Security in online web learning assessment

Providing an effective trustworthiness approach to support e-learning teams

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Abstract This paper proposes a trustworthiness model for the design of secure learning assessment in on-line web collaborative learning groups. Although computer supported collaborative learning has been widely adopted in many educational institutions over the last decade, there exist still drawbacks which limit their potential in collaborative learning activities. Among these limitations, we investigate information security requirements in online assessment, (e-assessment), which can be developed in collaborative learning contexts. Despite information security enhancements have been developed in recent years, to the best of our knowledge, integrated and holistic security models have not been completely carried out yet. Even when security advanced methodologies and technologies are deployed in learning management systems, too many types of vulnerabilities still remain opened and unsolved. Therefore, new models such as trustworthiness approaches can overcome these lacks and support e-assessment requirements for e-Learning. To this end, a holistic security model is designed, implemented and evaluated in a real context of e-Learning. Implications of this study are remarked for secure assessment in on-line collaborative learning through effective trustworthiness approaches.

Keywords Trustworthiness · E-Assessment · Information security · Collaborative learning
1 Introduction

Computer-Supported Collaborative Learning (CSCL) has been widely adopted in many educational institutions over the last decade. Among these institutions, the Open University of Catalonia\(^1\) (UOC) develops on-line education based on continuous evaluation and collaborative activities.

Although on-line assessments (e-assessments) in both continuous evaluation and collaborative learning have been widely adopted in many educational institutions over the last years, there exist still drawbacks which limit their potential. Among these limitations, we investigate information security requirements in assessments which may be developed in on-line collaborative learning contexts.

Despite information security technological enhances have also been developed in recent years, to the best of our knowledge, integrated and holistic security models have not been completely carried out yet. Even when security advanced methodologies and technologies are deployed in Learning Management Systems (LMS), too many lacks still remain opened and unsolved. Therefore, as new models are needed, in this paper we propose a trustworthiness approach based on hybrid evaluation which can complete these lacks and support e-assessments requirements.

The paper is organized as follows. Section 2 shows the background about security in e-Learning as well as our research already done with respect to trustworthiness and security in e-assessment. Section 3 reviews the main factors, classification and security issues involved in security in e-assessments and we discussed that security improvements in e-assessments cannot be reached with technology alone; to fill this drawback, in Section 4, we extend our security model with the study of the trustworthiness dimension. Once studied trustworthiness factors and rules and presented our previous work, in Section 5 we describe a model based on trustworthiness applied to e-assessments. In Section 6, we conduct our research to peer-to-peer e-assessment developed in a real on-line course and by developing a statistical and evaluation analysis for the course collected data. Finally, Section 7 concludes the paper highlighting the main ideas discussed and outlining ongoing and future work.

2 Security in e-learning background

Since 1998, information security in e-Learning has been considered as an important factor in e-Learning design. Early research works about these topics \([7]\) are focused on confidentiality and these privacy approaches can be found in \([13]\). Despite the relevance of privacy requirements in secure e-Learning, information security does not serve for privacy services only. Indeed, in many works \([6, 23]\), security in e-Learning has been treated following more complex analysis and design models.

In \([23]\) the author argues that security is an important issue in the context of education. Security is mainly an organizational and management issue and improving security is an ongoing process in e-Learning. This proposal is the first approach in which information security is applied to LMS as a general key in e-Learning design and management.

\(^1\)The Open University of Catalonia is located in Barcelona, Spain. The UOC offers distance education through the Internet since 1994. Currently, about 60,000 students and 3,700 lecturers are involved in over 8,300 on-line classrooms from about 100 graduate, post-graduate and doctorate programs in a wide range of academic disciplines. The UOC is found at http://www.uoc.edu