Chapter 6
Academic Technology for Competency-Based Education in Higher Education

Jonathan M. Kevan
University of Hawai'i at Mānoa, USA

Christine K. Sorensen Irvine
University of Hawai'i at Mānoa, USA

ABSTRACT

As more postsecondary institutions look to competency-based education (CBE) as a model for delivering instruction, technology challenges present major barriers to its adoption. In this chapter, the context of higher education is reviewed in terms of its need for technology to manage the CBE process at scale. The role of technology in delivering CBE is explored followed by a discussion of technologies that hold promise for use in CBE, including vendor-based and open learning management systems (LMS), adaptive technologies, and tools for data analytics. This is followed by a call to re-explore previously proposed (and dismissed) technologies to ensure the ideal path is promoted. Personal learning environments (PLEs) are offered as an example with descriptions of how they may align with the CBE model more effectively in existing academic infrastructure than LMSs. The authors conclude that while a void remains in infrastructure technology to support CBE, growth in CBE appears likely.

INTRODUCTION

The emphasis of competency-based education (CBE) on learning rather than on time spent in class creates a unique issue for academic infrastructure. The measurement of time, defined as the 'credit-hour' in academia, is the basic unit of degree progression driving current academic infrastructure (Silva, White & Toch, 2015). To change this unit is not simple. Unlike time where two students can be checked off for completing the same amount of credit hours, measurement by learning (i.e., measurement of the content that was learned) will always be uniquely contextual to the student. It should be noted that the credit-hour is not only a unit of degree progression, but it is also the cornerstone for the invoicing and scheduling of many services within the higher education business model (Silva, White & Toch, 2015)

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as well as for the awarding of federal financial aid. To completely remove the credit-hour as the unit by which learning is measured, new technologies are needed not only to support documenting learning progression, but also for business and auxiliary functions such as advising, student registration tracking, financial aid, and faculty work assignments, all of which and more are currently tied to the credit hour as a unit of measure (Bailey, Schneider, Sturgis, & Vander Ark, 2013).

The traditional education model has benefited from a long history of educational technology development that has helped run the business of academia as well as create new educational affordances. One example is the popular Learning Management System (LMS), a technology adopted by nearly 100% of all institutions (Dahlstrom, Brooks, & Bischel, 2014). However, like most academic technology, the majority of LMSs were designed to support the linear and one size fits all content delivery approach, typically implemented in the traditional higher education model (Wilson et al., 2007). The structuring of content this way, as a core function of the LMS, is directly in conflict with the personalized approach of the CBE model, which offers students the ability to self-regulate, enables progression based on mastery, and facilitates personalization of educational content. Support for common CBE practices such as prior learning assessment, the recognition of past learning towards degree progression, and non-traditional learning experiences is generally limited in LMS platforms and often restricts available assessment options, a critical component for measuring student mastery (Book, 2014; Glowa, 2013). Since LMSs support delivery of instruction at the course level, the recognition of prior learning can exempt a student only from an entire course rather than from a specific facet of an overall competency map. Likewise, the tracking of assessments in an LMS is organized at the course level, using course tools (such as a gradebook) and a course designation number versus an individual number for each competency that, upon mastery of each competency, would naturally progress the learner into his or her next required competency. Certainly portions of CBE instruction can leverage current tools, although these existing technologies may ultimately prove too limiting for the CBE model with its potential for education and assessment outside of the traditional course structures. While a small number of competency-centric platforms exist to support the unique attributes of CBE, they are typically comprised of a patch working of individual technologies due to a lack of comprehensive solutions (Le, Wolfe & Steinberg, 2014). This unfortunately raises the barrier to entry for new institutions allowing only those with the technical development capacity and funds to build homegrown solutions.

The need for CBE academic infrastructure appears to be widely accepted (Book, 2014; Ford, 2014; Glowa, 2013; Gluga, Kay, & Lever, 2013; Leuba, 2015; WICHE, 2014). While the infrastructure need alone is a formidable problem, one of the biggest challenges facing CBE is the need to collect, analyze, compare and report on the wide variety of CBE strategies and programs currently in practice (Sursock & Smidt, 2010) and the ways that students behave in and interact with them. Tackling this challenge through the analysis of strengths and weaknesses across various implementation strategies is critical to consolidating best practice recommendations for current and future CBE institutions (CAEL, 2015; Ford, 2014). The lack of a common technical infrastructure and patch working of tools adds to the complexity of realizing this goal. While supporting tool variety and grassroots development is important for innovation, the lack of common data collection specifications or interoperable tool development will continue to stunt data collection and analysis efforts necessary for CBE as it has done for large-scale efforts in the past (Gluga, Kay, & Lever, 2013). In cyclical fashion, the lack of common approaches to CBE is a deterrent for some technology vendors to invest in generating solutions that may ultimately not be used when best practices are identified while the void of interoperable and complete solutions limits institutions to disparate and home-grown technologies, further fragmenting CBE approaches (Leuba, 2015).