two categories: online assessment and proctored tests. Likewise, a group discussion was held with five education professionals, in such a way that new categories were generated the results indicate that the student body develops multiple dishonest activities, plagiarism, examination with the help of third parties, payment to relatives, strangers, or group mates, who try to cheat to pass a course that they consider demanding. In conclusion, teachers have turned to new ways of controlling online evaluations to reduce the levels of plagiarism and generate the development of competencies in students.*

Keywords-- *Online assessment, exams, university, Procterizer, evaluations s.*

I. INTRODUCTION

A proctored test is an examination supervised by a third party [1]–[3]. This type of exam is often used for distance assessment, as it ensures that the examinee does not cheat or plagiarize [4]. Proctored tests can also be used in educational institutions to ensure academic integrity in the assessment process [5].

Educational institutions that lack an information system easily confuse efficiency and effectiveness or sometimes focus on efficiency and leave effectiveness behind [6]. When it comes to online testing, efficiency and effectiveness are key aspects of successful testing [7], [8]. Efficiency refers to the speed with which you are able to complete the test, while effectiveness

measures the accuracy of the answer relative to the correct answer. Educational institutions at the higher level have implemented online testing using biometric systems [9].

Biometric systems are used in online testing to provide security and accuracy. These systems use physical characteristics such as fingerprints, iris and facial scans to identify the test taker and ensure that the person taking the exam is the person who registered for the exam. In addition, biometric systems can also be used to detect cheating or plagiarism attempts during the exam.

A research on online assessment in higher education proposed to design in educational systems at all levels, effective strategies in educational technology. The authors suggest a digital transformation [10]. However, there is another proposal to modulate competencies to improve the evaluation processes to avoid memorizing knowledge and to avoid dishonest behaviors. Therefore, the ways of teaching, learning and evaluating should be improved [11], [12].

Likewise, an investigation related to the evaluations and formats most used by teachers showed that they preferred multiple-choice exams and were significantly superior when they were multiple-choice. Also, the students were disappointed with the university teachers for not addressing issues such as academic dishonesty. This situation led students to lose interest in an online assessment that is really meaningful in relation to their learning [13].

Although, there is other research on the same topic where university students had a positive perception towards digital assessments, such as the Smart Equation Exam System (SEED), which unlike an online assessment, this is a program where students can detail the steps to solve the proposed exercises and get feedback, especially for students with writing disabilities [14].

Also, in other cases it has been achieved that students have better scores in the electronic evaluations [15]. Assuming that the Blended Learning modality benefits 77.2% of the participants considering the learning to be excellent [16].

Research related to information security practices found that they do not have significant effects in education compared to other sectors. Ideally, computer systems should be used through institutional accounts, so that sessions can be conducted with greater security, avoiding impersonation [17].

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But online evaluations generate stress, anxiety, fear, difficulties before an unknown platform [18].

In the stages of the pandemic, before, during and after, mistakes have been made in the online evaluation processes, resulting in misinterpretations and/or misperceptions on the part of the students and their families. Therefore, one solution may be blended, integrated and flexible teaching and learning [19].

Establishing theoretical notions and frames of reference is important for interpreting research results. Evaluation makes it possible to establish a value judgment on an aspect of reality and it is necessary to make decisions and argue about what has been evaluated.

Evaluation is developed through the achievement of competencies, which obliges teachers to use various instruments and in all cases should provide information on student progress and suggest elements for improvement [20], [21]. The concept of competencies implies the integration of concepts, procedures and attitudes, which is usually visualized with the delivery of a project [20], [22].

Facing massive online assessments is something that universities had not faced from an institutional perspective. University teachers and students have come together to offer a way to assess their knowledge, skills and abilities in a way that demonstrates student progress and performance [10], [23]. Most of the students are very familiar to online environments and new ways of authentication [24].

However, one of the disadvantages of online assessments was the impersonation and/or cheating on the exams using third parties, product of this type of fraud, research related to computer security and stylometry arise. Stylometrics are generally used in forensic examinations, identification of authorship, Internet activity and potentially malicious writings [25].

This proposal arises as an alternative not to identify plagiarism, but to identify if the student is really the author of the work under certain parameters.

Cheating or academic frauds are problems that educational institutions carry with them and lead to impose various forms of evaluation, including the implementation of applications such as artificial intelligence [26].

In the context of academic training and when evaluations are used throughout the teaching process, questionnaires are generally used through applications, debates, online games, synchronously [27], [28].

Supervised tests consist of developing the evaluations with established times from the beginning to the end of the evaluation. In this mechanism, there is software that monitors the computer desktop. Also, video and audio from the webcam are taken into account.

The biometric system has been successfully implemented in some institutions for attendance control, teaching in various fields, electronic evaluation and identity management [29], [30]. In this system, characteristics of the human being are

introduced to identify him/her. Generally it is done by fingerprint recognition, signature recognition, eye retina mapping, and iris pattern and voice recognition.

But in Latin America, specialized software such as Procterizer or Edx are not common due to the high cost [31], [32]. Other platforms present very few accessibility errors, most of the known platforms have mobile access and can develop courses massively [33]–[35].

The implementation of new platforms depends on the policies established in each university institution [36].

Given the information described above, it is necessary to recognize that there are determining factors in the evaluation linked to learning such as perceived usefulness, self-efficacy, knowledge mastery and experience, which are of interest to academics, researchers and decision-makers interested in training through distance environments [31].

The aim of this research was to analyze in depth the experiences and challenges of online assessments and proctored tests through a biometric system.

The main questions that mark the research are:

- a) What is the opinion of university teachers about online evaluations? Do they perceive advantages?
- b) What strategies did the university teachers apply to students in order to avoid plagiarism?
- c) Can competencies be evaluated through an online exam? What is the opinion university teachers about proctored tests?
- d) How does the attitude of students change when they know that their academic work will go through an anti-plagiarism software or that their exam will have a biometric system?

II. METHODOLOGY

Since this is a qualitative study, we worked with 10 key subjects, who are university teachers, all of them with more than five years of experience and who use the Procterizer software in each semester.

This restriction is due to the fact that the professional can easily identify the problems of both face-to-face and virtual evaluations.

The university teachers identified for the sample teach academic training courses such as mathematics I, communicative competencies and methodology. The selected university teachers indicated that at the end of the semester they require the delivery of an academic product, generally related to research.

For the collection of the information, informed consent was given to the university teachers, after which the link for the interview was provided. Each interview lasted an average of 60 minutes. Time in which two important aspects were asked:

- a) Online evaluation, which included didactic quality of online evaluations, strategies used to avoid academic fraud and evaluation by competencies

b) Supervised tests, which included strategies used by teachers for the application of supervised tests, anti-plagiarism software and student attitudes when knowing that the evaluations would be through a software that does not allow them to commit academic fraud.

Characteristics of the statements described in Table I. A meeting was also held with five professionals to discuss and analyze the positive and negative points of the proposed use of Procterizer in online evaluations.

TABLE I
CATEGORY, SUBCATEGORIES AND ITEMS OF ONLINE ASSESSMENT AND PROCTORED TESTS

Category	Subcategories	Item
Evaluation	Online evaluation	1. Opinion about the didactic quality of online evaluations.
		2. Opinion on the strategies applied in online evaluations to avoid plagiarism or fraud.
		3. Evaluation of student competencies.
	Proctored tests	1. Opinion on the strategies used in the application of proctored tests.
		2. Experiences with some type of anti-plagiarism software in academic deliverables.
		3. Student attitudes towards the Procterizer.

The second instrument used was the group interview, which was derived from the group discussion technique. In the virtual context, a meeting was held with five education professionals, who discussed the positions expressed. The statements of each item were guided as shown in Table I, since in order to achieve depth it is better to listen to the points of view of each professional according to their experience.

For the application of the instrument, the instrument was analyzed and validated by education professionals. Likewise, the criteria of (a) credibility, (b) transferability, (c) reliability and confirmability, and (d) reflexivity were met. Table II describes each of the actions developed according to the quality criteria applied in the data collection process.

TABLE II
ACTIVITIES DEVELOPED ACCORDING TO QUALITY CRITERIA

Criteria	Strategies	Activities carried out
Credibility	Interaction with study subjects	University professors were invited on a voluntary basis to be part of the research. Then the informed consent was read prior to the interview and it was carried out through a virtual meeting.
	Triangulation	After obtaining the information from the teaching staff, a critical analysis was made of each response obtained, comparing it with the background and theoretical references. The information gathered is strengthened when developing the discussion chapter.
	Verification of the members	The answers of the interviewees were transcribed by the research team, complying with the scientific rigor among them (a) autonomy given to each interviewee, when their answers were superficial (b) Beneficence, when the interviewee answered with total freedom without prejudice (c) Justice, when all the interviewees were established the same requirements to be part of the research.
Transferability	Thorough description	Each of the answers were analyzed, taking as a reference: time of service, teaching experience and experience with the Procterizer software. These data are referents to establish generalizations in the new knowledge.
Reliability and confirmability	Audit log	The documentation was exhaustively analyzed, avoiding gray literature. The answers were coded with the initials of gender (male, female) and age, F35, F40, F41, F38, M51, M58, M48, M53, M61, and F59.
Reflexivity	Journal	The findings were shared with the research team, through Google drive, in order to perform a critical analysis.

III. RESULTS

The participants indicate that evaluating online saves time for grading, especially if the system is based on the Blackboard, Chamilo or Moodle Platform, as having several classrooms assigned gives them the possibility of reusing the questions, saving valuable time that is used for feedback. Likewise, regarding the strategies applied in online evaluations to avoid plagiarism, they use questions with multiple choice and randomized answers, matching questions, true and false questions. The ideal throughout the evaluation process is to avoid bad practices such as sending screenshots to a third party, or to WhatsApp groups that integrate the student body. Having the camera turned off leads to impersonation, so it is necessary to activate cameras in class sessions, especially during evaluations. Another group of students tries to look for the answer on the web at the speed that implies collusion with family members, classmates or third parties to whom they pay the academic help service.

Another action raised by university teachers is time, indicating date and time of receipt of exams. Even in Google form formats, they close the option of receiving answers until a time limit. The single answer options with the purpose of not being able to forward the link to other classmates or third parties outside the institution that can solve the exam.

Finally, the competencies developed are autonomy skills, such as critical thinking, self-evaluation and attitudes towards technological environments.

In relation to proctored tests, the interviewees indicate that when applying the evaluations they establish the times (M58, M48, M53) and the activation of cameras in virtual rooms (F35, F40, M61). However, the use of other software is not used by academic institutions at the higher level. The latent concern of the university teachers is when they identify texts such as reports, essays, innovation or entrepreneurship projects that place them partially or totally on the web, despite having established partial progress with each work team (F35, F40, M53, and M58).

Therefore, the university teachers has found it necessary to turn its gaze towards new challenges, new ways of evaluating and avoiding plagiarism, and to put aside academic dishonesty. An important step is the use of Turnitin hosted in the Google Word document called Turnitin draft Coach (F35, F40, M51, M59), which allows to visualize the percentage of similarity in the works shared with the students. The students find freely available software on the web that they use to verify the information before the formal submission (F40, M53, and M59).

Finally, there is an important version of the use of software that detects plagiarism: students are more careful at the time of submission, they are concerned about finding a way to improve the writing, although it does not necessarily reflect learning. The valuation between learning and grading differs in this sense, approval is more important than learning.

The teachers interviewed had experience with the use of the Procterizer software, in which they describe constant

concern about the feeling that they are being watched and about the possibility of annulling the exam leading to the disapproval of a course. At the beginning of the exam, the program provides a guided process to the students so that they can take the test with security and confidence, indicating how to cancel the exam. However, the teachers are aware that this system is an ally in the evaluations since it guarantees that it is the student who answers the questions and not a third party, since he/she is supervised in the development of the test. The teachers also recognize that taking an evaluation with the Procterizer generates stress, anxiety, lack of concentration, insecurity and worry in the students.

When applying the second instrument, through a group discussion, new categories were established such as (a) robotization of human behavior (b) linking human thought and actions in the face of technology.

The emerging subcategories, as a result of the analysis with the participants, became in two moments. First, it is necessary to recognize that the human being is the one who created the technology called Procterizer, but then this same technology does not allow the expression of emotions and makes the human behave like a robot. In this way, the individual freedom of the human being in the presence of technology is eliminated.

Second, the technology excludes students who have ties, touches, or a disability that the Procterizer does not recognize.

Finally, professionals recognize that the use of the Procterizer system in some cases generates mental blockage, stress, fear and anxiety.

IV. CONCLUSIONS AND DISCUSSION

The quality of university education is the main objective of all the actors in the community. However, it is overshadowed by the results obtained during the virtual process. If the student body and university teachers are the same, then finding the root of the problem is the product of this research. Online assessments have transformed the university curricular structure in such a way that there are changes, which adjust to the synchronous or asynchronous modality.

Plagiarism levels have surpassed the known barriers, even with the arrival of the pandemic to the world, new information windows were opened [26].

The results obtained agree that it is necessary to identify that online evaluations should generate in students, knowledge mastery, self-efficacy, and willingness to work in teams, which are important points for teaching professionals interested in improving evaluations in virtual environments [31]. Likewise, the use of security systems such as Procterizer software or Edx platforms is not common in Latin American higher education institutions due to their high costs [32].

It is suggested to promote qualitative studies that consider evaluation proposals in line with the development of competencies and the development of soft skills in different

samples. Likewise, successful experiences with the use of technological tools applied to online assessment should be investigated in order to generate academic discussion.

V. RECOMMENDATIONS

Due to the experience acquired in the first years of COVID-19, in which education became virtual in most of the countries in the world, it became necessary to also carry out learning evaluations by virtual means. Although there are proctored and non-proctored assessments, the literature reviewed recommends the use of proctoring through third parties.

Based on the findings, we recommend further training in the use of these tools, which ensure the quality and validity of the information received for grading.

On the other hand, we also recommend other researchers to conduct similar studies in other parts of the world, especially in other Latin American countries in order to compare different methodologies and results and generate academic discussion.

REFERENCES

- [1] P. Jones, Y. Tong, J. Liu, J. Borglum, and V. Primoli, "Score Comparability between Online Proctored and In-Person Credentialing Exams," *J. Educ. Meas.*, vol. 59, no. 2, pp. 180–207, Jun. 2022.
- [2] V. Andreou, S. Peters, J. Eggermont, J. Wens, and B. Schoenmakers, "Remote versus on-site proctored exam: comparing student results in a cross-sectional study," *BMC Med. Educ.*, vol. 21, no. 1, p. 624, Dec. 2021.
- [3] F. F. Kharbat and A. S. Abu Daabes, "E-proctored exams during the COVID-19 pandemic: A close understanding," *Educ. Inf. Technol.*, vol. 26, no. 6, pp. 6589–6605, Nov. 2021.
- [4] D. Steger, U. Schroeders, and O. Wilhelm, "Caught in the Act: Predicting Cheating in Unproctored Knowledge Assessment," *Assessment*, vol. 28, no. 3, pp. 1004–1017, Apr. 2021.
- [5] A. Alegre-Martínez, M. I. Martínez-Martínez, and J. L. Alfonso-Sánchez, "Do proctored online University exams in Covid-19 era affect final grades respect face-to-face exams?," in *7th International Conference on Higher Education Advances (HEAd'21)*, 2021.
- [6] J. J. Vazquez, E. P. Chiang, and I. Sarmiento-Barbieri, "Can we stay one step ahead of cheaters? A field experiment in proctoring online open book exams," *J. Behav. Exp. Econ.*, vol. 90, p. 101653, Feb. 2021.
- [7] S. W. Tabsh, H. A. El Kadi, and A. S. Abdelfatah, "Faculty Perception of Engineering Student Cheating and Effective Measures to Curb It," in *2019 IEEE Global Engineering Education Conference (EDUCON)*, 2019, pp. 806–810.
- [8] M. N. Karim, S. E. Kaminsky, and T. S. Behrend, "Cheating, Reactions, and Performance in Remotely Proctored Testing: An Exploratory Experimental Study," *J. Bus. Psychol.*, vol. 29, no. 4, pp. 555–572, Dec. 2014.
- [9] A. Okada, D. Whitelock, W. Holmes, and C. Edwards, "Student Acceptance of Online Assessment with e-Authentication in the UK," 2018, pp. 109–122.
- [10] F. J. García-Peñalvo, A. Corell, V. Abella-García, and M. Grande, "La evaluación online en la educación superior en tiempos de la COVID-19," *Educ. Knowl. Soc.*, vol. 21, no. 0, p. 26, 2020.
- [11] L. G. Aretio, "Can we trust evaluation in distance and digital education systems?," *RIED-Revista Iberoam. Educ. a Distancia*, vol. 24, no. 2, pp. 9–29, 2021.
- [12] F. Cárdenas Cabello and J. Luna Nemecio, "Evaluación en línea ante la pandemia por COVID-19: Retos y Oportunidades para las Universidades Mexicanas," *Rev. Univ. y Soc.*, vol. 12, no. 6, pp. 394–403, 2020.
- [13] E. O. Yilmaz and T. Toker, "Analysing the effects of assessment and evaluation applications and exam formats in distance education," *Int. J. Psychol. Educ. Stud.*, vol. 9, no. 1, pp. 165–176, 2022.
- [14] M. D. (Assa'd) J. Ahmad, T. Haimur, J. A. Bawalsah, M. O. Hiari, M. Musleh, and T. Haimur, "Students' perceptions toward a smart equation exam system for students with and without handwriting difficulties," *Cypriot J. Educ. Sci.*, vol. 17, no. 7, pp. 2447–2461, 2022.
- [15] H. Hichour, "Teachers' Experience in E-assessment: Case Study of EFL Teachers in Algerian Universities," *Arab World English J.*, vol. 13, no. 1, pp. 450–461, 2022.
- [16] J. E. Vielma-Puente and M. A. Ruano, "Analysis of the Usefulness of the Basic Program of Teacher Training in a Blended Learning Modality," *Estud. Pedagog.*, vol. 47, no. 2, pp. 289–298, 2021.
- [17] R. D. Estrada-Esponda, J. L. Unás-Gómez, and O. E. Flórez-Rincón, "Prácticas de seguridad de la información en tiempos de pandemia. Caso Universidad del Valle, sede Tuluá," *Rev. Logos, Cienc. Tecnol.*, vol. 13, no. 3, pp. 98–110, 2021.
- [18] H. V. Gaikwad and S. S. Kulkarni, "Unmasking students' learning experiences during coronavirus pandemic," *J. Eng. Educ. Transform.*, vol. 34, no. Special Issue, pp. 219–225, 2021.
- [19] L. García Aretio, "COVID-19 y educación a distancia digital: preconfinamiento, confinamiento y posconfinamiento," *RIED. Rev. Iberoam. Educ. a Distancia*, vol. 24, no. 1, p. 09, 2020.
- [20] M. P. Martínez-Clares and C. González-Lorente, "Competencias personales y participativas vinculadas a la inserción laboral de los universitarios: validación de una escala," *Rev. electrónica Investig. y evaluación Educ.*, vol. 25, pp. 1–18, 2019.
- [21] S. Morales López, R. Hershberger del Arenal, and E. Acosta Arreguín, "Evaluación por competencias: ¿cómo se hace?," *Rev. la Fac. Med.*, vol. 63, no. 3, pp. 46–56, 2020.
- [22] J. A. Suyo-Vega et al., "University teachers' self-perception of digital research competencies. A qualitative study conducted in Peru," *Front. Educ.*, vol. 7, Oct. 2022.
- [23] J. A. Suyo-Vega et al., "Mental Health Projects for University Students: A Systematic Review of the Scientific Literature Available in Portuguese, English, and Spanish," *Front. Sociol.*, vol. 7, Jul. 2022.
- [24] O. Vitvitskaya, J. A. Suyo-Vega, M. E. Meneses-La-Riva, and V. H. Fernández-Bedoya, "Behaviours and Characteristics of Digital Natives Throughout the Teaching-Learning Process: A Systematic Review of Scientific Literature from 2016 to 2021," *Acad. J. Interdiscip. Stud.*, vol. 11, no. 3, p. 38, May 2022.
- [25] D. C. Ison, "Detection of online contract cheating through stylometry: A pilot study," *Online Learn. J.*, vol. 24, no. 2, pp. 142–165, 2020.
- [26] J. A. Oravec, "AI, biometric analysis, and emerging cheating detection systems: The engineering of academic integrity?," *Educ. Policy Anal. Arch.*, vol. 30, 2022.
- [27] L. Cañadas, "Evaluación formativa en el contexto universitario: oportunidades y propuestas de actuación," *Rev. Digit. Investig. en Docencia Univ.*, vol. 14, no. 2, p. e1214, 2020.
- [28] J. A. Suyo-Vega et al., "Undergraduate Teaching in Scientific Research: A Systematic Review of the Literature Available in Scopus, Eric and Scielo, 2012-2021," *J. Educ. Soc. Res.*, vol. 12, no. 3, p. 12, May 2022.
- [29] M. Hernandez-de-Menendez, R. Morales-Menendez, C. A. Escobar, and J. Arinez, "Biometric applications in education," *Int. J. Interact. Des. Manuf.*, vol. 15, no. 2–3, pp. 365–380, 2021.
- [30] J. L. Aznarte, M. M. Pardos, and J. M. Lacruz López, "On the use of facial recognition technologies in university: The uned case," *RIED-*

Revista Iberoam. Educ. a Distancia, vol. 25, no. 1, pp. 261–277, 2022.

- [31] M. S. Ramirez-Montoya, S. Martínez-Pérez, G. Rodríguez-Abitia, and E. Lopez-Caudana, “Digital accreditations in MOOC-based training on sustainability: Factors that influence terminal efficiency,” *Australas. J. Educ. Technol.*, vol. 38, no. 2, pp. 162–180, 2022.
- [32] T. Asten and E. Egorova, “Content and structure of massive open online courses technologies in the context of trends in the organization teaching in higher education institutions,” *E3S Web Conf.*, vol. 273, pp. 1–7, 2021.
- [33] M. Perifanou and A. A. Economides, “The landscape of MOOC platforms worldwide,” *Int. Rev. Res. Open Distance Learn.*, vol. 23, no. 3, pp. 104–133, 2022.
- [34] E. V. Likšina, O. A. Vagaeva, N. M. Galimullina, I. N. Efremkina, and Y. A. Dianova, “MOOC in physics as an additional resource for the fundamental training of would-be engineers,” *J. Phys. Conf. Ser.*, vol. 2373, no. 2, 2022.
- [35] O. A. Vagaeva, N. M. Galimullina, E. V. Likšina, I. N. Efremkina, and D. E. Lomakin, “Role of MOOCs in teaching Mathematics to students majoring in Engineering,” *J. Phys. Conf. Ser.*, vol. 1889, no. 2, 2021.
- [36] J. A. Suño-Vega *et al.*, “Educational policies in response to the pandemic caused by the COVID-19 virus in Latin America: An integrative documentary review,” *Front. Educ.*, vol. 7, Aug. 2022.