

An evaluation of competency-based education programs: A study of the development process of competency-based programs

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1 | INTRODUCTION

Competency-based education (CBE) has already shifted dramatically across the landscape of higher education. As a result of the Department of Education's Experimental Sites Program announcement in 2013 (Baker, 2013), several universities and colleges were given the opportunity to allow students to achieve college credits through competency-based assessments. CBE is expected to broaden access to higher education by assessing student-based workforce ready skills. Once competency is demonstrated, students will earn class credit which leads to a culmination of benefits such as lower tuition costs, flexible schedules, and shorter time until graduation. These changes align directly with The United States Administration's goals to create a more accessible and lower cost higher education for students. The number of CBE programs is expected to rise over the next 18 months, due in-part to the Department of Education's Experimental Sites program. However, although 65 colleges have decided to participate in the experiment, there is little research published on best practices to build a competency-based program that provides clear, valid, and defensible assessments; content that will remediate skill or knowledge gaps; or methods in which student and program success is ultimately measured. This study explores current practices for the development of CBE programs in an effort to identify common, effective practices.

The research questions that guided this study are as follows:

1. When designing the CBE program, what were the key elements used in the decision-making process?
2. What types of assessments were used to evaluate a students' specific skills or knowledge?
3. What development processes were implemented to ensure clear, reliable, valid, and defensible assessments?

4. What processes were followed to ensure alignment of curricular content to the competencies, objectives, and assessments?
5. What curricular strategies were put into place to support student mastery of competencies?

2 | LITERATURE REVIEW

Designing a CBE program for an online environment requires different developmental elements and some that are outside the norm of a traditional program development. Credit hours, assessments, and objectives that were once well defined by accreditors, regulators, and the United States Department of Education (US DOE) have fallen into a vaguely defined landscape, providing little direction for educational institutions. This uncertainty leaves most university leaders to, themselves, attempt to define the requirements for gaining accreditation as well as the best practices for developing a competency-based program. Accreditation itself has historically assured students that accredited institutions meet educational standards; however, accrediting agencies now must adjust to meet a changing educational environment. Many institutions that offer courses in the traditional online environment will now also offer CBE programs. Curriculum development teams must then find new ways to determine key elements for their CBE programs.

RQ 1: When designing a competency-based program, what were the key elements used in the decision-making process?

2.1 | Accreditation

Decisions on how to best align CBE programs with accreditor requirements must be strongly considered as part of the program

development process. President Obama, during his State of The Union Address, “emphasized this shared responsibility of states and higher education institutions—working with the federal government—to promote access, affordability, and attainment in higher education by reining in college costs, providing value for American families, and preparing students with a high quality education to succeed in their careers” (White House, 2015). In early support of this goal, the experimental sites program was designated by the U.S. Department of Education in the Dear Colleague letter 2013 (US DOE). This letter discussed how competencies would need to be mapped back to clock hours in a course to qualify for accreditation. Equating clock hours as part of the CBE modality for CBE programs created prior to 2013 later caused several constraints in the design elements of the CBE programs that had already launched at universities such as Western Governors University (WGU). The traditional model for calculating learning has always included fixed seat time. This enabled administrators as well as accreditors to calculate credit hours using the academic calendars and student per class workload as the standard of measurement. The traditional education system that was originally designed in the late 1800s to provide efficiency in measurement and standardization lost its luster to a new model that measures knowledge and demonstration of knowledge through CBE learning (Glen, 2004). As part of the Experimental Sites Initiative (ESI), colleges can now charge tuition based on a subscribed amount of time rather than the clock hours required to achieve a credit (for instance, a flat rate charged per term, regardless of the amount of competency units satisfied).

Decisions on how to best align CBE programs with accreditor requirements must be strongly considered as part of the program development process. In *Rethinking the Regulatory Environment of Competency-Based Education*, Lacey and Murray (2015) looked at CBE decision-making processes from the perspective of the regulatory environment. Although federal funding has since been approved for more nontraditional CBE programs, Lacey and Murray (2015) agreed that the best way to encourage continued success in CBE was for accrediting bodies to develop a solid regulatory format to meet the needs of competency-based programs. Currently, each state accredits all academic programs individually and the current model, separate from experimental sites, is based on the traditional clock hours/credit hours. Competency-based programs are not all the same because each college decides the format, language, and worth of the competency. It may present a challenge for accreditors to translate an individual school's model because there is not a standard requirement between colleges. How the accreditors evaluate a competency-based program could directly determine the decision-making process the institutions takes in designing their program. At the same time, various accreditation staff are academic subject matter experts but may not have experience with competency-based program models to properly evaluate the rigor or quality of the program. Difficulties can also occur from state to state in translating competency-based programs to various accrediting agencies.

2.2 | Financial affordability

Assuring the proper teams work together to create a rigorous program for accreditation purposes is important; moreover, keeping in line with

the federal, state, and local financial aid regulations for a competency-based program is equally important. Although some students may have the ability to pay cash for their education, and some will receive employer reimbursement, many will have to use the Federal Financial Aid program. Without financial aid access, students without the financial means or employee reimbursement would not have the resources to attend a competency-based program.

Another important distinction that institutional leaders involved in the ESI program must determine before development begins is which CBE model is best to pursue for their institution (based on the accrediting body requirements). There are four main CBE models that are approved for the ESI Title IV federal funding program. (a) The course-based CBE model, which is more closely related to the traditional higher education model; this model links student achievement to clock hours/credit hours that are tied to a predetermined number of credits to satisfy the requirements for a degree (US DOE). Competencies are threaded throughout courses, which are then mapped back to the credit hour. Competency-based assessment is the actual, underlying metric which gauges student learning in a course-based CBE program; however, the equivalency to the credit-hour allows students to qualify for financial aid. (b) Direct assessment attempts to unleash seat time and credit hours from the course materials; this can be accomplished through direct measure of student learning via many different types of alternative assessments such as “projects, papers, examinations, presentations, performances, and portfolios” as stated by the US DOE. (c) Prior learning assessments can now be included in the ESI program. These assessments draw from experience outside the classroom, and students receive credit for the experience and knowledge gained by those actives. (d) The hybrid model is the last option for the ESI program. The hybrid model allows students to attend both a traditional course as well as a competency-based course in a selected program. In the case of all of these CBE models, conferred degrees are based on the mastery of program competencies, which may or may not translate into a defined amount of completed credits depending on the program category type approved by the college's accrediting body.

One main difference in the CBE models is how they relate to federal financial aid under the rules of the US DOE. Historically, institutional leaders have made a choice between the CBE models depending on the established financial aid terms in conjunction with the terms for the university's associated accrediting body. Recently, other colleges have offered a hybrid between the course-based and direct assessment CBE models (Book, 2014; McClarty & Gaertner, 2015). In June 2015, the Council of Regional Accrediting Commission (C-RAC) announced a Common Framework for Defining and Approving CBE; this framework provides definitions for course-based, direct assessment, and hybrid models along with regional accreditor evaluation considerations. These guidelines will assist colleges and accreditors in making innovative program decisions that align with accreditor and federal financial aid requirements. In all CBE models, experiment site leaders must independently determine how students qualify for Satisfactory Academic Progress in order to receive Title IV funding (C-RAC, 2015).

2.2.1 | Career relevancy

Institutional CBE leaders must also determine how to do all of the following: develop career relevant program competencies that include both broad professional capabilities and context-specific terms within an organization, collect and analyze assessment data, and determine appropriate competency assessment tools (Ewell, 2001; Spee & Tompkins, 2001). Ninety-three percent of survey respondents for the Public Agenda (2015) indicate the importance of looking to authoritative sources to determine the essential standards, skills, and norms within an affiliated field (even though survey results of 500 hiring managers indicated low familiarity with CBE). Once explained, there was a high level of interest in collaborating with universities to define benchmarks and required skills for potential new hires (Franklin & Lytle, 2015). One of the ways that competency educators drive changes in the development of these educational programs is by collaborating with industries and employees, “such collaborative efforts ensure a balance of skills and knowledge as well as an application of competencies into productive outcomes” (Glen, 2004). By including employers and industry specialists in the development of a competency-base program, the employers can provide feedback to validate that the assessment requirements will provide student demonstrations of real industry skills. This is especially enticing for working adults who have a desire to earn a degree and the workforce experience and skills that could be demonstrated (Glen, 2004).

RQ 2: What types of assessments are used to evaluate a student's specific skills or knowledge?

Since “competency” has not yet been thoroughly defined by any one regulatory institution, it was described by the US DOE in general terms as measured achievement through direct assessment of defined competencies. How assessments of skills happens is up to the institution. For instance, “assessments can take the form of projects, tests, written assignments, and other concrete measurements” (Ordonez, 2014, p. 48).

Studies at the University of Redlands, Department of Management and Business CBE program showed that a focus was placed on competencies, which were based on management roles and responsibilities and general business skills. The design team adapted this concept in the form of assessments, which were focused on target organizations. These organizations were viewed from multiple lenses and portfolio notebooks to demonstrate work because, “it is a collection of major assignments that demonstrate connections between the student, the material, and a target organization” (Spee & Tompkins, 2001, p. 202). The assessments were conducted within each course and could be reassessed. The student then wrote a reflection about their journey of complications between assessments. Preassessment and postassessments were also given to gauge if knowledge had been gained, lost, or stayed the same in each course. This allowed students to synthesize their learning. The portfolio notebooks also provided the university with a means to track student progress throughout the program.

Assessments also varied substantially from one subject to another. Some were industry specific; for instance, in Health Administration some colleges used a combination of oral exams, written exams, and objective assessments (Mangelsdorff, 2014).

RQ 3: What development processes are implemented to ensure clear, valid, reliable, and defensible assessments?

McClarty and Gaertner (2015) shared that the long-term viability of a CBE program hinge on the external validity; in other words, whether employers see the program as credible or not. They go on to say,

There are two areas in assessment design and implementation that require significant and sustained attention from test developers and program administrators: (1) validating the assessment instrument itself and (2) setting meaningful competency thresholds based on multiple sources of assessment validation. Both areas are critical for supporting the legitimacy and value of CBE credentials in the marketplace (p. ii).

Some ways of validating the instrument include ensuring that clearly defined competencies are linked to the assessments and linking assessments to external measures like career-relevant learning outcomes. Valid test score interpretations can be supported by first setting standard cut scores to distinguish mastery from not mastered.

Content validity of assessments can be achieved by having transparent development processes that involve faculty members. Additionally, making aggregated assessment data available for faculty in periodic reports helps manage the assessment score thresholds. Positive aspects of successful assessments will then serve as a model, and less effective assessment can also be modified (CAEL, 2013). Johnstone and Soares (2014) suggested that assessments developed by experts in the industry and academic subject matter experts will ensure content validity of the assessment. However, assessments with valid content must then also be piloted with a small number of students to uncover existing problems; this will ensure that clear instruction is provided and scoring instruments are working. It is also important for universities to ensure that scoring thresholds are maintained to the highest degree possible by administering annual faculty calibrations, or norming sessions. All faculty members score the same student exam responses to verify that there is general consensus on the scoring activity. Even though there is often a high degree of variability in faculty scores, this exercise is meant to assist all faculty in finding a consistent approach to scoring assessments (Klein-Collins & Baylor, 2013).

In addition to the valid instrument development, standard setting procedures, and faculty scoring calibrations, graduates' achievement outcomes in life should be followed and monitored to ensure that the program credentials are equal to the same outcomes as a postsecondary degree (McClarty & Gaertner, 2015). “CBE programs maximize assessment benefits by providing a variety of multiple assessments at multiple intervals. Competencies are not only assessed in multiple ways but also by multiple assessors” (Public Agenda, 2015).

RQ 4: What processes are followed to ensure alignment of curricular content to the competency, objectives, and assessments?

Aligning the learning activities to the competencies, objectives, and assessments is essential. It is part of the planning process so that students can achieve the desired outcomes (Morcke, Dornan, & Eika, 2013). WGU was one of the first colleges to successfully launch a completely competency-based college, and it is now one of the largest and most successful competency-based programs (Watson, 2010). In the late 1990s, WGU and the State of Indiana collaborated to create a college degree that catered to adult learning. Their original target audience was minority, lower income adult students, and the program provided flexible, low-cost education for working adults. Beginning in May 2014, academic staff at WGU shared their practices for developing curriculum within WGU's competency-based model with 11 community colleges. Academic and industry experts first developed overarching program competencies. Validity of these competencies was maintained by ensuring an iterative and evolving cycle where market demands, academic expectations, and student needs could be incorporated in the competencies over time (Dragoo, 2015; Johnstone & Soares, 2014). A feedback loop from students and employers to faculty and program designers was also included as another measure of validity of the program competencies.

Western Governors University's academic staff then used the high-level program competencies to design and develop more specific courses and learning objectives, which then drove the selection of resources and assessments. Collaboration between development staff ensured that competencies were reflected in course objectives, and included skills and knowledge students needed to master aligned assessments (Voorhees, 2001). Broward College was one of WGU's partner colleges that followed this development model. Department faculty first identified, found, or created learning resources, and then created assessments while checking for alignment between learning resources and the assessments; this collaboration allowed for the identification of exact areas where modifications may need to occur (Johnstone & Soares, 2014).

Many community colleges and 4-year institutions have followed similar steps in competency-based curriculum design to ensure alignment. In 2010, the University of Maryland University College (UMUC) redesigned its curriculum to be more focused on program employer and alumni-identified outcomes students should have upon graduating. UMUC staff translated the program outcomes to learning competencies that would be used across individual courses through a curriculum mapping process. Curriculum mapping is a common practice to check for alignment between competencies, curriculum, and assessments. Klein-Collins and Baylor (2013) state, "when new programs or courses are developed at Delaware County Community College, teams of faculty fill out grids showing how that program or course will help students achieve specific competencies. Each course is reviewed every five years" (p. 15).

At Southern New Hampshire University, student experience is included as a part of a 3-year academic plan to help students achieve the competencies at varied levels across different learning modules.

Collaboration occurs within a module for each program year, and coordination also occurs from one year to the next (Bradley, Seidman, & Painchaud, 2011). At Tusculum College, rubrics are developed for each of the competencies. These rubrics are used in regular course assignments provided by the faculty. The college practices transparency by providing the competency rubric used for the assessment in the student and faculty handbooks along with a list of courses where each of the learning outcomes are assessed. Rio Salado College also uses vetted rubric assessment in a plan-do-check-act cycle to spot check courses every 3–5 years to ensure ongoing quality improvement. Results are then shared publically through an initiative called *Transparency by Design* (Klein-Collins & Baylor, 2013).

RQ 5: What curricular strategies were put into place to support student mastery of competencies?

In the article "Cracking the Credit Hour," Amy Laitinen (2012) notes, "the problem is that over the years, the credit hour's use has expanded beyond measures of time to serve a proxy for measures of learning" (p. 5). Formulating a strategy to support student mastery of the competencies rather than time as one of the main forms of measurement of learning has created an environment where mastery is more important than time. A great example of this is from Excelsior College, their motto is, "what you know is more important than where or how you learned it" (Laitinen, 2012, p. 13). This motto epitomizes the spirit of the competency-based program.

Knowledge is the most important aspect to a competency-based program. How students masters that knowledge is often called the "aha!" factor (Hill & Houghton, 2001, p. 154). Several studies that have looked at CBE have talked extensively about using reflection as a curricular strategy to ensure knowledge (Hill & Houghton, 2001; Spee & Tompkins, 2001). Adding a reflection piece is important to sustainable learning because the student "reflects on the task requirements, his or her own performance, and that gap that needs to be closed for a better result next time" (Hill & Houghton, 2001, p. 154). Creating the opportunity for metacognitive awareness is another curricular strategy to ensure student success. Metacognition is simply "knowing about knowing" Metcalfe and Shimamura (1994) describe it as "knowledge about what we perceive, remember, think, and act" (p. xi). When looking at curricular strategies, the question that some might ask is "does the student know the process of learning?" Moreover, do they know how to transfer that knowledge to action? Some colleges have used the knowledge of metacognition as a reflection opportunity by asking the student to reflect on how they learned how to put point A into action, what that learning process looked like, and how they felt about that process? Was it difficult, was it easy, will the student adjust how he or she learned to a different tactic based on how he or she learned?

An example of using metacognition in a CBE program is adaptive testing. Adaptive testing allows students to answer question and indicate their level of knowledge. They can choose options to indicate if they know their answer is undoubtedly correct, unsure if their answer is correct, or unsure whether the answer is correct or incorrect. At the end of the adaptive test, students receive reports that allow them to

see where they are on the spectrum of metacognition. In other words, it will show whether they know what they know and if they know what they do not know (Li-Ju, Ho, & Yung-Chin, 2010). Once students have identified what they know and what they do not know, they can learn the skills needed to progress towards demonstration of the practiced skills through assessment.

The expectation of a CBE model is that students will enter the program with certain demonstrable skills from work and life experiences. Staff and faculty support these practices, as do various technologies that capture both the skill or level of knowledge and the data surrounding student interaction with faculty and staff. These data help faculty members and support staff better prepare and motivate students in a positive direction and at a reasonable pace. It also assures the support staff that the curriculum and assessments are properly facilitating students' needs in the program; for example, this process alerts faculty members if there are students who are behind in their progress and need support to master their competencies through interventions processes designed by the institution (Albanese, Mejicano, Anderson, & Gruppen, 2010).

Creating change in an education system requires more than a few alternative options; the changes put forth by CBE are a disruption of current processes that assess learning, knowledge, and skill in higher education. According to Glen (2004), "the true disruptive potential of these online competency-based programs lies in the critical convergence of multiple vectors: the right learning model, the right technologies, the right customers, and the right business model" (p. 15). As the opportunity for ESI opened up for additional applications in January 2016, technologies continued to be created as a means to support strategies that were put into place for the competency-based modality (Mathewson, 2016).

3 | METHODOLOGY

Many studies have focused on curriculum design, standards, assessments, costs, alignment, faculty, and student centered programs. None look at how this process works, who is involved, who makes the decisions, what staff is used to formulate the process, or what type of assessments are being used to gauge competency. Although the concept of CBE is not new, the use of this type of assessment is new to many universities and colleges.

The purposes of this study are to examine the design, development, implementation, and delivery of postsecondary competency-based programs as a new pedagogical approach to meet the growing needs of students. The premise of this study was that competency-based programs will offer valid alternatives for students who have been in the workforce for many years and possess the skills and knowledge needed in the workforce, but otherwise require the official recognition of these skills and knowledge in the form of college credentials to advance their careers. Additionally, the educational goals put forth by the United States Government to provide affordable, accessible education alternatives will also be met.

Research is virtually nonexistent with regard to the process of developing a competency-based program. Because competency-based

programs are unique and pedagogically different than traditional programs, they require a certain set of processes native to traditional program development along with unique development processes. By researching the processes that various institutions use in the development of their competency-based offerings, a new body of knowledge can be formed to help other institutions develop their own competency-based programs. The hypothesis of this study is that there are various effective practices to meet the standards set forth by The US DOE's ESI to drive the development of a competency-based program at a university or college.

A 30-item, in-house online survey was designed to ask competency-based program designers about their processes, measurements of success, and overall CBE program structures. Our survey questions were directly correlated with each research question and based on the literature review suggestions for more research. Our survey involved three sections of multiple choice questions, open-ended questions, and a question about associated accreditation to determine the spectrum of accrediting bodies that are currently developing competency-based programs. The limitation of this study was the small number of colleges and universities that participated in the study. However, there are a number of colleges that were in the process of developing their programs and were unable to answer the questions because they were at the beginning of their development process. This has led to many CBE professionals not yet having the answers to provide for this survey.

4 | RESULTS

The results of this survey provide some insight into the design process of a competency-based program. Participant demographics include higher education professionals from schools reporting to several accreditation bodies across the country. This included the Higher Learning Commission, Western Association of Colleges and School, Southern Association of Colleges and Schools, New England Association of Schools and Colleges, and Northwest Association of Schools and Colleges. The review of literature shows very few higher education professionals have researched, written articles, or presented on the topic of creating CBE programs because the process of developing CBE programs is a newly adopted initiative by many institutions, and researchers have yet to thoroughly investigate the process. Because there is a large amount of colleges and universities currently developing CBE programs and creating their own best practices while simultaneously going through the development process, the sample size for this study is relatively small. All innovators and practitioners that participated in this survey provided open and honest feedback about their practices.

RQ 1: When designing the competency-based program, what were the key elements used in the decision-making process?

All study participants affirmed the use of input from industry professionals also known as subject matter experts to develop their competencies and objectives. Eighty-eight percent of participants used industry

professionals for developing and reviewing the assessments. Fifty-six percent of participants used a psychometric editor for editing of competencies and objectives. Forty-four percent said they do not use a psychometric editor, noting that the subject matter expert is typically “an expert in defining outcome objectives and competencies.”

4.1 | Results summary

These comments provided insight into how competencies, objectives, and assessments are developed differently than traditional online programs (Table 1a). Where a college may hire a faculty member as the subject matter expert to develop a course, the CBE programs administrators hire professional industry experts to assist the team in developing the program. Furthermore, including both academics and industry experts help the curriculum development team focus on tangible skills that students must be able to do on day one of employment and thereafter.

Ongoing collaboration between qualified professionals is required during the curriculum development process to ensure the program will have access to specific industry experience and some curriculum development experience. Survey results support the literature in that industry professionals are participating in the development of university curriculum to some extent. In this research study, survey responses

indicate some limitations when working with industry professionals on the development of CBE programs because of specialized areas of expertise within an industry. One participant expressed “disagreement [of industry professionals] in defining what constituted base requirements / nonnegotiable components of their profession.” Another participant stated that “industry professionals can have such a specialized focus that their responses are influenced by this.” In other words, a subject matter expert may have experience in management, but their experience could be in such a specific industry that the requirements are not common among other management industries.

4.2 | Finding for emerging research

Areas for further study include inquiry on practices for acquiring industry professionals, detailing their participation practices in program development, and measuring their participation in maintaining programmatic alignment to industry standards over time.

RQ 2: What types of assessments were used to evaluate a student's specific skills or knowledge?

Participants in this study have a variety of types of assessments in their CBE programs. Assessments include objective exams, performance assessments, or a combination of both. Some of the performance assessment included simulations, portfolio artifacts of learning, and a combination of both formative and summative assessments (Table 1b).

Each participant noted that best practices for creating assessments included an alignment of the competencies and objectives to the assessment throughout the development process, assuring the rubrics are created with precision for each assessment. One of the more notable best practices included making sure the assessment was authentic, which includes evidence-based learning in the design process.

4.2.1 | Findings for emerging research

A follow-up study on using several subject matter experts to create each course needs to be evaluated. One of the participants advocated for the review of several industry subject matter experts to assure assessments are not only industry specific, but also generalized enough to assess broad professional skills.

RQ3. What development processes were implemented to ensure clear, reliable, valid, and defensible assessments?

Creating a process of regular review for each assessment is important for the overall health and security of the assessment in a CBE program. Assessments are the only way the students are demonstrating knowledge and skills; thereby, having relevant and up to date assessments is essential to a CBE program. Participants in this study provided some basic guidelines that they currently adhere to in their CBE program and consider as their best practices for assessment development (Table 2).

TABLE 1 (a, b) Summary of participants' written responses R1

Description	Participate comments
(a)	
Participants include comments for best practices while developing competencies and objectives	Start with the end in mind for concrete and measureable competencies/objectives
	Include synchronous dialogue for each topic
	Take detailed notes
Participants include best practices while working with industry professionals	Joining professional industry associations
	Focusing on evidence of learning
(b)	
Participants include best practices while designing these assessments	Competencies directly align with assessments
	Rubrics are precise
	Assessments are authentic as possible (to industry)
	Team members include diverse industry experts (SME)
Participants include best practices while developing assessments	Orderly processes on a clear timeline (that) promote sound item development
	Documentation of all processes and review those processes
	Static development processes that may change as team becomes familiar with the development process of a CBE program

TABLE 2 Summary of participants' written responses R3

Description	Participate comments
Participants used several methods to create assessments	Vendors Consultants Faculty members Industry leaders
Participants indicated using an assessment review process of varying degrees of time	60–90 days 10 days to check for basic miskeying, 30 days for performance Annually Ongoing
Participants indicated best practices regarding time period for revising assessments	Once a year When analysis indicate problems and annually Annually
Participants used different methods to assure valid and defendable assessments	Industry review Multiply reviews Validation panel Faculty validation Student beta test

What can be gleaned from these participants is that when a CBE programs assessment is developed, there must be a process in place to review and revise it on an ongoing basis to assure they are valid and reliable. Assuring valid, reliable, and quality assessments requires a team of individuals to accomplish this task. Each survey participant identified the same groups of people for these teams: faculty, assessment experts, and curriculum development team members, including instructional designers, psychometricians, editors, deans, and external reviewers. These individuals work as a team and independently to accomplish the development of competency-based programs, including the assessments. Some of the best practices noted for developing a competency-based program included documenting all processes and reviewing those processes to assure a clear timeline and, most of all, making sure the rubrics align to the assessment and provide enough detail to measure the students work.

TABLE 3 Summary of participants' written responses R4

Description	Participants' comments			
Respondents shared current practices for aligning course content and assessments with competencies and outcomes	22% Align course content and assessments to competencies and outcomes at the same time	22% Did not align course content and assessments to competencies and outcomes at the same time	11% No consistent alignment practices	44% No response
Respondents developed assessments first and then developed and aligned course content	22% Developed assessments first	11% Did not develop assessments first	22% Developed some assessments first	44% No response
Respondents developed curricular content first and then aligned assessment to course content and competencies	44% Developed curriculum content and then aligned assessments	0% Did not develop curricular content before aligning assessments	11% Developed some curriculum content before aligning assessments	44% No response

4.2.2 | Findings for emerging research

Based on this research study, the process of review and validation is completed by different groups of individuals. Ultimately, students will need to be able to perform work-place skills that align to the competencies assessed. Future studies to obtain employee performance data will either corroborate the assessment as valid and reliable or will indicate poor employee performance. This information can then be compared with various assessment development practices to determine which practices are the most successful.

RQ4. What processes were followed to ensure alignment of curricular content to the competencies, objectives, and assessments?

One limitation of this portion of the study is that only 55% of survey participants responded to the survey questions for RQ4. All of the respondents indicated that assessments are reviewed by both industry experts and faculty members, which helps to ensure the alignment of curricular materials and assessments to competencies. Moreover, the majority of respondents indicated that they developed curricular content prior to aligning assessments to competencies and objectives. One key observation was that the practices for developing curriculum and assessments varied widely. The results indicate the opposite design principles of backward design and top-down development were both used.

4.3 | Respondent results

Survey results also indicated that participation of industry professionals decreased at the stage of assessment preparation, and even further at the stage of checking for alignment of curriculum and assessment (Table 3).

4.3.1 | Finding for emerging research

Further study on the how the selected design process influences the alignment of the curriculum, assessments, and competencies will provide valuable information on best practices for ensuring programmatic

alignment. Curriculum mapping is a common method used to investigate alignment that can be applied to various design strategies and will also help to track and monitor alignment. Studies on the collaboration of CBE professionals throughout an iterative curriculum and assessment design process will also provide good information for works to ensure aligned CBE programs.

RQ5. What curricular strategies were put into place to support student mastery of competencies?

One limitation of this portion of the study is that only 44% of study participants responded to the survey for RQ 5. Of the respondents, half supported the assumption that technology has provided an opportunity for CBE to be very innovative when interacting with students. Half of the respondents indicated that tracking of assessment results is automated and can, therefore, indicate when a student may need additional assistance. All respondents indicated that an established intervention exists for their CBE programs.

4.4 | Survey results

Another student support included in the survey results was the usage of a variety assessment types; for example, live simulations and adaptive tests (Table 4). Having a variety of assessment types allows for multiple learning paths for different students to achieve the same competencies and objectives. However, the varied assessment types were noted as costly and, therefore, not always included. It was also reported that 75% of the respondents make use of interactive simulations and adaptive learning technology.

4.4.1 | Finding for emerging research

Support for student progress through a CBE program needs to be provided in a timely manner given the student-driven, less structured environment. Future study on the use of data to track and monitor

student performance on assessments will help to identify early needs for intervention. Study on the resulting interventions will also provide meaningful predictors and guidance for future best practices in providing student support as well as development practices for curriculum and assessment. Interventions can include support from faculty, staff, or adaptive technologies. Adaptive technologies also establish student metacognitive learning. Future studies on the results of student metacognition and reflective learning will help to identify other effective support strategies for students in CBE programs. Another item that could be studied for effect on student metacognition and student performance is whether or not assessment measures are transparently shared within the university.

4.5 | Implications for practice

CBE is the fastest growing model in higher education today. When a competency program is developed correctly, it creates the opportunity for the student to be assessed on the skills and knowledge he or she already has while also concentrating on the skills that he or she needs to develop. Although this is only the beginning of many research studies that will look at CBE and the development processes, our results indicated that there are some common and best practices that various universities currently implement for their own competency-based programs. Each of the colleges or universities that answered the questions in this study presented a variety of answers for each question. This indicates that while practices are emerging in the development of competency-based programs, they have yet to be solidified. Nonetheless, practices will continue to change as more colleges and universities begin to develop competency-based programs.

5 | CONCLUSION

In a competency-based development model there are several practices that are currently evolving away from the traditional development practices used for online programs. Some of these changes include who is involved with development teams, what items are involved with the development processes, how assessments are developed and validated, and how students are supported through different faculty and staff practices as well as technology interventions. Even with the impetus from the Department of Education and the Obama Administration to find ways to innovate and educate students in cost effective, career ready programs, the colleges developing these programs are still setting standards and best practices for the CBE community to follow. The community of CBE practitioners has made great strides in communicating and collaborating on best practices with each other. A once silent group who would keep best practices confidential so that others would not “copy” is now discussing concerns, processes, and best practices through Listservs, forums, and conferences. This study points toward existing practices that some educational institutions have implemented. Furthermore, this study also provides some insight for institutions that are just beginning their

TABLE 4 Summary of participants' written responses R5

Description	Participants' comments
Frequency of faculty/student contact and/or intervention	Weekly
	Biweekly
	Frequently if student is doing poorly
	Every 2 to 3 weeks if student is doing well
Methods of faculty/student interactions	After assessments
	Email
	Webinar
	Discussion/Conference calls
	Dashboards
	Faculty will individualize most meaningful interactions
Faculty mentorship	

development journey. There are some concrete processes that several CBE teams are practicing: alignment, validity, faculty roles, professional SME's, review of assessments in a regular cycle, and supporting students through the assessment process. As competency-based programs continue to be developed at more universities these processes will continue to develop.

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