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IMPLEMENTATION OF AN E-PROCTORING SOLUTION FOR ONLINE EXAMS: STUMBLING BLOCKS FOR TRUST

Oumaima Ajmi

Abstract

The case illustrates the difficult, but successful, journey of choosing and implementing an e-surveillance tool in a Swiss public university during the COVID-19 health crisis. The importance of this case is to show the difficulty of using new technologies in the public administration, given the conjuncture of several aspects in this type of project, especially for academic projects. This feedback also shows the technical, pedagogical and ethical challenges to be consolidated in order to maintain academic integrity in times of crisis.*

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1. Introduction

Our academic system is based on a fundamental concept: *trust*. Trust is anchored in the relationship between a student and his mentor, a doctoral student and her thesis director, an author and the editors-in-chief of journals, and a reader and an author. Indeed, the cases of plagiarism and cheating that have always existed among students have been taken extremes, as evidenced by a growing body of literature.⁵⁸⁰ However, institutions have been able to react and put appropriate measures in place to block the temptation to cheat during exams, whether these are timed tests or thesis dissertations. For example, the University of Geneva uses software such as *Compilatio* and services dedicated to teaching ethics to students.⁵⁸¹

But what happened when the whole educational order was suddenly turned upside-down by the onset of the COVID-19 public health crisis? All educational institutions and universities were forced to close their doors quickly and found themselves facing this dilemma: how could they administer exams to their students and grant reliable, valid degrees?

It soon became clear that a miracle technological solution did not exist and that the human, organizational, and legal context had to be dealt with holistically. The rectorate of the University of Geneva expressed itself as follows: ‘Beyond the technical characteristics of the tools selected, it raises important questions: data protection, the degree of supervision necessary, weighing of interests between respect for

⁵⁸⁰ C. Gallent Torres and I. Tello Fons, ‘Intégrité académique dans l’enseignement supérieur espagnol: Des mondes parallèle’, in *L’urgence de l’intégrité académique*, ed. by M. Bergadaà and P. Peixoto (Caen: Éditions EMS, 2021), pp. 55-68.

⁵⁸¹ University of Geneva, *Detecting Plagiarism with Compilatio*, n.d; University of Geneva, ‘L’UNIGE lance des cours d’éthique pour tous les étudiants’, *Le Journal*, 78 (2013), Article 4.

privacy and the need for the university to fully accomplish its teaching mission and its corollary, the control of knowledge and skills'.⁵⁸²

While the implementation had to be quick, the entire project was complex. This complexity was due to the fact that remote proctoring tools had never been used by public universities in Switzerland or elsewhere in Europe before the public health crisis.

As head of this project and thus on call since March 2020, the author of this chapter was a participant observer of this case, which required an approach that was both scientific and emphatic about understanding all the sensitivities of the stakeholders involved: students, professors, rectorate, journalists, and legal authorities. As Bergadaà does in her research methods, over the nine months of this project, we sometimes had to adopt an emic posture, allowing us to understand the feelings of the people observed; at other times, we adopted an etic posture, that led us to remain outside the research object so as not to risk influencing it with our subjectivity.⁵⁸³ In this article, we will describe the systemic approach that we adopted from the outset and the mechanisms that we put in place at the Geneva School of Economics and Management (GSEM) at the University of Geneva and how, at each stage, the recurrent issue of trust was raised.

We will present the feedback on implementing a digital remote proctoring tool during the spring semester of 2020. This experiment is not over, and adjustments had to be made for the winter 2021 exam session. We will conclude with some avenues for reflection and future action. Indeed, it is a safe bet that, even after a return to normal, higher education institutions will attempt to keep some of their exams online.

⁵⁸² Email from the Rector of 21 December 2020 on 'Coronavirus: Contrôle de la session d'examens de janvier-février // Supervision for the January/February exam session'.

⁵⁸³ M. Bergadaà, *Le temps: Entre science et création* (Caen: Éditions EMS, 2020), p. 30.

2. The institution was closed: how could we administer exams?

As the exam period approached, the issue of ‘remote exam security’ became the priority for the teaching teams in April and May 2020. Unlike their American counterparts, but like other European public universities, Swiss public universities had difficulties setting up technical solutions for exam supervision, given the significant legal requirements and the scarcity of European technical solutions.⁵⁸⁴ Distance education technologies were not in much demand before the pandemic, and the use of technology to ensure the security of remote exams was still in the exploratory stage. The use of new technologies and artificial intelligence for examinations had also been a field of applied research for several years, primarily through the initiation of the TeSLA project.⁵⁸⁵

On 25 March 2020, the rectorate of the University of Geneva decided to maintain the exam session in May and June 2020 and have it administered remotely. During regular exam sessions, some fifteen professors and assistants supervise hundreds of students bent over their exam papers, checking their identity cards and making sure they do not have any books or ‘cheat sheets’ and that their phones are switched off. Suddenly, we needed to envisage students alone in front of a screen. A

⁵⁸⁴ O. Bénis, ‘La fronde inédite des étudiants d’HEC contre la surveillance de leurs examens en ligne’, *France Inter*, 21 May 2020; Commission Nationale de l’Informatique et des Libertés (CNIL), *Surveillance des examens en ligne: Les rappels et conseils de la CNIL*, 20 May 2020.

⁵⁸⁵ ‘TeSLA system is a project funded by the European Commission. It will follow the interoperability standards for integration into different learning environment and it will be developed to reduce the current restrictions of time and physical space in teaching and learning, which opens up new opportunities for learners with physical or mental disabilities as well as respecting social and cultural differences’; TeSLA, *Trust-Based Authentication & Authorship: E-Assessment Analysis* (TeSLA Project, n.d.).

question of *trust* immediately arose: how could we prevent students from being tempted to cheat?

The first immediate solution was to adapt the conditions of the examinations to the circumstances. In collaboration with the education committee, the dean's office asked instructors to change the evaluation methods and rethink how they evaluated knowledge in their courses. Several instructors changed the way they evaluated students to continuous assessment, written work, or oral exams. However, in most cases, it was impossible to change the procedures for checking acquired skills in only two months.

GSEM is a faculty created in 2014. GSEM's student body is made up of more than 2,000 very diverse people, at the bachelor's, master's, doctoral, or professional development (Executive MBA) levels. For the May–June 2020 session, there were twenty-five written exams and 1,355 students registered for the session, which meant 5,000 examinations between 25 May and 6 June 2020, including first-year exams for classes of over 400 students for which conditions could not be changed.

We therefore had to set up an online examination procedure to do all this checking. Consequently, the second question of *trust* arose: would we be able to set up online exams that would be operational on D-Day and remain free of bugs throughout the exam period?

With the lockdown, most students had returned to their families. And it is important to remember that Geneva, an international city, welcomes students of multiple nationalities. It is therefore common to have more than forty-five nationalities represented in an auditorium of three hundred students. How could we enable students to take their exams, regardless of the quality of their Internet connections, from their homes in lockdown?

The dean's office decided to grant special exemptions to lower the pressure on students, allowing those who were afraid to take their June exams online to postpone them to the makeup session in August or the

regular session in the following academic year we hoped that the 2020–2021 academic year would take place in more normal conditions (which was not the case).

When public buildings were closed and restricted public health measures were imposed, GSEM and the management of the University of Geneva embarked on a project to find a solution to secure its online exams.

3. The importance of a multidisciplinary team for the success of the project

Since the work of von Bertalanffy, we know that a system like the one at GSEM is a whole that cannot be reduced to the sum of its parts, and that its elements are interdependent, with relations governed by rules where each contributes to the common objective of the system and is related to its environment.⁵⁸⁶ However, in the day-to-day life of a faculty, we all know that players operate independently, each guided by the logic of their interests.⁵⁸⁷ In ‘normal’ times, opportunities for meetings and debates are rare.

For the information system cluster, this was not the first project based on artificial intelligence technologies that we had put in place.⁵⁸⁸ On the other hand, given the different dimensions of setting up an e-proctoring tool, which was a complex and urgent project and which was added to the list of the cluster’s ongoing projects, we were able to rely

⁵⁸⁶ L. von Bertalanffy, *General System Theory: Foundations, Development* (New York: George Braziller, 1968).

⁵⁸⁷ M. Crozier and E. Friedberg, *L’acteur et le système: les contraintes de l’action collective* (Paris: Le Seuil, 2014).

⁵⁸⁸ An example is GSEM Bot: an automated chatbot that relies totally on machine learning technologies and aims to help future students register for the faculty’s master’s degree according to their studies. It was deployed online on 7 January 2020.

on the skills of the education committee given the different dimensions of this project.⁵⁸⁹

- Academic and pedagogical skills were represented by the head of the bachelor's program, who was most concerned with the use of the tool, and by the program advisers.
- The search for the solution and the supervision of the legal dimension was managed by the information systems (IS) project team.
- The technical aspects, deployment of the solution, and support were also managed by the IS project team.
- The student perspective was supported by the GSEM student association, with which we held discussions, adapted our communications, and explained the different initiatives of the project, and Student Services, which managed the announcements to students.
- The decision-making dimension was represented by the dean's office, which initiated the project. Its involvement and leadership guaranteed the synergy among the members of this group.

On 1 April 2020, the group defined the specifications. Based on our research on large-scale reviews, the working group highlighted the following features in order to ensure the conditions of the tests:⁵⁹⁰

- Be able to authenticate the student at the start of the exam.
- Ensure that an exam session proceeded normally by having the same authenticated students taking their exams without receiving help from third parties.

⁵⁸⁹ Education committee (COMENS): a faculty committee that meets twice a month to update study regulations and manage exam sessions.

⁵⁹⁰ N. Thompson, 'What Is Online Proctoring?', *The E-Assessment Association*, 3 April 2020.

- BE able to ensure the open book/closed book examination procedure.

The functional requirements were limited to these three points because it is evident that, in the case of a remote examination, as with large-scale in-person examinations, there is no such thing as zero risk, even in a normal exam period.

4. What solution should we choose?

A third question of trust was asked of GSEM's IS cluster: which information technology tool should we rely on to control fraud while complying with the law on public information, access to documents, and personal data protection (LIPAD)?⁵⁹¹

We investigated the solutions available on the market that satisfied the functional requirements by adding the following criteria, in order of importance.

4.1 Compliance with the data protection law:

This criterion was essential for the faculty. Exam security must not conflict with data security and students' privacy. To do this, we first looked for Swiss solutions that respected the country's data protection legislation and students' privacy.

In the absence of such a solution, we sought a European solution with an adequate level of protection. During this search, we noticed that neighboring countries, including France, were ahead of us on e-exams. A press release from the Ministry of Higher Education, Research, and Innovation in France provided a list of European solutions that complied with the General Data Protection Regulation (GDPR).⁵⁹²

⁵⁹¹ Official site of the State of Geneva, *Loi sur l'information du public, l'accès aux documents et la protection des données personnelles*, 17 October 2020.

⁵⁹² Direction Générale de l'Enseignement Supérieur et de l'Insertion Professionnelle, *Fiche 5—Examens à distance*, 2020; Direction Générale de

At the technical level, the constraints that the working group established were as follows:

- To be able to manage exams with more than 400 students.
- To ensure equal treatment, all exams must be taken at the time set out in the exam schedule, and all students must take the exam simultaneously.
- The solution had to be available for the May–June 2020 session.
- GSEM’s written tests concerned both students at GSEM and those in other faculties. Because the session dates were maintained, it was impossible to postpone the exam session due to the possible unavailability of a solution.

4.2 Compatibility with Moodle⁵⁹³

Moodle, the Learning Management System (LMS) deployed by the university, is widely used by instructors and students during class sessions. The desired solution would consist in a complementary module to Moodle to ensure that e-proctoring would allow us to avoid adaptation measures. For an LMS to be an e-assessment tool, it must be accompanied by an e-proctoring system. This solution could only be adopted if it met the first three criteria.

To resolve this dual issue of legal- and security-related trust, we followed several investigation avenues, including contacting other business schools to see what they were putting in place for their exams. At that time, no Swiss institution had decided which tool to use; HEC Lausanne was at the same stage as us.⁵⁹⁴ On the other hand, the private

l’Enseignement Supérieur et de l’Insertion Professionnelle, *Fiche 6—Évaluer et Surveiller à Distance*, 2020.

⁵⁹³ Moodle: <https://moodle.unige.ch/>.

⁵⁹⁴ Université de Lausanne: <https://www.unil.ch/hec/fr/home.html>.

French business school ESC Pau had already implemented the TestWe tool for examinations.⁵⁹⁵

Although we examined multiple technical solutions for the exam session in June 2020, no solution that met all our criteria could be found on the market. We had to drop one of our requirements, and the only one we could drop was the solution's compatibility with Moodle, which was the only criterion that did not affect the security of the exams or compliance with the legislation.

4.3 The choice

We chose the TestWe solution from the list of tools recommended by the French Ministry of Higher Education, Research and Innovation in order to meet the requirements of art. 13 A, subpara. 2 to 6 of RIPAD (the articles in the Swiss data protection regulation concerning data storage in the European Union [country with an adequate level of protection], reserved possibility of carrying out audits, and cascading subcontracting, subject to the written approval of University of Geneva).

EduTech, which was founded in 2014, offers an exam management platform that includes everything from creation to consultation of copies, including correction of copies.⁵⁹⁶ Although this solution could not be integrated directly with our LMS, it had some undeniable advantages, such as the possibility of taking the exams offline, which was a solution to one of GSEM's concerns, namely enabling our students to take their exams, regardless of the quality of their Internet connection.

The implementation of this solution for our school went fast. All we had to do was import the list of students and instructors for each exam in order to create a dedicated interface. The access for instructors and

⁵⁹⁵ ESC Pau: <https://www.esc-pau.fr/>; TestWe: <https://testwe.eu/fr>.

⁵⁹⁶ MLConseil, 'Découverte des EdTech et Webmarketing', *Blog Marketing Digital*, 16 October 2017.

students was created automatically, and notifications were sent to their institutional email boxes to access their profiles.

Here are this tool's anti-cheating measures:

- Identification of the student with a photo taken the first time they connect.
- Photos taken every three seconds.
- Detection of the student's absence in front of the camera;
- Detection of the presence of a different person in front of the camera;
- In the case of closed-book exams, blocking keyboard shortcuts and access to browsers and to the hard disk (functions similar to those of SEB—Safe Exam Browser);⁵⁹⁷
- If the measures are not complied with, an alert is sent, and a review of the progress of the exam will take place afterward.

5. How did instructors respond?

Rationally considered, everything ought to run smoothly. However, the instructors were attached to Moodle, their daily teaching tool. A new question of trust arose quite quickly: could we trust the faculty to implement the solution optimally, which essentially meant in record time?

Before we implemented the chosen solution, on 20 April 2020, the dean of the faculty presented the solution to a special meeting of professors to learn about their questions and fears and encourage them to collaborate with our team. Following this, we set up a series of training courses for instructors to help them adapt to this new system. The IS

⁵⁹⁷ Safe Exam Browser: <https://safeexambrowser.org>.

cluster organized three training sessions on 28, 29, and 30 April 2020, for the instructors affected by the exam session.

Because we needed to assess the reliability and validity of the chosen solution, we encouraged the instructors to prepare mock tests, which gave them additional work. Nevertheless, it was the only way to familiarize students with the new tool. We were then able to collect all their questions online and refine finetune our IS support.

6. Students were concerned about e-proctoring

After GSEM announced on 24 April 2020 that it would be using the TestWe platform, student representatives came forward, complaining about the intrusion of this type of tool into their private lives and the processing of their data by a third party; this led to a petition and an avalanche of emails.⁵⁹⁸

The question of trust quickly became political: how could we ensure, and reassure students, that personal data would not be used by third parties or for purposes other than examinations alone?

Because of the uniqueness of the project and the nature of its purpose, we went through many ups and downs, sometimes encountering resistance that we found hard to understand since our objective was to protect our students against knowledge delinquents and protect the credibility of their degrees. However, all the conspiracy theories circulating on social networks have only increased in this pandemic period.⁵⁹⁹ As a result, legitimate and imaginary questions mingled while the urgency of the situation prevented us from taking the time to convince everyone of the validity of the solution.

⁵⁹⁸ M. Prieur, 'Examens: Un logiciel espion inquiète des étudiants', *GHI—Le Journal indépendant des Genevois*, 27 April 2020.

⁵⁹⁹ L. Broyer, 'Quand les réseaux sociaux nous font perdre la tête face au covid19', *Journal du Net*, 25 May 2020.

It was therefore necessary to demystify the concept of e-proctoring and the ideas about technical solutions, which were often close to science fiction. We explained that the monitoring functionalities could be limited to photographs of candidates or expanded to video recording during the exam and recording of the student's screen. As for data processing, this could involve the manual verification of the data by the solution providers until the tool automatically processed them using advanced technologies.

TestWe offers the possibility of photo capture and automatic data processing using machine learning technology to detect a face in a photo and authenticate this face by comparing it with a reference photo; this process is referred to as biometric authentication.

Biometric authentication is the 1:1 comparison of two photos. The result is therefore binary and no biometric template is saved. The risk with this type of solution is that someone might access these photographs and use them without the subject's knowledge. Thus, the IS cluster concentrated its efforts on promoting optimal data security in the University of Geneva's servers.

Unlike real-time remote monitoring, automatic algorithms reduce access and viewing of photographs to cases reported by the algorithms. The tool does not decide, but it alerts us. Specific people at GSEM would then verify this alert. It was essential to make it clear that the algorithm does not 'condemn' anyone; rather, it makes a preselection, and we decide what to do next, depending on what we see. Moreover, the same thing happens in person: alerts are reported by the exam proctors. These alerts are checked by the competent bodies, which will then make a decision. Lines of code are blind to ethnic origins and religious symbols and guarantee complete equality in the processing of student data without any decision-making power.

The purpose of a remote e-proctoring tool is to secure the procedure for exams that take place without the physical presence of exam

proctors. Because they use advanced artificial intelligence and biometric processing technologies, these tools generated both realistic and irrational fears.

7. Then the media got involved

Let us not forget that the general situation was already very stressful. Students' fears about the intrusion of this technology into their private lives had been widely publicized. The latest documentaries on the intrusion of tech giants into everyone's daily lives and the illicit use of data had heightened the atmosphere of fear and mistrust of new technologies. This mistrust resulted in an avalanche of newspaper articles before each exam session.

Journalists specializing in science or investigative journalism did not approach us. However, the 'mainstream' articles were based on the students' fears and did not refer to the arrangements we had put in place to ensure the security both of the exams and of students' personal data, and in particular the students' freedom to choose not to use the platform.

The report from the University of Geneva to the authorities of the canton of Geneva supported our technological choices. The university's central legal department and communications team were a great help in answering questions from the media and managing these external interactions. In the end, we obtained the consent of 95% of all students involved in GSEM's written exams. This percentage was confirmed in December 2020 for the session taking place in January 2021. In addition, since it was essential for the students to feel good about the process, the author of this chapter questioned some students on two occasions. The first was after a series of twenty-five mock exams preceding the June 2020 session; at that time, 67% of the students gave a satisfaction rating above 4/6. The second time was after the December 2020 practice exams, when 68.14% of students found the platform intuitive and easy to use. In addition, 65% of students who responded to

the second questionnaire believed that e-proctoring helped preserve the credibility of their degrees.

8. Subsequent events and measures for the January 2021 exam session

At the end of the makeup session and given that the public health crisis continued, and with it the online teaching measures, GSEM confirmed its choice to use the TestWe platform, as initially configured for the exam session of June 2020 and the remedial session of August and September 2020.⁶⁰⁰ Based on our experience, we have reinforced our requirements as described below. It must be noted here that only the supplier of TestWe agreed to implement all the modifications and adjustments we requested.

8.1 Biometric processing and legal basis

Even though the pandemic was an exceptional situation and an overriding public interest, if the chosen solution uses biometric processing to authenticate students, it is essential to ask whether there is a legal basis allowing the processing of biometric data. Although the latest version of LIPAD does not consider biometric data to be sensitive, it is essential to remember that as of 2022, they will be so considered.⁶⁰¹ On the other hand, the legal basis for acting cannot be simply an internal directive of the institution; it must be a law. In the absence of a legal justification, it is necessary to opt for a tool without biometric processing, although this necessitates an exceptional effort to have a limited number of people view students' photos one by one for exams involving up to 600 students.

⁶⁰⁰ University of Geneva, *Passage à l'enseignement à distance—Coronavirus—UNIGE*, 23 October 2020.

⁶⁰¹ Official site of the State of Geneva, *Loi sur l'information du public*.

8.2 Recognizability of collection and informed consent

Recognizability of data collection:

The collection of personal data, and in particular the purposes of the processing, must be recognizable for the data subject. This requirement of recognizability constitutes a concrete expression of the principle of good faith and increases the transparency of data processing. (LIPAD, art. 38)

In other words, we understood that we needed to be as clear as possible with our students. It was important to describe the system's functionalities, the data collected, and the type of processing carried out on these data. It was equally important to indicate the data retention period (LIPAD, art. 40) and the processing exceptions related to cases of fraud to make it is easy for students to 'know or identify the purpose(s) of the processing, whether they are indicated at the time of collection or they result from the circumstances'. All of this information must be included in the consent form. Consent is 'any freely given, specific, informed and unambiguous indication of the data subject's wishes by which he or she, by a statement or by a clear affirmative action, signifies agreement to the processing of personal data relating to him or her' (GDPR, art. 11). In order to respect the possibility of accepting or refusing, students must be given an alternative. In our case, GSEM offered students the opportunity to take the exams in person in the University of Geneva computer rooms on which the software was installed.

8.3 Data security

Whether monitoring data are processed manually or automatically, it is crucial to secure the data (LIPAD, art. 37) against unlawful processing and ensure that they are kept confidential. In implementing the TestWe solution at GSEM, the data were initially stored in the AWS cloud in France.

It is important to emphasize that the use of the cloud is still problematic and requires a significant effort to verify the often complicated processing on these private platforms, which frequently makes use of automatic processes specific to these platforms.⁶⁰² On the other hand, this requires negotiations with the solution provider because it involves specific developments and an additional cost. Although this storage is regulated by RIPAD article 13A and strengthened our students' data protection, we asked TestWe to transfer data to our servers at the University of Geneva and change the legal place of the contract to Geneva. These changes were confirmed in our TestWe license.

After debate, the exceptional nature of the situation won the acceptance of cantonal officials following complex political negotiations. On 16 November 2020, the following press release was finally issued:

Thus, in view of the foregoing, the Officials therefore recommend that UNIGE renounce the use of the X software, except during the particular or extraordinary period within the meaning of the Epidemics Act, but not beyond the June–July 2021 session, and in strict compliance with the above-mentioned conditions.⁶⁰³

The press release continued,

the officials consider that the use of e-proctoring software such as X, which makes use of biometric technology, is not proportionate in the context of the administration of academic

⁶⁰² 'Le Conseil fédéral prend des mesures pour un Swiss Cloud', *24 Heures Suisse*, 11 December 2020.

⁶⁰³ <https://www.ge.ch/ppdt/doc/documentation/Recommandation-16-novembre-2020.pdf>

examinations given the intrusion it involves in the private lives of the people concerned.

However, they note that, in the event of an extraordinary situation within the meaning of the Epidemics Act, the weighting of interests must consider the extraordinary nature of the situation. Therefore, they consider that the use of software X is tolerable, in this context only, and subject to strict compliance with the following cumulative conditions:

- The exam in question concerns a considerable number of students, making it impossible to use another, less intrusive means of supervision (i.e. cohorts exceeding 200 students);
- The exam in question has a typology that implies that fraud is relatively easy to carry out by sending a third party in place of the student (e.g. exam in the form of multiple-choice questions);
- Students who do not wish to have their data biometrically processed are offered an alternative (taking the exam in person or otherwise), regardless of the constraints related to the public health situation;
- Strict compliance with the measures taken by UNIGE concerning the initial system and mentioned above (in particular, the supervision of the e-proctoring system via the adoption of an operating directive, detailed information to students, and the changes made to the contract between UNIGE and TestWe, as well as any other measure presented to limit the infringement of the rights of the persons concerned, such as the strict

data retention period or the limitation of viewing images).

Following this decision, a new development was requested from TestWe concerning exams with fewer than 200 registered students in order to allow us to deactivate biometric processing for those exams because:

Monitoring fraud and plagiarism is one of the missions of UNIGE. If this monitoring is limited to capturing sound and images without biometric processing, it, therefore, falls within the mission of UNIGE and meets the legal basis requirements laid down by LIPAD, art. 35, para. 1.⁶⁰⁴

This feature may also be offered to students if in-person exams are temporarily suspended due to force majeure connected with the current public health situation (COVID-19). The controls will then be applied *a posteriori*, and the students will have the same examination conditions.

9. Conclusion

The detection of cheating—the bane of academia—was effective, and no cases of major cheating occurred in the GSEM exams. The instructors, the students, and the students’ parents praised the considerable efforts made by GSEM in record time to secure the examinations and guarantee the credibility of the diplomas awarded. The project team worked day and night despite the complications of the lockdown to be there for students and instructors and make this project a success.

As for technical bugs, we experienced a few cases for which we quickly found solutions. These bugs were mainly due to last-minute

⁶⁰⁴ Republic and Canton of Geneva—Cantonal Data Protection and Transparency Officer, *Université de Genève—Utilisation du logiciel X*, 16 November 2020, p. 14.

changes that were not implemented by default in the platform. Thanks to the procedures put in place, the number of bugs decreased considerably during the makeup session (five cases out of 7,000 exams in the makeup session).

From an organizational standpoint, the work was complex since each decision led to a modification in arrangements that were already in place. For example, the waiver granted by the dean so that failures in the June session were not counted led to changes in the results management system. The ban on closed-book exams resulted in a specific request to disable this option at the TestWe level for each exam, followed by final validation of each exam by the IS team to minimize the risk of error.

The e-proctoring technology remains a necessary tool that mainly plays a dissuasive role because, as with exams written in person or students' essays, it is almost impossible today to detect cheating and fraud with 100% accuracy. Techniques and motivations to cheat are developing in parallel with anti-cheating tools.⁶⁰⁵ However, it is still the responsibility of academic institutions to implement the necessary tools to maintain the credibility of their degrees and establish the principles of academic integrity in this infinitely open and connected world. The rector of the University of Geneva emphasizes that

The University of Geneva guarantees both the quality and the credibility of the degrees it awards, of which its students are the primary beneficiaries. As such, it must implement the necessary means to prevent possible fraud, in person, or remotely. This control, which is common to higher education institutions around the world, is recognized as being in the public interest.

⁶⁰⁵ S. Kronlund, 'Étudiants: Les tricheurs', *France Culture*, 26 January 2021; K. Sakho and E. Viniacourt, 'Partiels à distance: Les cinq nouvelles techniques de triche', *Libération*, 12 January 2021.

However, beyond this operational success, we members of the education committee were happy to see that this experience made it possible to initiate a debate between professors and researchers from all disciplines, on a basis of equality. Together, we considered the meaning, at the educational level, of the online evaluation of knowledge, the creation of internal tools for monitoring online exams, and the critical analysis of knowledge assessment methods, all of which is articulated with the concept of academic integrity. Like the public health crisis, this intense experience inspired us, challenged us, but ultimately helped us grow.

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