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Defining Competencies and Outlining Assessment Strategies for CBE Programs



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John started college back in his early twenties, but soon came a wife, children, a “real” job, and a mortgage, so college had to wait. Lately, co-workers with college degrees have been given promotions even though John has more years of experience. He needs to finish his degree!

He still works full-time and has a family, so John really needs something online. But when he checks out online programs, he is overwhelmed by how many classes he has to take and how long it will take him to complete his degree. What about courses he’s already taken? What about the skills and knowledge he has from 15 years of working in the field?

Within a competency-based education (CBE) program, previous coursework, knowledge, skills, and experience count for everything. CBE awards college degrees for what students know and can do, whether they take the full course or not.



Competency-based education is not like traditional classrooms

Competency-based education differs from traditional classrooms in several ways. In most CBE programs, the Carnegie unit, which began in the late 19th century, isn't used to determine when students are ready to graduate from college. Instead, how students perform on measures of competencies determine when graduation will occur (Seymour, Everhart, & Yoshino, 2014). CBE focuses solely on students' competence rather than grades or completed credit hours to determine successful completion of an academic course or program. Grades are arbitrary, and are not comparable across the same course taught by different instructors and sometimes across the same course taught by the same instructor (Allen, 2005; York, Rankin, & Gibson, 2015)! High grades might indicate that a student has mastered the content presented in the course, but high grades in no way indicate a student's ability to apply the knowledge learned in the classroom to real-world situations (Meyer-Adams, Potts, Koob, Dorsey, & Rosales, 2011).

Instead of grades, CBE programs focus on the real-world aspect of applying the knowledge, rather than just on the ability to recall the knowledge. The driving force and ultimate goal for curriculum shifts from knowledge acquisition to knowledge application, and the driving force for the process shifts from the teacher to the student in the CBE world. Even the responsibility for content is no longer the teacher's in the CBE world; students have shared responsibility for their learning. Further, the focus of the assessment process shifts from an emphasis on summative to an emphasis on formative, and evaluation is criterion-referenced rather than norm-referenced (Carraccio, Wolfsthal, Englander, Ferentz, & Martin, 2002).

Another way in which CBE programs differ from traditional classrooms is that time no longer matters (Voorhees & Bedard-Voorhees, 2015). CBE courses are not fixed; they vary in time based on how long a student needs in order to demonstrate competency. Gone are the days of taking 4-5 courses during a 15-week term every term for about four years. No longer does a student have to complete 126 or so credit hours to graduate. Instead, a student is presented with a list of competencies, and perhaps with a list of courses and learning outcomes that map to those competencies. Students can scan the competencies and prepare to demonstrate what they know and can do for those competencies that they already have.

But what is competence?


Writing competencies

There is a good-sized body of literature on CBE programs, measuring competencies, and what CBE assessment needs to look like, but there is not much literature on where those competencies come from.

Competencies can come from a variety of sources. Typically, when an institution is moving from a traditional, seat-time instructional approach to a competency-based learning model, competencies stem from the program outcomes. The gut reaction is to call the program outcomes “competencies,” since they are based on the key knowledge and skills needed for graduation (Baughman, Brumm, & Mickelson, 2012). Rarely, however, are those outcomes written in a way that experts would consider a competency.

Competencies need to be specific and measurable, while focusing on the skills and abilities that are required in the real world.

Outcomes tend to focus on the knowledge piece while competencies focus on the knowledge application piece (Carraccio et al., 2002). Instead, to maintain the academic integrity of the program, one should start with the outcomes and derive competencies from those. Program outcomes are typically more broadly written than competencies. Outcomes are specific, but not so specific as to lend themselves to effective real-world measurement. Competencies need to be specific and measurable, while focusing on the skills and abilities that are required in the real world. Competencies can also come from professional organizations. For example, the American Institute of Certified Public Accountants (AICPA) published a resource on professional and personal core competencies needed for those entering the accounting profession (Sharifi, McCombs, Fraser, & McCabe, 2009). Accounting programs can find what they need in the AICPA resource, and can revise their curricula to provide the content necessary for students to demonstrate competency.



While not every professional organization has published competencies for higher education programs in the field, professional principles and standards are a good place to start when a program needs to create competencies for a CBE program. The use of subject matter experts from the appropriate field is crucial to ensuring that the competencies created for an academic program match the knowledge, skills, and abilities required from someone successfully pursuing a career in that field (Baughman, et al., 2012; Cecil & Krohn, 2012; Stainburn, 2014).

A common practice of developing competencies is described here as an example. If competencies need to be written for a nursing program, the institution should access the principles and standards utilized by the American Nurses Association. The program outcomes for the nursing program should be aligned to the principles and standards, and then competencies be written to include this information. Courses within the nursing program should then be mapped to the competencies, making it very clear to students what is expected in each course. Professional nurses from the field should be brought in to review the competencies, approve the competencies, and indicate if any competencies are missing from the program. The resulting competencies should reflect all that a nursing student must know and be able to do by the end of the nursing program.

But how do general education courses fit into the CBE world? While it's true that competencies are often written at the program level, it's common for specific courses to map to the program-level competencies. That means that each course contributes in some way to the overall achievement of competencies.

In the case of general education courses, often the competencies covered are referred to as institutional competencies. These may include competencies such as public speaking, critical thinking, communication, ethics, understanding cultures, or integration and application of information (Cecil & Krohn, 2012). The writing of institutional competencies should follow the same process as described for writing program competencies. The experts who review institutional competencies may differ from those used for program competencies; for example, an expert in public speaking can address the viability of any speaking-related institutional competencies.




Measuring competencies

Regardless of where program or institutional competencies originate, they must be measurable. Effective assessment is the driving force behind strong CBE programs. In order to effectively measure competencies and determine that a student has mastered them, CBE programs must offer multiple measures of those competencies, and with multiple assessment methods in order to build a case for the validity of the CBE program (Carraccio, et al., 2002; Drisko, 2014; Meyer-Adams, et al., 2011).

In other words, each competency must be measured more than one time, and in more than one way (that is, multiple choice tests, papers, presentations, performance-based real-world assessments, etc.). The tests used to measure competencies should focus on clusters of competencies as they might appear in the real world rather than on just one competency. The more real-world the assessment is, the more value the results hold for determining students' competency (Drisko, 2014).

Knowledge can be tested using multiple choice or forced response items, but students must demonstrate what they can do by completing real-world, performance-based measures.

The assessments used to measure competencies must not only measure one's knowledge and skills, but also get at one's ability to integrate, synthesize, and use the knowledge and skills necessary to become part of a community of practice. Student learning is impacted the greatest when competencies are "linked to and embedded within specific courses and across the curriculum" (Baughman, et al., 2012, p. 117). The assessments used to measure competencies must also be sensitive enough to recognize changes in learning across time, so measurement of the competencies should occur more than once. The best measures of competence will involve complex, real-world, hands-on performance-based assessments (Baughman et al., 2012; Drisko, 2014).




Assessments developed to measure competencies must be written specifically for that purpose. These assessments must be properly vetted to ensure that they are measuring what they claim to be measuring. Knowledge can be tested using multiple choice or forced response items, but students must demonstrate what they can do by completing real-world, performance-based measures.

While previous assessments in the CBE program are crucial for determining if a student has the knowledge required for the competencies, the performance-based assessment is often the deciding factor of whether the student has demonstrated competency.

These assessments must be opportunities for students to demonstrate real-world skills and abilities. For example, students could be asked to write a marketing plan for a fictitious product in order to demonstrate mastery of the competencies for a marketing course or program. A nursing student could have program competencies related to taking vital signs and reading lab reports. A performance-based measure for this student might have her complete an intake on a fictitious patient, including taking and recording vital signs, ordering appropriate labs, and correctly interpreting the lab results.

Performance-based measures rarely have right and wrong answers. Instead, they are often projects that require subjective evaluation. Thus, strong rubrics and evaluator training are necessary to effectively measure student performance of these competencies.

Rubrics are considered strong when each cell accurately describes what student work earning that particular score looks like. Students know exactly what is expected in order to earn the best grade possible. Strong rubrics also must be properly vetted to ensure that the descriptions are not ambiguous; that is, reviewers are interpreting the descriptions in exactly the same way each time.




Further, those reviewing students' work must be trained to properly use the rubrics. This training requires an explanation of the project, a review of each cell of the rubric, and sample projects for reviewers to evaluate in order to practice using the rubric. Training is a success when the rubric is performing consistently across reviewers of the same project, that is, a project is scored consistently across multiple reviewers. In practice, a minimum of two reviewers are required to score each student's real-world, performance-based assessment using a well-vetted rubric. If the reviewer's scores are not the same or within 1-2 points of one another, a third reviewer must grade the project.

Determining competence

Final scores on the performance-based measure determine whether the student has demonstrated competency. But how do reviewers know what scores indicate that a student has mastered a competency? There is no simple answer to this question. Those developing assessments for a competency-based education program must be able to demonstrate that the assessment is measuring the required knowledge, skills, and ability required for that competency rather than some other irrelevant trait. Developers must be able to demonstrate that knowledge and ability explain the test-score variability seen among test-takers rather than some extraneous variable. Further, what do the scores actually mean? Does a higher score indicate that the student has a greater ability to perform the job?

Validity studies must be performed in order to answer these questions and to ensure that the high-stakes assessment is performing as developers say it is. There are several types of validity, and the evidence comes from the content of the measure, how the measure relates to other variables, and the structure of the measure. A proper validity study will provide the evidence required to demonstrate that a student has the knowledge and skills necessary for a competency, but also that a high score on the assessment indicates that the student will also perform well on other job-related tasks that require that same competency (McClarty & Gaertner, 2015).




Once the assessment is properly vetted, test developers must determine where to divide the scores to indicate those who have mastered the competency and those who haven't. In a CBE model, cut scores would determine which students receive credit for mastering the competency, and which students do not receive credit. Levels of proficiency can also be set, such as basic, proficient, and advanced. There are several methods that can be used for setting cut scores; the one selected typically depends on the test developer's preference. The error of setting a cut score too high or too low is possible, and test developers need to determine which is the lesser of the evils. Is it better in this situation to fail students who should have passed? Or is it better to pass students who should have failed? Due to the high stakes nature of measuring competencies, cut scores tend to be set high, with an indication of students who have demonstrated mastery versus those who have shown some proficiency and those who have shown no proficiency (Zieky & Perie, 2004).

Putting it all together

So what does a competency-based education program look like? There are a variety of approaches taken by institutions, but generally a CBE program contains some common characteristics.

Student knowledge must first be measured using a diagnostic test to determine if the student possesses enough information to “test out” of class modules. If a student shows mastery of the course content, there would be no need to review any of the course modules. Instead, the student could progress to the performance-based assessment to demonstrate mastery of the competencies. This performance-based assessment must follow all of the best practices related to rubric grading, including having the project evaluated by at least two reviewers. Students who are unable to show mastery at either the knowledge or skill levels would need to visit certain modules in the course to review the information needed to master the course or program competencies. The role of faculty changes dramatically in CBE programs, as well. Faculty are no longer there to impart knowledge onto the students; they are there to serve as facilitators and supporters.



The days of lecturing to a classroom of students is gone. Instead, reaching out to students who are struggling, checking in with students who haven't accessed any course materials lately, and providing support to the students who need additional help become the faculty's new responsibilities. Few faculty can even comprehend what this might look like, as it goes against the role they're used to. But just as the student assumes responsibility for learning the material and demonstrating mastery, so faculty must also assume a different role to ensure the success of the program (Voorhees & Bedard-Voorhees, 2015).

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Conclusion

Competency-based education most definitely goes further than the traditional classroom approach in ensuring that students learn. CBE models distinguish top performers from average performers by linking learning and performance

(Hawkes & Weathington, 2014). By focusing on competencies and ensuring that graduates demonstrate mastery of those competencies prior to graduation, institutions can produce a group of professionals who can hit the ground running in their new careers while at the same time establishing the proven value of a given academic program.



About the Author

Dr. Barbara Rowan is the Director of Academic Research, Usability, and Evaluation for Course Design, Development, and Academic Research, Higher Education Services, Pearson North America. In this role, she is responsible for aligning internal standards to third party standards, leading and managing efficacy culture and workflow efforts, and developing and implementing a research roadmap that focuses on instruction, assessment, and learning models and practices.

Prior to joining Pearson in 2010, Dr. Rowan spent 20 years in higher education, holding a variety of administrative positions and teaching research methods and statistics courses, both on-ground and online. Dr. Rowan's research interests include computer-based and computerized adaptive testing, measurement equivalency of computer-based versus paper-based measures, student motivation and engagement in the online environment, and online assessment evaluation. Publications and presentations focus on assessment in self-paced, online courses; creation and validation of a measure of quantitative literacy; competency-based education; the science behind learning design; and assessment and measurement-related topics.

Dr. Rowan holds a B.A. degree in mathematics and English from Malone College, an M.S. in psychology from Georgia College & State University, and a Ph.D. in assessment and measurement from James Madison University.

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Developing a CBE Program: Four Key Decisions

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