Computers & Education 92-93 (2016) 53–63

Contents lists available at ScienceDirect

Computers & Education

journal homepage: www.elsevier.com/locate/compedu

Utilizing webcam-based proctoring to deter misconduct in online exams

Kenrie Hylton [a, *], Yair Levy [b], Laurie P. Dringus [b]

[a] Department of Computer & Information Sciences, Northern Caribbean University, Manchester Road, Mandeville, Jamaica
[b] College of Engineering and Computing, Nova Southeastern University, 3301 College Avenue, Ft. Lauderdale, FL 33314, USA

ARTICLE INFO

Article history:
Received 28 May 2015
Received in revised form
29 September 2015
Accepted 2 October 2015
Available online 8 October 2015

Keywords:
Architectures for educational technology system
Distance education and telelearning

ABSTRACT

Deception and dishonesty in online exams are believed to link to their unmonitored nature where users appear to have the opportunity to collaborate or utilize unauthorized resources during these assessments. The primary goal of this study was to investigate the deterrent effect of Webcam-based proctoring on misconduct during online exams. This study involved an experimental design in comparing an experimental group and a control group. Both groups attended the same course, used the same e-learning system, with the same instructor, and took the same set of online exams. One group was monitored by a Web-based proctor while the other was not monitored. The results indicated no statistically significant difference between the scores of the two groups, although the non-proctored group had slightly higher scores. There was a statistically significant difference found on the time taken to complete the online exams where the proctored group used significantly less time to complete their exams. The results of a post-experiment survey indicated that those who were not proctored perceived to have experienced greater levels of opportunity to engage in misconduct than those who were monitored by a Web-based proctor.

1. Introduction

Although misconduct in academia has been around for some time (McCabe, Trevino, & Butterfield, 2001), advances in technology intensify the problem (Harmon & Lambrinos, 2008). The intensification of misconduct is particularly on the rise concerning online exams that are administered and taken in an unmonitored setting (Hollister & Berenson, 2009). The critical issue of securing the integrity of online exams has proven challenging (Burke, 2009), particularly as it relates to addressing the mounting challenges of dishonesty in online exams (Ramim & Levy, 2007).

A few technology-based solutions have been proposed and employed to address the problem of learner authentication in online exams. Penteado and Marana (2009) examined the use of a Web-based camera (Webcam) for facial recognition to authenticate users in exams in online learning systems. Levy and Ramim (2009) proposed that multiple distinct biometric devices including fingerprint scanners or face geometry be utilized to authenticate users prior to taking an online exam, and that learners are willing to use such technology. Milliron and Sandoe (2008) noted that most of the technology-based countermeasures have focused on the verification of the user's identity. Although somewhat feasible, these identity

* Corresponding author.
E-mail addresses: khylton@ncu.edu.jm (K. Hylton), levyy@nova.edu (Y. Levy), laurie@nova.edu (L.P. Dringus).

http://dx.doi.org/10.1016/j.compedu.2015.10.002
0360-1315/

verification approaches do not address a more complex problem, which is "to verify that the test-taker is unassisted by others or unsupported by resources that are disallowed by the instructor" (Milliron & Sandoe, 2008, p. 4).

Adkins, Kenkel, and Lo Lim (2005) highlighted another method to help deter the misuse of online exams using a proctored environment, such as a human proctor. A proctor is "one appointed to oversee students during an examination" (Rosser, Young, & Klonsky, 2007, p. 1459). Research has demonstrated possible misconduct via the significant inflation of grades in exams carried out in an unproctored setting (Carstairs & Myors, 2009; Prince, Fulton, & Garsombke, 2009). This concurs with Faucher and Caves (2009) who noted that misconduct in exams often occurs when "opportunities are provided and surveillance is minimized" (p. 39). Due to the significant deterrent effect of proctoring on misconduct, some scholars have suggested that online exams need to be taken on campus in a proctored setting (Landon & Robby, 1999; Shuey, 2002). However, Shuey (2002) noted that this might counter one of the primary objectives of distance education, which is remote access. Although it can also be argued that students may visit nearby libraries or sites to be physically proctored, but this may not always be possible depending on where the individual is located.

The goal of our study was to examine the utilization of Web-based proctoring through a Webcam to determine the influence this technology may have on deterring misconduct in online exams. In the context of this work, a Web-based proctor is defined as one who utilizes a Webcam for video surveillance to observe the users and their environment during the online exam session. We sought to ascertain the relationship between the application of video surveillance based technologies and the results of online exams.

This experimental study involved a control as well as a treatment group where both groups were exposed to the same settings and pool of questions with the exception that the treatment group was knowingly monitored by a Web-based proctor. The results of the online exams were analyzed for each group, and a post-experiment survey was administered to collect relevant feedback on whether or not participants felt they had the opportunity to collaborate or use unauthorized resources during the online exam.

The relevance of this research is in the examination of the deterrent effect of Webcam-based surveillance on misconduct in online exams. Our study is unique in that, although there have been numerous suggested technologies on countering the problem (Adkins et al., 2005; Levy & Ramim, 2009), most have been focused on authentication and identity verification. The current research goes beyond this point to address the problem that occurs after authentication, which is of unsanctioned collaboration and the utilization of unauthorized resources during an online exam. This study involved empirically testing the application of Webcams as a video surveillance device to counter the misconduct challenge.

Our study is of significance to the computer education as well as information systems domains, particularly within areas regarding online exams and e-learning systems. This is also important because the United States (US) Department of Education requires that appropriate procedures or technology are implemented to verify the identity of students who participate in distance education courses (U.S. Department of Education Office of Postsecondary Education Accreditation and State Liason, 2010). Additionally, the implication of results should be of significance to a number of other research areas across a number of domains, such as criminology and social sciences in relating to the deterrent effect of surveillance. Our study further examined concepts of deterrence along with surveillance in the context of securing and protecting the integrity of specific academic information systems. The research is also applicable to multiple industries, including those offering online professional certification exams and prospective employee exams (Makransky & Glas, 2011), as well as employee training and testing.

2. Literature review

2.1. Misconduct

Misconduct was generally defined by Camp, Gaes, Langan, and Saylor (2003) as "the failure to follow explicit rules" (p. 504). Misconduct as it relates to information systems is the unauthorized, deliberate misuse of an organization's information systems. These include but are not limited to such acts as unauthorized use of the information system and accessing unauthorized information (Cronan, Foltz, & Jones, 2006). Misconduct in the context of our study focused on dishonest and delinquent behavior in online exams. Dishonesty in online exams is noted as being related to identity verification and ensuring that students operate within the established boundaries (Gikandi, Morrow, & Davis, 2011). Academic misconduct is further considered to be any act that provides an unearned advantage over another including impersonating someone else for an exam as well as utilizing unauthorized notes or collaborating with others during an exam (Hughes & McCabe, 2006).

McCabe and Trevino (1993) conducted a study with 6096 students from 31 colleges and universities in the US. Their results indicated that approximately 64% of the respondents had engaged in misconduct on exams. Crittenden, Hanna, and Peterson (2009) cited a survey conducted by the Center for Academic Integrity of approximately 50,000 undergraduate students from colleges and universities across the US that found that an overwhelming 70% of respondents admitted to serious academic misconduct on exams. These findings highlight the pervasiveness of the problem of misconduct within academic institutions.

Furthermore, the results from a more limited survey that focused on technology-assisted misconduct indicated that approximately 90% of respondents engaged in some form of Internet based misconduct (Berry, Thornton, & Baker, 2006) and misuse of academic information systems. These findings are further supported by the results of a survey of 62 participants from four English-speaking countries, which suggested that there is a strong perception that technology, which facilitates ease of access to information, has led to increased misconduct (Dick et al., 2002). These statistics have led to a growing