

## Chapter 6

# A Conceptual Model for Cloud-Based E-Training in Nursing Education

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### ABSTRACT

*In specific fields, such as e-training in nursing, involving computer-intensive training scenarios, there is an increased demand to deliver training services to a larger number of learners, and with it, the need for cloud services. However, to date there has been a lack of a formalized framework relating to the use of cloud computing for on-demand interactive e-training resources in nursing education. To this end, this chapter formalizes a conceptual framework for a cloud-based e-training system in nursing education. The conceptualization takes into consideration nursing e-training system requirements, with a focus on applying cloud computing technologies to ensure the dynamic scalability of virtual distributed services and computing power while maintaining QoS and security.*

### INTRODUCTION

Nursing education has recently undertaken a technological advancement and has employed effective teaching and training methods to address learning requirements and assist learners to build life-long skills, develop their problem-solving abilities and employ resources to obtain the best benefit from technology.

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Internationally, there is a growing trend toward the need for effective clinical skills education that is flexible and suits different learning expectations (Bloomfield et al. 2013). Therefore, to accommodate the intensive practical needs of nursing students and guarantee an effective training processes, it is essential that the most effective teaching methods are utilized, supported by technologies that offer an effective intelligent adaptive training environment to develop learning and to promote skills. Simulation-based learning is the next era in the history of clinical practical education. The use of simulation within clinical skills education is an emerging educational technique gaining global recognition as a valuable pedagogic approach and an effective way to ensure practical skills in a safe simulated clinical environment. Generally, for e-training in nursing to be effective, important requirements must be satisfied, including that the e-training environment should provide dynamic scalability of virtual distributed services, computing power, QoS and security.

E-training is widely regarded as a valuable mechanism for the acquisition of clinical skills in nursing education where flexible access to e-training resources and the opportunity to engage in independent learning enables students to practice skills at a time of their own choosing and at their own pace (Bloomfield and Jones 2013). One of the benefits of utilizing the powerful features of e-training tools is that it provides valuable feedback to the learners throughout the training process, it allows them to select the learning content; and it enables them to engage in self-assessment and to evaluate the results of their learning. However, resources need to be developed to provide an online and realistic training environment. Therefore, it is important to be able to access virtual resources, such as online simulations and virtual lab repositories, to provide on-demand up-to-date training.

A promising solution to the limitations facing e-training in nursing in relation to scalability to enable it to cope with the increasing number of users and resources is cloud computing, which can provide educational institutions with a distance computing infrastructure and data as a service on-demand over the Internet (Fasihuddin et al. 2012). It also offers educational platforms and services, and virtualization by combining all resources and centralized data storage (Ghazizadeh 2012).

Particularly, for nursing clinical skills learning where services such as virtual labs, simulations, and multimedia provision are computer-intensive and should be offered in a highly scalable way, the cloud-based environment can enable both students and their instructors to access computing resources on-demand for lectures and labs, according to their learning needs (Gonzalez-Martínez et al. 2015).

However, many challenges associated with cloud deployment may arise, such as data privacy, security, availability, consistency, and transmission. Many research studies have proposed solutions to tackle these problems. One solution for educational institutions is for them to build their own private cloud in which to place their sensitive data under their own management. Other research suggests using a cloud backup for important data and information to ensure the requirements of the Service Level Agreement, which specifies the terms of the contract, are met in relation to the provision of the cloud services (Fasihuddin et al. 2012).

Despite the effective solutions which have been applied to cloud models to fit e-training environments, there is still a growing need for a customized e-training cloud platform that meets the specific needs of training environments. For this reason, the aim of this chapter is to enhance the conceptual model developed in (Samra, Li, Soh, & AlZain, 2017) for a cloud-based e-training system in nursing, taking into consideration e-training requirements and utilizing the capabilities of cloud computing to address the challenges, such as QoS in terms of resource provisioning and security in terms of data protection in transmission and storage.

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