

## **Detecting cheaters and plagiarism in online exams – techniques and data**

Rainer Scheuchenpflug, Institut f. Psychologie, Universität Würzburg,  
scheuchenpflug@psychologie.uni-wuerzburg.de

Alexander Hörnlein, Rechenzentrum, Universität Würzburg, hoernlein@uni-wuerzburg.de

Poster presented at ESPLAT 2021

The COVID pandemic forced many instructors to change not only lessons to an online format, but also exams. There seems to be a general suspicion among university instructors that these exams lead to increased levels of cheating. But is it actually the case that students cheat extensively in timed online exams?

We report practical experiences with timed synchronous online (TSO) exams administered via a system for teaching, training and testing (CaseTrain) developed at the University of Würzburg, Germany. CaseTrain allows instructors to create exam texts where questions and answer options are randomized individually, which makes cheating more difficult. This technique is used both in paper-and-pencil and in TSO exams, but does not provide evidence for cheating. Therefore we developed two different techniques to detect plagiarism and cheating in online exams: For exams which require answers in free text, the second author programmed a log-file analysis of student typing behavior which can detect large changes in answers (based on time difference to the last entry), which might result from copy-pasting answers of other students or from the internet. Since the time course of the changes is recorded in the system's data base, copied answers can be detected and traced even if students subsequently change the wording of the answer in order to create an impression of own work.

The second technique, used in exams for statistics, uses different data sets for different students. These data sets are prepared before the exam and distributed to the students as encrypted ZIP-file. Since different students should enter different statistics as solutions, an exchange of solutions can be detected and proven.

All TSO-exams had to be monitored by video conferences with continuous auditory and visual connections of all participants due to Bavarian government regulations (BayFEV, 2020), which seems to be considered as a technique to prevent and possibly detect cheating (e.g. Bilen et al., 2021), and was even used to monitor gaze direction during the exam by one instructor.

We interviewed instructors who used TSO-exams about current practice, acceptance, workload, techniques used, and (subjective) probabilities of cheating behavior.

Instructors report no apparent differences in grade distributions or error patterns compared to exams in physical presence. Instructor workload is increased because of the necessity to create more questions and new questions testing transfer and competences instead of recall and reproduction, and there is noticeable reluctance to implement additional measures to prevent cheating in online exams. Instructors who use the

additional detection techniques described above report larger workload in exam grading due to these techniques.

Log-file analysis was available for 8 exams in WS20; in one of these exams 1 of 61 participants copied material verbatim from an online source and subsequently changed the wording; in two other exams the method did not identify any suspicious activity, and in the remaining five exams the analysis did not lead to instructor reactions. In SS21, 11 of 33 online exams contained text items - where the analysis could have been used to detect plagiarism - but none of the instructors requested the logfile analysis from technical support, and relied instead on student admonition to refrain from copying from external sources.

Using different problems for different individuals helped to identify a cluster of four and a cluster of two cheating persons in 394 participants in two statistics exams in SS20, a cluster of three cheaters in 389 participants in WS20/21, and two clusters of two cheaters in 396 participants in SS21. In addition, a cluster of four participants in SS20 were convicted of exchanging solutions due to identical, but otherwise singular error patterns. Note that both techniques are not used to identify cheaters in an automated process; they create data which have to be examined by two experienced instructors (legal requirement) in order to arrive at the accusation of cheating.

The effectiveness of continuous auditory and visual monitoring seems to be limited; the persons identified to be cheating by log-file analysis and different solutions were continuously monitored during the exam, but not detected. On the other hand, all participants were disturbed by acoustic interference and, in one exam, by admonitions to keep their eyes on the center of the monitor. Several students could not participate in the video conferences due to limited bandwidth, which also interfered with recording their exam performance in the CaseTrain system.

Unfortunately, cheating rates identified by the techniques above cannot be compared to rates in traditional exams in earlier semesters because the techniques were not used before, partly because of additional workload generated by the techniques; cheating rates for traditional exams reported in the literature are much larger (e.g. Wu et al., 2020). Subjective impressions of experienced instructors and objective data suggest similar rates of cheating to traditional exams, so the common suspicion of higher rates of cheating in online exams is probably not warranted.

#### References:

Bayerische Fernprüfungserprobungsverordnung – BayFEV, 2210-1-1-15-WK, GVBl 2020, S. 570 (2020). Online: <https://www.gesetze-bayern.de/Content/Document/BayFEV>

Bilen, E., & Matros, A. (2021). Online cheating amid COVID-19. *Journal of Economic Behavior & Organization*, 182, 196-211. <https://doi.org/10.1016/j.jebo.2020.12.004>

Wu, Y.-W., Zhong, L.-L., Ruan, Q.-N., Liang, J., & Yan, W.-J. (2020). Can Priming Legal Consequences and the Concept of Honesty Decrease Cheating During Examinations? *Frontiers in Psychology, 10*(2887). <https://doi.org/10.3389/fpsyg.2019.02887>