Chapter 1
Keystroke Dynamics in E-Learning and Online Exams

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ABSTRACT

In the internet era, the online examination has become an integral component of online processing and online learning. Student assessment in the online education system is submitted remotely without any face-to-face recognition and interaction. However, student authentication is the significant challenge in online education and examination. This chapter aims to examine various authentication systems, potential threats, and solutions to student authentication in the online examinations and learning. In this chapter, a keystroke-based authentication system is discussed for online examinations. Keystroke-based authentication does not require any additional investments as compared to the other existing authentication approaches such as face recognition, iris recognition, fingerprint, and so on.

INTRODUCTION

E-learning systems are becoming one of the largest growing segments of Web-based systems (Shauna Beaudin, Yair Levy, James Parrish and Theon Danet, 2016; Alwi & Fan, 2010). E-learning platform uses a wide range of learning activities such as to meet learning outcomes (Levy, 2008). However, the prevalent uses within academic institutions, e-learning systems are a strategic way for institutions/organizations from various institutions/industries to deliver training to students/employees in order to improve their course content or skills or obtain certifications. In the current scenario, users interact with the e-learning systems through a variety of learning activities. But according to Bailie (Bailie & Jortberg, 2009) e-learning activities can be categorized as formative or summative e-assessments. However, the formative e-assessments are used to identify the gap between current understanding and the desired goal by providing feedback, dialogue, and non-assessed activities. Hence, e-learning systems must ensure that users completing e-learning activities are genuine and secured (Peres, Lima, & Lima, 2014). The DOI: 10.4018/978-1-5225-7724-9.ch001
Joint Information Systems Committee (JISC) (2006) has defined the e-assessments as, “the end-to-end electronic learning and assessment processes where [Information & Communications Technology] ICT is used for the presentation of learning or assessment activity. A risk to e-learning systems is when users deliberately reveal their authentication details to allow another user to impersonate them (Apampa, Wills, & Argles, 2010). Impersonation is considered the intentional collaboration between users with the intent to commit a fraudulent behavior by the misrepresentation of identity potentially undermining the value of the system (Apampa et al., 2010; Gathuri, Luvanda, & Kamundi, 2014).

To understand the challenges associated with an e-learning environment, we should know the definition of what the term e-learning means. Clark and Mayer help define e-learning as instruction delivered by any technological mode intended to promote learning (2011). Teaching and learning in an e-learning environment happen differently than in the traditional classroom and can present new challenges to instructors and learners participating in the online learning environment. Technology-assisted learning tools are quickly changing the face of education, transitioning of the classroom learning environment to an online-only or blended online learning experience (http://biometrics.pbworks.com).

The offline exam is chosen as an evaluation method for both online and off-line courses, but online course examinations have also expanded rapidly (http://polinance.blogspot.in) and are used to evaluate the student’s knowledge of using modern computer technology without any effects on the traditional university course exam that uses pens, papers and invigilators. Online exam can improve the standards of the student’s examination whereas the traditional examination. Thus, the online examinations are considered as an essential source for university exam, and the development of network technology polices has given the possibility to conduct the exams online that can benefit a large number of student community. In the new technology, the computer has been generally useful to the fields of education and gives the professors/instructors the advantage of an adequate assessment using the new era e-learning and e-exam procedure. The study conducted on online exam and traditional exam indicates that online learning has better results than traditional exams (R. Joyce, G. Gupta, 1990; Eros Desouza, Matthew Fleming, 2003). On the other side of online learning and examination conduction includes many challenges. A study suggested that about 73.6% of the students in the sample held the perception that it is easier to cheat in an online versus traditional course or e-examinations (King, Guyette, & Piotrowski, 2009). Among them, authentication of the user who involved in the process is a major one. However, many solutions were also proposed to avoid the online cheating and are as follows:

1. Comparing the IP addresses to see if two students are in the vicinity of each other.
2. We can make use of plagiarism detection tool Turnitin and search engine to check some questions for possible dishonesty (Yong Sheng, Vir. V. Phoha, Steven, and M, Rovnyak, 2005).
3. Watchful eye of a webcam or with software profiling your keystrokes or your syntax to see whether it really is you answering the questions (https://elearningindustry.com)
4. Commercial products for proctoring E-exams: The first one is named Secureexam, a remote proctor made by Software Secure; the second one is named Webassessor, made by Kryterion; and the third one is named ProctorU, made by Axicom (Yong Sheng, Vir. V. Phoha, Steven, and M, Rovnyak, 2005).
5. Effective authentication methods (Fabian Monrose, Aviel D. Rubin, 2000; Romain Giot, Bernadette Dorizzly, Christophe Rosenberger, 2011; Ramu, Dr.T. Arivoli, 2013)
6. Usage of microphones that visually record the student’s testing environment, movements, and background noise (Patricia A. and Robert I, 2009)
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