

A framework for the formulation of security issues in the field of e-learning using Meta-Synthesis method

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CHRONICLE

ABSTRACT

Article history:

Received January 20, 2014

Accepted 30 August 2014

Available online

August 31 2014

E-learning

Security issues

Formulating requirements

Application development and e-learning services in the context of communication networks and information along with qualitative and quantitative improvements of activities and services can expand some of threats which emergence in the networks of this infrastructure of telecommunications. Consequently, this is an inevitable necessity attention to accuracy and efficiency payment issues and security concerns to managers and decision makers. Based on other researches and effective experiences in the field of e-learning security, this research attempts to define a logical structure to security contents in this field. We have presented a three-dimensional model for security issues and requirements of e-learning, based on the findings of research. Actuarial three-dimensional model are infrastructure-oriented viewpoint; service-oriented viewpoint and customer-oriented viewpoint. Each of these three dimensions in this model has described in the form of model with two fields: e-learning issues and security of e-learning issues.

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1. Introduction

Development and diffusion of information and communication technology (ICT) has altered activates of social units, business units even influence on governments in the social, economic, political and technological infrastructures. Therefore, a new society has been created called information society (Ziamba & Olszak, 2012). The major characteristic of these communities is importance of information, knowledge and their resources that needs to protect (Arabsorkhi et al., 2009). Inclusive ICT infrastructure in the information society provides basic admission and facilities for developing variety of electronic functional spaces and supply value added services to all users (Younis et al., 2013). However, the nature of this infrastructure provides a context to operate new type of threats and attacks on security systems, applications or users of e-services (Adams & Blandford, 2003; Cardenas & Sanchez, 2005; Defta, 2011). Hence, security concerns are key issues to safe using of these services (Eibl, 2009; Hayaati, 2010).

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The developers and suppliers of technologies are worried data confidentiality increasing e-learning services value and investments volume (Furnell, 1999). Because, inattention to security issues can affect using e-learning services (Adams & Blandford, 2003; Eibl, 2009; Hayaati, 2010). Nevertheless, there is no merit attention to security issues in practical and theoretical realms (Ramim & Levy, 2006). This fact shows the importance of doing research in the field of e-learning security. There are some risks and threats in spite of various solutions in the field of e-learning (Eibl, 2008; Cardenas & Sanchez, 2005; Hitchings, 1995). Some researchers believe that this problem is a result of non-systematic factors, such as human (Arabsorkhi & Yadegari, 2010). However, it can argue that inattention to aspects of the developing process; supply management and e-learning services can lead to create risks and attacks in this field (Zuev, 2013). There are two basic requirements to fulfill the security requirements of the technology space, services and preservation in the field of e-learning: First, facing with systematic security threats and challenges of this field (Arabsorkhi & Yadegari, 2010; Hayaati, 2010) and second, having a comprehensive approach to identify and cover all areas of challenges in the security issues. These two needs can be accountable by providing security framework in the field of e-learning (Mellado et al., 2010).

This paper develops at supporting security requirements in the field of e-learning. The structure of this paper after introduction is as follows. The objectives and literature review of the study are presented in section two. In the third part, research methodology is presented. All stages of meta-synthesis method and finding research are expressed in fourth section. The findings are presented by providing conceptual model and finally in section five, conclusions of this study are presented.

2. Literature review

There are variety issues in the field of e-learning, which have been investigated in other researches in the conceptual, technical and management sphere. Some of highlighted researches in this field are presented in the Table 1.

Table 1
Summary of literature review

| Subject | Basic information | | Type of security issues | Formulation/classification issues | Point of issues |
|---|---|------|---|---|---------------------------------------|
| | Author/Authors | Year | | | |
| E-learning solutions and security requirements | Arabsorkhi et al. | 2009 | Standard security requirement | Managerial, technical and procedural | Focus on Services |
| Identification and analysis of security challenges and strategies in e-learning | Arabsorkhi & Yadegari | 2010 | Standard security requirement | Managerial, technical and procedural | The custodian of the delivery service |
| Towards- secure learning applications: a multi-agent plat form | Carine & Webber | 2007 | Technical security requirement | - | Technology and application |
| E-learning and Information Security Management | Hayaati | 2010 | Public security requirement | It emphasizes on the necessity of it | Delivery services |
| Understand the ethical implications of e-learning security attacks by the students | Ramim & Levy | 2010 | Public security requirement | It emphasizes on the necessity of it | Services recipients |
| approach of public Key Infrastructure to expand the secure distributed environments of e-learning and fluid learning advanced fluid | Kambourakis, Kontoni, Rouskas & Gritzalis | 2007 | Technical security requirement | The requirements based on the confidence model. | Infrastructure of delivery services |
| Privacy concerns in the field of e-learning | May & Sébastien | 2011 | Public security requirement | The requirements based on privacy | Services recipients |
| Information security in the e-learning platforms | Defra | 2011 | Public and technical security requirement | Procedural and technical | Software of delivery services |
| An engineering security methodology of web for e-learning systems | Aljawameh | 2011 | Secure development services issues | Technical | Delivery services |

There are major points about the mentioned researches in Table 1. The first case is associated with more attitudes – not major- and techniques to secure issues in the field of e-learning. Another case is the lack of concurrent security of payment by various stakeholders in the field of e-learning. Final case is the lack of a comprehensive approach to manage issues and security requirements in the field of e-learning that some researchers focus on them in many new articles (Zuev, 2013; Hayaati, 2010). Considering these gaps, we focus on developing a systematic framework to secure e-learning issues.

3. Research methodology

The qualitative studies have examined in the literature review of this research, which is connected to the subject of this investigation. However, there are not researches about providing a security framework in the field of e-learning. Consequently, we present a logical framework for the best formulating of previously researches by meta-synthesis method. Meta-synthesis is an assembly process of the results for the individual researches that are in the level of abstraction. However, some researches defined it as meta-evaluation or systematic study, which is wrong (Zimmer, 2006). The capabilities of this method lead to increase trends of using it as a useful scientific method for organizing and promoting qualitative research. Based on this issue, we try to utilize meta-synthesis method to formulate associated results of e-learning security fields and organize them as a logical framework, integration, interpretation and composition. Meta-synthesis method is associated with the implementation of different methods and Fig. 1 summarizes the method of this paper.

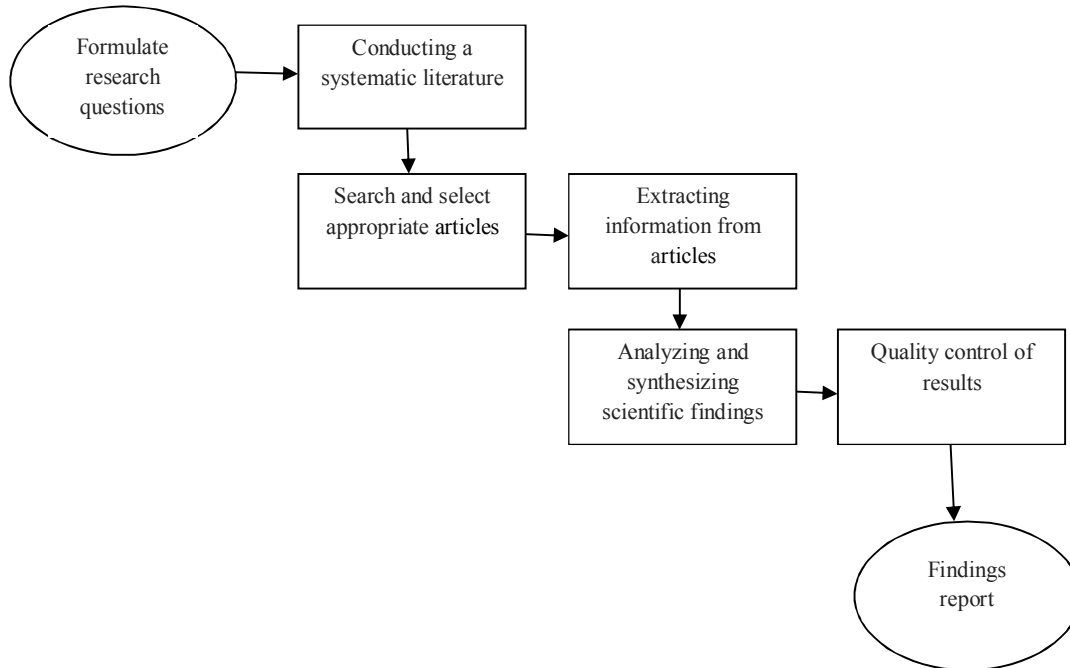


Fig. 1. Steps of meta-synthesis method

It should be noted that meta-synthesis method has utilized to build a framework to security issues in the field of e-learning.

4. Findings research

The research questions will discuss in the first part of this study. The following questions are associated to achieve desired goals using meta-synthesis method:

“Based on the security issues in the field of e-learning, what a logical framework is? And what its dimensions are?”

Previous studies are analyzed on the two features to formulate a logical framework to e-learning security requirements:

- Pure research in the field of e-learning security.
- Pure research in the field of e-learning.

We have aimed security issues in examining research in the field of e-learning that have formulated e-learning. However, findings in the field of e-learning have identified key issues and elements, which

have considered formulating e-learning services, directly. We suggest our framework to formulate e-learning security issues at the end of this activity. In the following, we utilize different search engines to perform research, based on defined keywords. One or a set of groups and professional references have analyzed using variety search engines. In addition, academic centers have been recognized to select many articles and reliable references. Each of these databases has a number of professional scientific publications. We studied related articles to e-learning and e-learning security in the specification listed of these databases and their journals. In the next step, we evaluated and selected appropriate articles. A set of indications has been shown in the Table 2.

Table 2
Accepted and rejection criteria of articles

| index | Accepted criteria | Rejection criteria |
|----------------------|---|---|
| Geographical | All continents | - |
| Language of research | English and Persian | other |
| Time of study | 1980-2013 | Before 1980 |
| Methods | Qualitative | Quantitative |
| Population of study | E-learning, e-learning security, security information | Except e-learning, security e-learning, security information |
| Condition of study | Aspects of e-learning security, functional aspects, developing issues and components of e-learning environments | Except of Aspects of security e-learning, functional aspects, developing considerations and components of e-learning environments |
| Type of document | Published articles in the journals and international conferences | Personal opinions and personal websites |

The process of selecting articles based on the meta-synthesis method is shown in Fig 2 and Fig. 3.

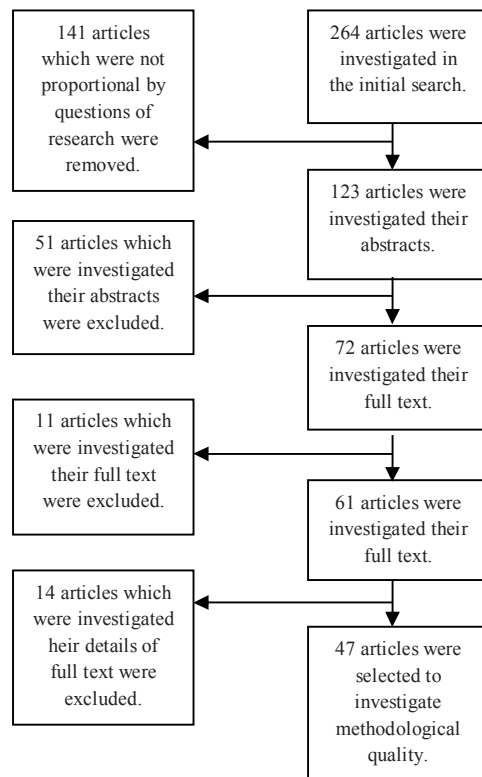


Fig. 3. Process of selecting appropriate articles in the field of e-learning

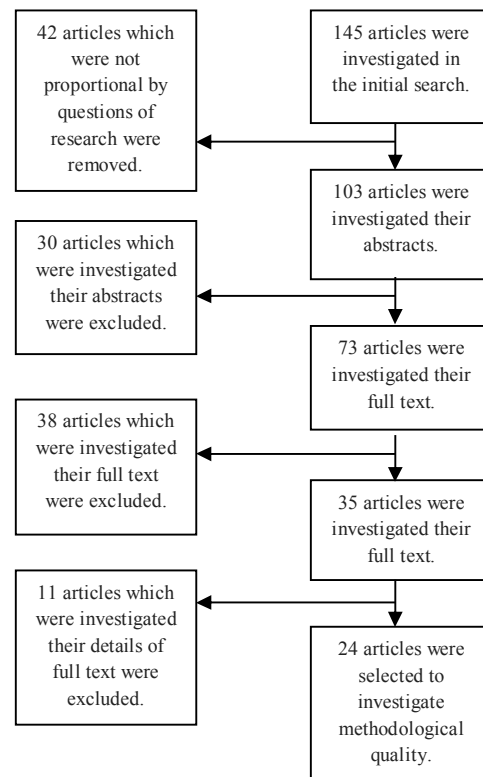


Fig. 2. Process of search and selection of appropriate articles in the field of e-learning security

There were 47 articles about e-learning security and 24 remaining articles about e-learning scope that have investigated CASP methods separately. Finally, 29 articles, which had e-learning security subjects and 17 articles, which had e-learning subjects obtained required scores to do a qualitative content analysis. We were studying selected articles to achieve related results of e-learning security concerns. Summary of obtained results are listed in the format of table. This table is used as input of analysis step and combining finding results of research. We have studied selected articles to achieve related results for security concerns of e-learning. Summary of obtained results are listed in the format of table. This table is used as input of analysis step and combining finding results of research. We searched topics, which have emerged among selected meta-synthesis studies, based on analysis of qualitative findings researches. In the other word, these topics are associated with major issues of e-learning and e-learning security or they can be utilized to formulate the issues of this area. We identified issues by reviewing studies and findings shown in Fig. 4. Then, they organized in the same categories, which can describe issues of e-learning and e-learning security. This analysis is formulated as a separated table.

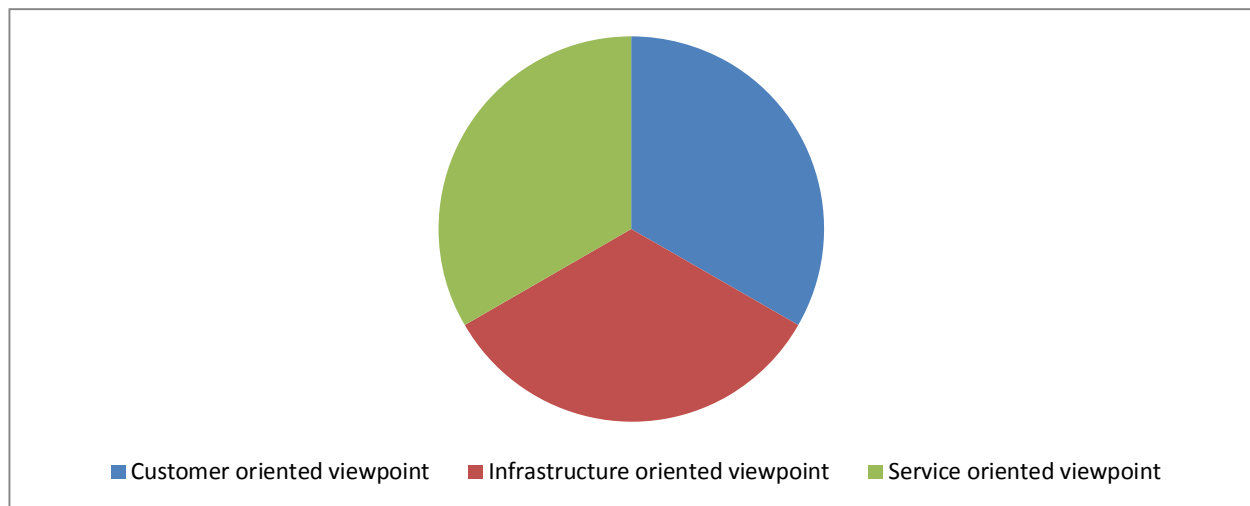


Fig. 4. The represented model to define security requirements of e-learning

Last issue of meta-synthesis method is a framework, which controls quality of findings. We used approaches to separate major studies in the qualitative research. However, we utilized a set of standard criteria in the process of meta-synthesis method as a CASP method to select qualified articles. Furthermore, we will apply both electronic and manual strategies to search all the relevant articles, comprehensively.

Accordingly, we provided a logical framework for security requirements of e-learning by meta-synthesis method, analyzing frameworks, theoretical models in the field of e-learning and information security. The framework has identified purposes such as: designing, developing, managing, distributing and e-learning applications; identifying key references of e-learning security and non-security; identifying key issues and e-learning decision variables in the mentioned fields; identifying domains of security or control objectives of e-learning in the mentioned fields. Consequently, we tried to obtain a three-dimensional model of e-learning and requirements of e-learning security. The three dimensions of this model are infrastructure-oriented viewpoint, service-oriented viewpoint and customer-oriented viewpoint. In each of mentioned approaches there are key issues as decision variables in this field. These topics are included indices, which are used for designing, developing and planning in that issue. We have enabled to define a conceptual framework, based on mentioned dimensions using meta-synthesis method.

Table 4
The results of the data analysis of meta-synthesis

| Category | Source ID | Metrics | |
|--------------------------|---------------------------------------|--------------------------------------|--------------------------------------|
| Developer's viewpoint | Technology | e-learning aspects | |
| | | Designing software | |
| | Plat form | e-learning security aspects | |
| | | Environment of development | |
| | | Secure development of software | |
| | | Security requirement | |
| | Support | Security patches | |
| | | Communication facilities | |
| | | Multimedia features | |
| | | Security communications | |
| Providers' viewpoint | Applications and educational services | Security Tools | |
| | | Secure configuration | |
| | Media Services | Consideration of e-learning | |
| | | Extensibility | |
| | | Development Platform | |
| | | Security assurance | |
| | Quality and quantity of services | Consideration of security e-learning | |
| | | Security Evaluation | |
| | | Security guidelines | |
| | | Remote learning | |
| Customer's viewpoint | Knowledge | Learning by computers | |
| | | Online education | |
| | Customer's standards | Consideration of e-learning | |
| | | Consideration of security e-learning | |
| | | Security application | |
| | | Security mechanisms | |
| Customer's viewpoint | Knowledge | Network | |
| | | Portal | |
| | Customer's standards | Consideration of e-learning | |
| | | Consideration of security e-learning | |
| | | Network security | |
| | | Portal security | |
| | Customer's viewpoint | Knowledge | Distribution |
| | | | Exchange /supply points |
| | | Customer's standards | Consideration of e-learning |
| | | | Consideration of security e-learning |
| Availability | | | |
| Communication's Security | | | |
| Customer's viewpoint | Knowledge | Content | |
| | | Education | |
| | Customer's standards | Consideration of e-learning | |
| | | Consideration of security e-learning | |
| | | Teachers | |
| | | Financial | |
| | Customer's viewpoint | Knowledge | Security services |
| | | | Accuracy system performance |
| | | Customer's standards | Consideration of e-learning |
| | | | Consideration of security e-learning |
| Course | | | |
| Education a leavens | | | |
| Customer's viewpoint | Knowledge | Assessment | |
| | | Cooperation | |
| | Customer's standards | Consideration of e-learning | |
| | | Consideration of security e-learning | |
| | | Accuracy Content | |
| | | Confidentiality | |
| | Customer's standards | Consideration of e-learning | |
| | | Consideration of security e-learning | |
| | | Flexibility | |
| | | Quality of Service | |
| Customer's standards | Accuracy of system performance | | |
| | Availability | | |
| Customer's standards | Reliability | | |

5. Conclusion

We have presented a framework to formulate security concerns in the field of e-learning using meta-synthesis method. This framework can be utilized as a support to security requirements engineering. This framework proceeds to security requirements engineering in the field of e-learning from several points. First, this logical framework is the best indicators for control objectives and security issues by introducing three viewpoints and diverse fields of e-learning with different security requirements. The requirements should be architected in security requirements engineering framework. Therefore, logical routine of requirements realizes in effect of using suggested framework. Secondly, each of these viewpoints and the scope of the definition have control objectives and specific security requirements. In addition, they are followed diverse security requirements based on the role of e-learning fields. Hence, a key process or support function of security requirement engineering can play essential role for the logical framework. Ultimately, each of these areas has its security agencies that are players in the security requirements engineering. Obviously, there is a difference between each of areas of security requirement engineering and the roles of them in the diverse fields of security requirement engineering. Consequently, there is a rational practical screening by using logical

framework. Accordingly, the proposed framework is examined to provide comprehensive support to security requirements in the field of e-learning.

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