



INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

ONLINE EXAM PROCTORING SYSTEM

Yelkar Anjali Rajendra
Department of Computer
Engineering
GMVIT Tala
Univeristy of Mumbai

Pawar Reena Vishwas
Department of Computer
Engineering
GMVIT Tala,
Univeristy of Mumbai

Khopkar Diksha Anil
Department of Computer
Engineering
GMVIT Tala,
Univeristy of Mumbai

Ratwadkar Pallavi Pravin
Department of Computer
Engineering
GMVIT Tala,
Univeristy of Mumbai

Prof. Raghvendra Singh
Assistant Professor GMVSC & GMVIT
University of Mumbai

Abstract: In this paper, we introduce a multimedia analytics system to perform automatic and nonstop online test proctoring (OEP). The overall thing of this system is to maintain academic integrity of examinations, by furnishing real-time proctoring to descry the maturity of cheating actions of the test taker. To achieve similar pretensions, audio-visual compliances about the test takers are needed to be suitable to descry any cheat gets. There have been giant hops in the field of education in the history 1 – 2 times. Seminaries and sodalities are transitioning online to give further coffers to their scholars. The COVID-19 epidemic has handed scholars more openings to learn and ameliorate themselves at their own pace. Online proctoring services (part of assessment) are also on the rise, and AI- grounded proctoring systems (hereafter called as AIPS) have taken the request by storm. Online proctoring systems (hereafter called as OPS), in general, makes use of online tools to maintain the saintship of the examination. While utmost of this software uses colorful modules, the sensitive information they collect raises enterprises among the pupil community. There are colorful cerebral, artistic and technological parameters need to be considered while developing AIPS. This paper totally reviews being AI and non-AI-based proctoring systems. Online courses, online examinations and online instruments are conducted by colorful universities and Information Technology (IT) institutes worldwide. Delivery tools have been created for conducting the examinations from any place. Applying this will lead saving time and travelling cost. Currently, due to the COVID-19 epidemic, there's a big demand on the online courses and examinations. This paper introduces a new approach for test proctoring using 360- degree security camera. Substantially, online examinations' security is a major concern. In this paper, the operation of the 360- degree security camera over the traditional webcam was delved in order to enhance the test security and to minimize the stressful restrictions.

Keywords AI · AIPS · Artificial Intelligence ,Exams ,Online proctoring, Online learning Proctoring system

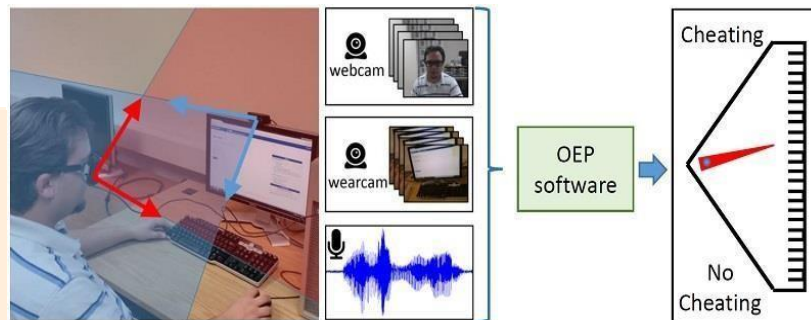
1. INTRODUCTION

Over the last few years, online education has advanced rapidly. More students are taking advantage of Massive Open Online Courses (MOOCs) and other online certificate courses. Colleges are also transitioning online to provide more resources to their students. There has also been a rise in individuals rolling out their courses. All of this gives students more opportunities to learn and improve themselves. (Li et al., 2015). In the past year, during the pandemic situation, almost all educational institutions have been forced to transition to an online education form (Moreno-Guerrero et al., 2020). Colleges started taking classes and tests online, for courses in all fields. The COVID-19 Pandemic also affected entrance exams and the hiring process, which filters students by taking a written test. We acknowledge that maintaining academic discipline and the sanctity of testing in the exams is imperative. This sudden shift to online learning has different effects on students of each level. One cannot expect the same level of seriousness and focus from a graduate-level student and a school student. Each student would have their learning, understanding, and information retaining capabilities. In this situation, malpractice during academic work would be on the rise, be it in the form of plagiarism or cheating during tests. We believe the implementation of an Artificial Intelligence Based Proctoring System (AIPS) is the need of the hour. We also believe that it would soon become the norm to use such systems for continuous monitoring for digital exams, ranging from MOOCs to exams taken during hiring. The quality of one's online certificate is dependent directly on the quality of the testing process that one undergoes to obtain it. In the same way that exams would be monitored when taken in schools and colleges, they need to be proctored when being conducted online. An AIPS is needed to keep a check on all students, as when giving exams online, there are more ways and opportunities for a student to cheat. The exact ratio of teachers to students that used to be in place for physical exams to monitor them would not be practical in this scenario.

The software would assist the human proctor in keeping track of the student activities. In this way, whenever a student is suspected, they would be brought to the forefront of the human proctor's screen, and their suspicious activity flagged for later review. This way, a single human proctor can focus their attention on students most likely to cheating. It also provides an extra layer to the monitoring system. This way, false positives can also be reduced, and the workforce required to monitor the exam also reduces. The system's selection depends on the preferences of the university and the resources of the majority of the student body. If the students are giving the exams from a location where they have a weak net connection or electricity cuts, a human proctor system might not work since any issues with the student's live stream would lead to them being flagged. The digital secure browser-based system would work better; for as long as the computer is running, the exam can be conducted while ensuring the student is monitored.

What is Remote Proctoring?

- 1) This is the process used for proctoring or supervising the candidates during an online exam. In this process, the candidates are remotely monitored by the supervisors who are located at any other remote location with the help of technology.
- 2) This process is used to prevent candidates from cheating or carrying out any sort of malpractices during an online exam.
- 3) Remote Proctoring is the only mechanism which can be used to put a stop to cheating or any malpractice while conducting online exams. As it is developed using the best technology, it helps you to conduct online exams in an absolute cheating-free way.



Online Proctoring System (OPS): an Overview Online Proctoring in education is not a new area of research. Even before the Pandemic, many universities/institutions were using proctoring systems for online courses. The competitive and adaptive exams like GRE, GMAT, CAT are purely proctor-based exams. Online proctoring makes use of virtual tools for monitoring activities (such as 6424 Education and Information Technologies (2021) 26:6421–6445 1 3 tab change, timestamp, background noise etc.) for assessing the students appearing for exams. Such exams are generally happening online and remote location so that any student from any location can give exams to ensure the integrity (Caveon et al., 2013). Online proctoring system focusses on two major components viz. Web camera for recording the video of the student appearing for the exam which can be later on viewed by examiner/proctor. Examiner/proctor can potentially look at any mischievous things, cheating happening during exam or not. The second component is Locking which prevent students from opening other tabs in the web browsers. This is also known as Computer or Browser Lockdown (Alessio et al., 2017). According to (Hussein et al., 2020) there are following features of proctoring, they are being tabulated (Table 1) below:

There are three types of proctoring system identified by (Hussein et al., 2020). Figure 1 shows the types of proctoring systems: There are various technological advancements that have occurred in online proctoring system. The (Hussein et al., 2020) exclusively covers and overview of proctoring tools. An investigative study was conducted on proctoring system and its evaluation. Based on the investigation, the paper offers recommendations for educational institutions about use of proctoring system. (Prathish et al., 2016) proposes an intelligent online proctoring system. The said proctoring system is based upon audio and video parameters. However, the paper lacks in evaluating their own research work. (Chua et al., 2019) implemented a system which can detect and prevent cheating using tab locking and question bank randomization. (Pandey et al., 2020) develops e-Parakh which is online examination proctoring system exclusively used for mobile devices. (Slusky, 2020) explores various cybersecurity issues in online proctoring system. the paper discusses methods and techniques of multi-factor authentication and authorizations, including the use of challenge-response, biometrics (face and voice recognition), and blockchain technology.

Features of Online Proctoring System

Features	Description	Newer Technologies
Authentication	Authentication includes verifying the identity of both candidate and proctors who are the part of proctoring software	Two factor authentication, OTP, Face recognition is used to authenticate entity in proctoring system
Browsing tolerance	This is restriction provided by proctoring system software about usage of other resources (such as othertabs of browsers, other face detection during live proctoring etc.)	This is done by log tracking and analysis, Face detection, Object Detection etc
Remote authorizing and control	It gives authority to the proctor to take control over proctoring system (like he/she can start/pause/stop the examination of a particular student remotely)	This is generally done by giving administrative rights and using multilevel security models
Report generation	It is about creating the student’s report and activity log during the exam	This is normally done by the technologies like Python, ASP.net any other open-source programming language

Types of Online Proctoring Systems

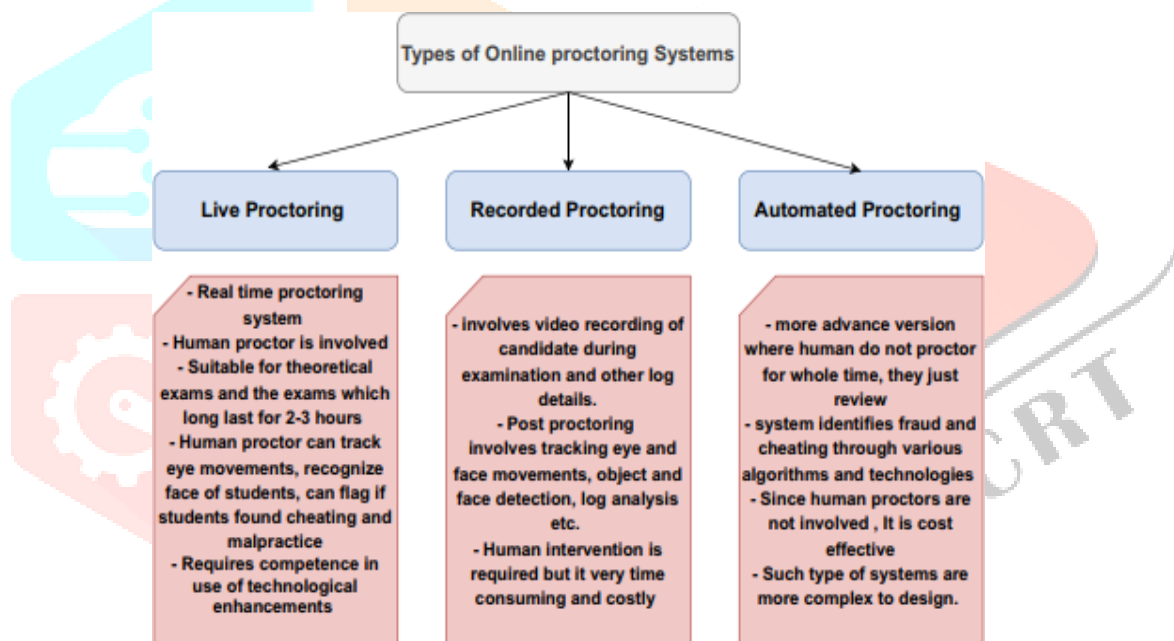


Fig. 1 Types of Online Proctoring Systems

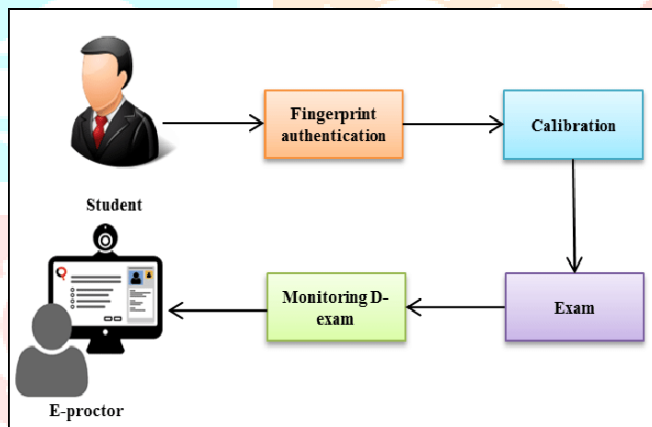
2.LITERATURE REVIEW

This systematic literature review sought to assess the current state of literature concerning online examinations and its equivalents. For most students, online learning environments created a system more supportive of their wellbeing, personal lives, and learning performance. Staff preferred online examinations for their workload implications and ease of completion, and basic evaluation of print-based examination logistics could identify some substantial ongoing cost savings. Not all staff and students preferred the idea of online test environments, yet studies that considered age and gender identified only negligible differences (Rios & Liu, 2017).

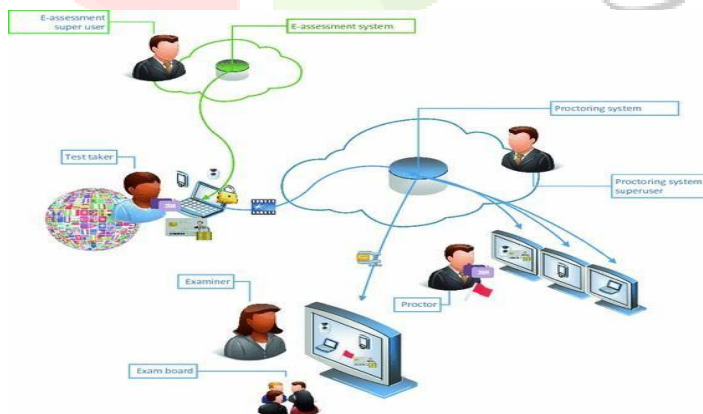
While the literature on online examinations is growing, there is still a dearth of discussion at the pedagogical and governance levels. Our review and new familiarity with papers led us to point researchers in two principal directions: accreditation and authenticity. We acknowledge that there are many possible pathways to consider, with reference to the consistency of application, the validity and reliability of online examinations, and whether online examinations enable better measurement and greater student success. There are also opportunities to synthesize online examination literature with other innovative digital pedagogical devices. For example, immersive learning environments (Herrington et al., 2007), mobile technologies (Jahnke & Liebscher, 2020); social media (Giannikas, 2020), and web 2.0 technologies (Bennett et al., 2012). The literature examined acknowledges key elements of the underlying needs for online examinations from student, academic, and technical perspectives. This has included the need for online examinations need to accessible, need to be able to distinguish a true pass from a true fail, secure, minimize opportunities for cheating, accurately authenticates the student, reduce marking time, and designed to be agile in software or technological failure.

We turn attention now to areas of need in future research, and focus on accreditation and authenticity over these alternates given there is a real need for more research prior to synthesis of knowledge on the latter pathways. The credibility of online classes faces criticism due to the distance between students and instructors that may contribute to breaches in integrity (Moten, Fitterer, Brazier, Leonard, & Brown, 2013). Researchers contend that online programs must address student integrity; the use of proctoring software is one way to do so, to try to assure that students are being fairly and effectively evaluated. Moten and colleagues explained that in online courses, students work in relative autonomy and anonymity and instructors may not be certain who is taking exams or how best to validate learning.

FLOW CHART



PROCESS



There are various technological advancements that have occurred in online proctoring system. The (Hussein et al., 2020) exclusively covers and overview of proctoring tools. An investigative study was conducted on proctoring system and its evaluation. Based on the investigation, the paper offers recommendations for educational institutions about use of proctoring system. (Prathish et al., 2016) proposes an intelligent online proctoring system.

AI based Proctoring System: Current Scenario

Existing Architectures on AIPS (RQ1) ProctorU is an example of an OPS that uses a microphone and webcam. It is a live proctoring system in which the proctor guides students through the entire process of an online exam, and also monitors them using the webcam. Proctors are required to ensure that no unauthorized materials are present before the start of the exam. They are also required to verify the student's identity by asking them to present their ID cards. Students are required to maintain an

uninterrupted audio-visual connection to the proctor throughout the session. (Milone et al., 2017) Kryterion, a widely- used commercial OPS uses an approach very similar to the one used by ProctorU. (Prathish et al., 2016) The AI module of ProctorU, however, isn't highly secure and can be deceived, which is why the company recommends using their hybrid solution to maintain high security. This hybrid solution augments automated proctoring with professionally trained live proctors, who have the ability to interrupt the test and intervene in case they suspect something. (Slusky, 2020). Xproctor, another popular OPS, authenticates students & constantly tracks and monitors them via facial recognition, behavior video streaming, audio and photographic methods. It also supports various LMS, which when installed on the person's computer, paves way for unlimited photo captures, screenshots, and video captures. (Slusky, 2020). Another example of a proctoring system is the EU-funded project Tesla. Tesla aims at developing techniques for the verification of test-takers via biometrics. This involves facial recognition, voice recognition, keystroke analysis and fingerprint analysis to ensure that no impersonation is taking place, and that the answers are being given by the actual test-taker.

Issues

One major consideration to be made when designing any software is of the issues which may occur at any stage of execution. For any proctoring software, we must primarily consider two factors where a user may face problems: technological and human response. A major Security factor which can be misused easily is user privacy (Beust et al., 2018). Since, user authentication is necessary before allowing the student to attempt the exam; they are required to verify their personal details to the proctor. This can be done by scanning their User Identity Cards like College ID, Aadhar Card etc. (Butler-Henderson & Crawford, 2020; Caveon et al., 2013; Slusky, 2020). Such documents are often linked to sensitive user details and can be misused easily. The mobile numbers linked can also lead to phishing calls and serious offences like catfishing, harassment and so on. A proctor may end up indulging in immoral activities with the information at hand (Coghlan et al., 2020). Hence, a lot of emphasis must be given to ensuring that any Proctoring Software is robust, secure and ensures privacy of the test-taker. Impersonation by candidates is another security few which needs to be avoided (Hylton et al., 2016). Since Proctoring Software give us the liberty to attempt any exam at home, this facility can be misused by users as they may make any other person attempt the test using their credentials (Ghizlane et al., 2019). User Authentication, therefore, becomes a necessity before permitting anyone to begin with the exam. For ensuring fair assessments, various security measures are applied by Proctoring software. Some applications involve gaining control of the candidate's device. This includes webcam, microphone and even gaining screenshare access of the Desktop/Laptop/Mobile Phone.

Future /Scope

Educational institutions and corporate organizations across the world had gradually begun the process of adopting online proctoring software over the past decade to conduct remote examinations in a fair manner and ensuring that the candidates gave the exam in a known environment. Due to the COVID-19 Pandemic, it has become the need of the hour to leverage remote proctoring platforms to conduct seamless tests while also ensuring that the candidates do not indulge in malpractices during these online exams. (Remote Proctoring, 2020). There are numerous benefits to any organization when they conduct any assessment via remote proctoring instead of the traditional pen-and-paper based method. Scheduling exams becomes easier as there is no need to set up specific testing centers to conduct examinations. Communication between the examiner and the examinee is more streamlined, hassle-free and faster. Results of the examination can be generated faster and, in some cases, almost instantly. Online examinations also give the organization the liberty to conduct the exam on a massive scale without worrying about maxing out the capacity of the examination centers. (Arora, 2021). However, a sincere effort needs to be made for developing proctoring technologies to ensure that the level of online examinations is at par with offline examinations in all aspects; be it integrity of marks scored, ensuring candidates do not get involved in wrongdoings etc. Social perception of the masses towards online exams also needs to be changed and they must be made aware of the benefits for the same.

The issues while designing an AI-based proctoring system as discussed by above need to be tackled with the use of existing technologies. Advancement of technologies will no doubt be beneficial for constructing more robust and secure systems but currently, anticipating the growing need for this software; a conscious effort needs to be made to enable existing technologies in mitigating the issues that exist. (Pimple, 2021). Any proctoring software needs to accurately establish the identity of the person giving the examination. Impersonation is a big threat to the sanctity of the online exams and hence, various methods are being employed to ensure that the designated person is the one giving the examination. Proctoring software ask every candidate to submit some personal information or proof of identity which is then verified before allowing the candidate to proceed. Certain systems have begun employing biometric authentication via fingerprints through the fingerprint scanner which is now readily available on mobile phones or laptops nowadays.

PROPOSED SYSTEM

Proctoring software involves two major elements. First, it activates the camera on a computer, and records the student taking the exam. This enables faculty to observe the students' behavior and identify activities that may indicate cheating such as talking to others or looking up information in books. Second, it either limits the students' ability to use their computers for other tasks by eliminating the ability to engage in activities such as copy-pasting, printing and searching the internet, or it records everything that students do on their computers, or both. Limiting students' abilities to use other tools or resources is referred to as "locking down" the computer or browser. Recordings of exams can be reviewed by the professor or teaching assistants; alternatively,

Hardware Requirement: Software Requirement:

RAM: 8 GB OS: Windows 10

HDD: 1 TB Language: Python,

Flask,MySQL, BOOTSTRAP

Mobile: Web Cam Goggle wear Cam

CONCLUSION AND DISCUSSIONS

The effect of proctoring with video is large enough to suggest that an impact on test scores exists, with the likelihood that when non proctored, students may resort to academic dishonesty by using resources that were explicitly forbidden during the test. The effect of proctoring with video shows a potential effect on the percentage of test time used to take the test, with proctoring resulting in less time compared with non proctored tests, where students took significantly more time to complete the test. Additionally, lockdown software without video monitoring, did not have a similar impact as proctoring software that used video monitoring. Proctoring with video monitoring significantly negatively impacts online test grades, probably because it deters cheating, and its use is important to assure academic integrity through similar test taking conditions in similar courses when using online tests.

Online testing is the next wave of adoption after online learning which has seen a significant rise in demand due to the problems posed by the ongoing COVID-19 Pandemic. OPS do not claim to be completely fool proof but are rapidly changing the adoption of online testing from home, a scenario that previously would have been thought to be preposterous amongst the masses. With the advent of Online Proctoring Software, security issues associated with it are multiplying and are a cause of legitimate concern. Highly sensitive biometric data can be collected and stored on the pretext of verification purposes. Hence, personal data collected during OPS operations need to be carefully identified, classified, and labeled according to its sensitivity level for storage to maintain its confidentiality, integrity, and availability; irrespective of the medium of storage. Debate and disagreement about the appropriateness of remote proctoring technologies is bound to continue into the future. There are definite considerations that speak in favor of such technologies despite their drawbacks. It is not unfair to acknowledge here that in-person proctoring is not ethically perfect either: it too can miss cases of cheating and hence, result in unfair accusations of academic dishonesty. Furthermore, we have to accept the fact that it is vital to maintain academic integrity to protect both students and institutions.

References

- Abdel Karim N., Shukur Z. Proposed features of an online examination interface design and its optimal values. *Computers in Human Behavior*. 2016;64:414–422. doi: 10.1016/j.chb.2016.07.013. [CrossRef] [Google Scholar]
- AbuMansour H. 2017 IEEE/ACS 14th international conference on computer systems and applications (AICCSA) 2017. Proposed bio-authentication system for question bank in learning management systems; pp. 489–494. [CrossRef] [Google Scholar]
- Aisyah S., Bandung Y., Subekti L.B. 2018 international conference on information technology systems and innovation (ICITSI) 2018. Development of continuous authentication system on android-based online exam application; pp. 171–176. [CrossRef] [Google Scholar]
- Al-Hakeem M.S., Abdulrahman M.S. Developing a new e-exam platform to enhance the university academic examinations: The case of Lebanese French University. *International Journal of Modern Education and Computer Science*. 2017;9(5):9. doi: 10.5815/ijmecs.2017.05.02. [CrossRef] [Google Scholar]
- Alzu'bi M. Proceedings of conference of the international journal of arts & sciences. 2015. The effect of using electronic exams on students' achievement and test takers' motivation in an English 101 course; pp. 207–215. [Google Scholar]
- Amigud A., Dawson P. The law and the outlaw: is legal prohibition a viable solution to the contract cheating problem? *Assessment & Evaluation in Higher Education*. 2020;45(1):98–108. doi: 10.1080/02602938.2019.1612851. [CrossRef] [Google Scholar]
- Anderson H.M., Cain J., Bird E. Online course evaluations: Review of literature and a pilot study. *American Journal of Pharmaceutical Education*. 2005;69(1):34–43. doi: 10.5688/aj690105. [CrossRef] [Google Scholar]
- Ardid M., Gómez-Tejedor J.A., Meseguer-Dueñas J.M., Riera J., Vidaurre A. Online exams for blended assessment. Study of different application methodologies. *Computers & Education*. 2015;81:296–303. doi: 10.1016/j.compedu.2014.10.010. [CrossRef] [Google Scholar]
- Attia M. Postgraduate students' perceptions toward online assessment: The case of the faculty of education, Umm Al-Qura university. In: Wiseman A., Alromi N., Alshumrani S., editors. *Education for a knowledge society in Arabian Gulf countries*. Emerald Group Publishing Limited; Bingley, United Kingdom: 2014. pp. 151–173. [CrossRef] [Google Scholar]
- Bennett S., Bishop A., Dalgarno B., Waycott J., Kennedy G. Implementing web 2.0 technologies in higher education: A collective case study. *Computers & Education*. 2012;59(2):524–534. [Google Scholar]