# Chapter 4
# Competency–Based Assessment:
## From Conceptual Model to Operational Tool

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## ABSTRACT

*Competency-based Assessment (CBA) is the measurement of student's competency against a standard of performance. It is a process of collecting evidences to analyze student's progress and achievement. In higher education, Competency-based Assessment puts the focus on learning outcomes to constantly improve academic programs and meet labor market demands. As of to date, competencies are described using natural language but rarely used in e-learning systems, and the common sense idea is that: the way competency is defined shapes the way it is conceptualized, implemented and assessed. The main objective of this chapter is to introduce and discuss Competency-based Assessment from a methodological and technical perspectives. More specifically, the objective is to highlight ongoing issues regarding competency assessment in higher education in the 21st century, to emphasis the benefits of its implementation and finally to discuss some competency modeling and assessment techniques.*

## INTRODUCTION

Educational systems have always benefited from technological advances to explore new research areas and improve the teaching-learning process. Over recent years, there has been an increased interest in incorporating competencies into educational curriculum to insure the teaching meets industry-required needs. A Competency-based Education (CBE) focuses on the outcomes of learning by defining goals and processes to achieve them (El Falaki et al.,2011). It contributes to student's career readiness since the main goal is to let students progress at their own pace and measure their achievement against a standard of performance. Educational programs based on CBE describe skills and capacities that one needs to achieve and should be align with both industry and academic standards (Johnstone & Leasure, 2015). CBE involves a methodology to describe, model and assess competencies. However, developing educational programs with a focus on competency as student's characteristic is challenging and needs further attention when it comes to learners' cognitive skills which are considered as unobservable traits, hard to conceive and objectively measure (Hnida, Idrissi, & Bennani, 2014). The research question addressed in this chapter is: how competencies are modeled and assessed within an e-learning platform.

The starting point of developing a competency assessment model is defining and modeling students' attributes to be measured. Based on our literature review, it seems that competencies still subject to different modeling and scales, and have suffered from a variety of interpretations and implementations within e-learning systems: (1) different conceptions of learner profile (2) various approaches promoting either knowledge, skills or attitudes, (3) different assessment strategies to meet specific needs. The variety in competency modeling and assessment techniques could be explained, then, by the fact that existing models and standardized tests don't follow the extremely rapid change.

In the above situation and in order to assess competencies in an online educational system, we need to clearly set a competency assessment model. This category of assessment is viewed as putting students on a competency scale in order to compare them, more specifically, it tends to pinpoint where their understanding is strong and where their understanding is less strong. For tutors, assessing student competencies help them generating concept maps, with understood concepts and misunderstood ones, that need further explanations or more practices in real contexts. This highlights the need to develop a guideline explaining how to effectively implement Competency-based Assessment.

Competency-based Assessment is an important research topic which might be divided into two open problems: (1) Assessment design, which includes competency modeling by test designers, it is about formulating a competency structure to assess and clearly link each competency to an appropriate situation, problem and material. (1) Assessment implementation by test developers, it includes means and tools used to capture measurable attributes of competency. However, assessing competencies involves a complex range of learners' characteristics such us: knowledge level, style, abilities, cognitive skills, background, etc.

The purpose of this chapter is to discuss and highlight open problems of Competency-based Assessment and issues regarding its implementation in online educational systems. It tends to find a common understanding of competency, reports and discusses competency modeling and assessment techniques and concludes with a set of best practices. The rest of this chapter is organized as follows:

In Section II, we report and analyze competency definition, trying to, first, understand what the term "competency" means and which of the students' attributes are involved in, and then, to find a form of consensus about how competencies could be defined and what criterion might be used to effectively measure a shown performance. In Section III, we discuss ongoing issues and challenges regarding com-

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