

Security for Online Exams: Digital Proctoring

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Abstract: Sustainability of education has become of paramount importance during the COVID-19 pandemic at all educational levels worldwide. In this process, the assessment process, which is one of the most important steps of education and teaching activities, started to be applied as online exams. In addition to being compulsory during epidemic periods, the fact that it has various advantages such as reducing costs, suitability for new teaching approaches, preparing a large pool of questions, being time and place independent has led to an increase in the use of online exams. In addition to the advantages that online exams have due to their structure, they have also brought some disadvantages. Some limitations arising from the lack of synonymous proctors during the exam are among these disadvantages. There are a number of digital proctoring tools developed to reduce this limitation. These tools aim to increase exam security by recording the movements of students during the exam process. In this study, information was given about the add-ons used to make online exams safer and more reliable, and a general evaluation was made about the add-ons to provide in-depth knowledge to online exam practitioners.

Keywords: Moodle, distance education, exam security, digital proctoring

Introduction

Distance education becoming widespread day by day due to its convenience of increasing access to learning opportunities (Koçdar, 2011), reaching individuals who are geographically distant, and teaching individuals who cannot be in the classroom environment due to physical disabilities (Frank, Reich & Humphreys 2003) has also made it possible to take exams online. Herand & Hatipoğlu (2014) suggest that the assessment of students' knowledge who have completed their education through distance education should also be done by distance education. Otherwise, it is not deemed practical due to the students being in remote places, and it also contradicts the flexibility principle of e-learning (Levy & Ramim, 2007).

Conducting online exams without a proctor can cause academic irregularities (Bozkurt & Uçar, 2018). King et al. (2009) stated that there are various cheating situations in online exams, such as using books, taking the exam

for someone else, consulting others in the exam, using online resources, and obtaining questions from various sources in advance. It is stated in the literature that measures such as lockdown of the browser and operating system to prevent cheating in online exams (Kapoor, 2014), restricting the non-exam features of the computer, being able to view the exam area in 360 degrees (Kitahara, 2011), tracking eye movements (Gordon, 2013), taking screenshots during the exam (Bailie & Jortberg, 2009) should be taken.

Various add-ons with different features have been developed to prevent academic irregularities in online exams and to ensure exam security. In this study, some add-ons that can function as a proctor and work integrated with Moodle teaching management system were examined. The reason why Moodle teaching management system is preferred in the study is Moodle is the most preferred lesson management system in distance education due to its high-quality educational qualities (Önal, Kaya, & Draman, 2006) and its strong, reliable, flexible, and rapid development (Rice, 2006).

Online Proctoring Tools

Online proctoring tools are add-ons for a secure online exam with a webcam, microphone, and a stable internet connection. There are also versions with advanced features of these tools, which can basically take screenshots at a certain interval. It is seen that it has different characteristics from each other (Patil & Bromwich, 2020).

1. Lockdown of open applications on the individuals' computers taking the online exam,
2. Disabling the screenshot function
3. Disabling copy-paste
4. Disabling music and audio output
5. Disabling the virtual machine
6. Freezing additional monitors
7. Personal identification
8. Tracking eye movements
9. Noise detection
10. Face scan and scanning the exam room
11. Image recording
12. Monitoring and recording behaviors.

It is thought that academic irregular behaviors that occur or may occur during exams can be prevented with these features.

Although digital proctoring tools have existed for many years, it seems that they have become frequently used in various universities and colleges after the COVID-19 pandemic, which occurred in early 2020, as education could be continued in online environments. Information about some of such software, which varies based on its

developers and features, is provided below.

Mega Proctoring

Mega proctoring is a Moodle-integrated Google Chrome extension used in online exams designed by ME Education Technologies and Consulting Service. This add-on provides sufficient conditions for a secure exam as a virtual proctor in online exams, with features such as tracking movements and authentication to identify academic irregularities that may occur during online exams. Users who want to take the present online exam must install this extension.

The list of web pages visited by the users collects data such as the date of visiting these pages and network tracking, number of clicks, mouse position, keystroke recording. He saves random screenshots and audio files during the exam. Proctoring rules can be determined based on the needs in the add-on, which has one payment per user.

Proctorio

Proctorio is a web browser extension for Google Chrome used to proctor online exams. Thus, it provides the opportunity to take the exam anywhere. It integrates with the currently used LMS system. It aims to prevent academic irregular behaviors that the student may show during the online exam by recording with a webcam and microphone, monitoring the screen, monitoring internet activity, and locking some computer features. It also has features such as getting instant results to the notebook, tracking for plagiarism, setting flags for suspicious behavior, evaluating the room where the online exam is held, and authentication.

E-Proctoring

E-proctoring is an artificial intelligence software that compares and verifies user identity with advanced machine learning techniques and is integrated with Moodle, so the question pool does not need to be added to any area other than Moodle. This software locks the operating system against other non-exam pages, scripts, and communication tools. It aims to prevent academic fraud that may occur during the online exam with its features such as identity verification and random screenshots, monitoring the system, and recording sessions.

Moodle Proctoring

Moodle Proctoring is a Moodle Quiz plugin that captures a user's photo with the webcam tool to determine who is taking an online test on Moodle. Users can access their exams by installing the Moodle add-on manager or via GitHub.

This plugin automatically takes a photo at a specified time and stores the image in a small *.png* format in

Moodle data. If the user does not allow the use of the webcam, access to the exam is denied, and during the exam, it reports suspicious activity to the online examiner and provides control.

The add-on also helps to take random photos with the webcam while the student is taking the exam and requires camera permission from the user before starting the test. The student giving the permission can start answering the exam questions by seeing the photo. This plugin, which looks like a video service that captures every moment, attempts to prevent the user from exhibiting suspicious behavior during the online exam.

Based on the statistics about Moodle Proctoring, it is seen that the plugin was used in a total of 576 different sites in February 2021. With regards to the increase in the number of sites used, it is seen that the figures are 131 websites in November 2020, 190 websites in December 2020, 269 websites in January 2021, and 576 websites in February 2021. On the other hand, 280 of these sites use Moodle 3.8, 139 have Moodle 3.9, and 146 of them use Moodle 3.10 versions. The number of downloads of this plugin indicates that it was downloaded 867 times in the last 90 days, and the most downloaded months are February 2021 with 339, March 2021 with 302, and December 2020 with 265 (moodle.org).

Conclusions and Recommendations

Distance education has increased rapidly with the developments in the field of education, and it has become mandatory during the COVID-19 pandemic process (Can, 2020). It is also the type of education where the learner and the teacher are in different places regardless of time and place (Akçay, 2014). With distance education, education can be continued in situations such as physical and geographical problems, and assessment in distance education is also conducted online (Donovan, Mader, and Shinsky (2007); Xu, Iran-Nejad, and Thoma (2007); Anderson, Cain, and Bird (2005)). However, academic irregularities can occur in online exams conducted in online environments (Bozkurt & Uçar, 2018). Therefore, various proctoring tools have been developed to prevent these irregularities.

Proctoring plugins are software designed to enable a more reliable exam environment for online exams. Looking at the findings of this study, which aims to provide information about digital supervisor tools developed to reduce academic irregularities that occur in online exams, it is seen that each tool has its own pros and cons. However, when we look at the common features of digital proctoring tools, we see features such as user authentication, saving browser history, and locking other computer features except for the online exam. Although there may be deficiencies in these systems according to preference/preferences, they can be used alone or with different tools to prevent academic irregularities in online exams.

In the context of the findings of this study and the studies in the relevant literature, the following suggestions can be made to the researchers for future studies. Since this study is prepared in a theoretical framework, these tools can be tested with different parameters by putting them into practice, or detailed examinations can be made

by taking opinions from exam providers who use them.

References

- Akçay, S. (2014). *Eş zamanlı sınıf ortamının grafik tasarım dersinde kullanımına yönelik bir uygulama ve öğrenci algıları [An application and student perceptions for the use of concurrent classroom environment in graphic design course]*. Yüksek Lisans Tezi [Master thesis], Gazi Üniversitesi, Eğitim Bilimleri Enstitüsü [Gazi University, Educational Sciences Institute], Ankara.
- Anderson, H.M., Cain, J., and Bird, E., (2005). Online student course evaluations: Review of literature and a pilot study. *American Journal of Pharmaceutical Education*, 22(1), 7-29.
- Bailie, J. L., & Jortberg, M. A. (2009). Online learner authentication: Verifying the identity of online users. *Journal of Online Learning and Teaching*, 5(2), 197-207.
- Bozkurt, A., Uçar, H. (2018). E-learning and e-exams: examination of learners' perspectives concerning the authentication methods in online assessment processes. *Mersin Üniversitesi Eğitim Fakültesi Dergisi [Mersin University Journal of Education Faculty]*, 14(2), 745-755.
- Can, E. (2020). Coronavirüs (Covid-19) pandemisi ve pedagojik yansımaları: Türkiye'de açık ve uzaktan eğitim uygulamaları [Coronavirus (Covid-19) pandemic and its pedagogical reflections: Open and distance education practices in Turkey]. *Açıköğretim Uygulamaları ve Araştırmaları Dergisi [Journal of Open Education Applications and Research]*, 6(2), 11-53.
- Donovan, J., Mader, C., & Shinsky, J., (2007). Traditional course evaluation formats: Student perceptions. *Journal of Interactive Online Learning*, 6(3), 158-180.
- Eproctoring (2021). Why eProctoring is the best solution to secure online exams? Retrieved from <https://eproctoring.com/features/>
- Frank, M., Reich, N. & Humphreys, K. (2003). Respecting the human needs of students in the development of e-learning. *Computers & Education*, 40, 57- 70.
- Gordon, L. (2013). *Technology thwarts cheating in online exams*. Retrieved from <http://search.proquest.com/docview/1348623176?accountid=8403>.
- Kapoor, K. (2014). *Preventing high-tech cheating*. *Claims*, 62(9), 11. Retrieved from <http://search.ebscohost.com/login.aspx?direct=true&db=bth&AN=97628680&lang=tr&site=ehost-live>.
- Kitahara, R., Westfall, F., & Mankelwicz, J. (2011). New, multi-faceted hybrid approaches to ensuring academic integrity. *Journal of Academic and Business Ethics*, 3(1), 1-12.
- Koçdar, S. (2011). *Uzman görüşlerine göre Türkiye'de uzaktan eğitim programlarının akreditasyonu [According to expert opinions, accreditation of distance education programs in Turkey]*. Doktora Tezi [Phd thesis], Anadolu Üniversitesi. Sosyal Bilimler Enstitüsü [Anadolu University. Social Sciences Institute], Eskişehir.
- Levy, Y., & Ramim, M. (2007). A theoretical approach for biometrics authentication of eexams. *Chais Conference on Instructional Technologies Research içinde (ss. 93-101)*, The Open University of Israel, Raanana, Israel.

- Mega Proctoring (2021). Mega proctoring. Retrieved from <https://www.meetcs.com/mega-proctoring-solutions/>
- Moodle Proctoring (2021). Moodle Proctoring Retrieved from https://moodle.org/plugins/stats.php?plugin=quizaccess_proctoring
- Önal, A., Kaya, A., & Draman, S. S. (2006). *Açık kaynak kodlu çevrimiçi eğitim yazılımları [Open source online education software]*, Akademik Bilişim.
- Patil, A. & Bromwich, J. E. (2020). *How it feels when software watches you take tests. New York Times.* Retrieved from <https://www.nytimes.com/2020/09/29/style/testing-schools-proctorio.html>.
- Proctorio (2021). Proctorio. Retrieved from <https://proctorio.com/>
- Rice, W. H. (2006). *Moodle e-learning Course Development. A Complete Guide to Successful Learning Using Moodle.* Packt Publishing.
- Topuz, A. C. (2016). *Bilgi güvenliğinin sağlanmasına yönelik geliştirilebilecek yazılımsal stratejiler: Online sınav uygulamaları örneği [Software strategies that can be developed to ensure information security: Example of online exam applications].* Retrieved from: http://www.sdf.gov.az/development/uploads/qrantlar_uzre_neshrler/eif_kitabrlar/eif_konfrans_2016_informasiya_cemiyeti.pdf#page=153
- Xu, Y., Iran-Nejad, A., & Thoma, S.J., (2007). Administering defining issues test online: Do response modes matter? *Journal of Interactive Online Learning*, 6(1), 10-27.