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A Delphi Study of Effective Practices for Developing Competency-Based Learning Models in Higher Education

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This is to certify that the doctoral dissertation by

Lisa McIntyre-Hite

has been found to be complete and satisfactory in all respects,
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Walden University
2016

Abstract

A Delphi Study of Effective Practices for Developing Competency-Based

Learning Models in Higher Education

by

Lisa McIntyre-Hite

MA, Kent State University, 2004

BS, Kent State University, 1999

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Learning Instruction and Innovation

Walden University

May 2016

Abstract

Currently, there is an increase in competency-based education programs in higher

education institutions in response to student and employer needs. However, research is

lacking on effective practices for developing competencies, assessments, and learning

resources for these programs. The purpose of this qualitative Delphi study was to gather

expert opinions about effective practices for developing competencies, assessments, and

learning resources in competency-based programs in higher education. The conceptual

framework was based on principles of andragogy, critical subjectivity, and social

constructivism. Ten long-term specialists in developing competency-based programs in

higher education served as participants. Data from 3 rounds of interviews were coded and

categorized using Delphi methodology. Eighteen principles for effective practices were

agreed upon for developing competencies, 15 principles for effective practice were

agreed upon for developing assessments, and 16 principles for effective practice were

agreed upon for identifying and leveraging learning resources. Areas of disagreement

related to competencies, assessments, and learning resources were identified, with

evidence that the variation in rankings presented by participants was due to the unique

contexts of different higher education programs. The research from this study contributes

to positive social change by providing an emerging list of effective practices useful in

developing programs that help students graduate sooner with both a degree and skill set

relevant to employers and to their future personal satisfaction.

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Chapter 1: Introduction to the Study

Competency-based learning models in higher education provide students with an opportunity to shorten time-to-degree by acknowledging prior experience, or competency, and removing required seat time (Weise & Christensen, 2014). Specifically, some competency-based learning models use an approach in which once a student masters a competency, he or she moves on and is not required to complete any additional assignments or coursework. Competency-based learning models "have the potential for assuring the quality and extent of learning, shortening the time to degree/certificate completion, developing stackable credentials…and reducing the overall cost of education" (United States Department of Education, 2013, para. 7). In addition, The U.S. Department of Education (2013) issued a statement indicating they will collaborate with higher education institutions and accrediting bodies to "gather information to inform future policy regarding competency-based education" (para. 7). Although competency-based models where time may not be a measure for student learning are relatively new challenges for the Department of Education, the debate surrounding competency-based models is not new. In the late 1970s, Spady (1977) stated that competency-based education was a "bandwagon in need of a definition" (p.9). In 2016, there is more agreement regarding what competency-based education is yet little research regarding what makes it effective.

With universities scrambling to compete with accredited universities offering competency-based programs, a Delphi study can help explain what experts in the field recognize and recommend as the elements of effective competency-based learning models in higher education. This research contributes to positive social change by providing a theoretical context to inform decision-making and development of effective competency-based learning models in higher education.

This chapter includes background information related to competency-based learning, the problem statement, the purpose and nature of the study, the research question, as well as the conceptual framework for the study. Operational definitions are presented along with assumptions and limitations. The significance of the study and its impact on society are described.

Background

Competency-based curriculum has been part of course-based programs in higher education dating back to 1977 (Spady, 1977). The development of competencies to inform program development has been the subject of research studies; however, none of this research is within the context of a model that no longer measures seat time as a proxy for student learning. Specifically, the health care field is known for applying a competency-based approach to program development; however, this approach is utilized within the confines of a course-based program (Fater; 2013; Mangelsdorff, 2013) where students progress at a fixed pace. Within the health care field, there is great variation

regarding how competencies are developed and how they inform program development. Fater (2013) and Zeind, Blagg, Amato, and Jacobson (2012) researched how professional competencies are applied to university programs, but they cautioned against simply adopting professional competencies and leaving it to the university to implement the competencies. Studies across the fields of health care, humanitarian logistics, and business advocate for incorporation of multiple stakeholder perspectives, including employers, students, and academic experts in the development of competencies (Baughman, Brumm, & Michelson, 2012; Cydis, 2014; Fater, 2013; Mangelsdorff, 2014; van der Lee et al., 2013). In addition to the variation in the research literature regarding how to develop competencies, there are instances in which the competencies are based on roles a student may fulfill after graduation rather than the specific skills a student should know or be able to do after graduation (Whitehead, Selleger, Kreeke, & Hodges, 2014).

The variation in how competencies are developed is just one inconsistent variable in competency-based program development. There are also inconsistencies regarding how assessments are leveraged in competency-based program development. Researchers have explored the role of formative assessment in competency-based models and have reached inconclusive results regarding its role in competency-based models. Bok et al. (2013) noted that students perceived formative assessments within competency-based models to be just as high stakes as summative assessments, whereas Carbonell, Lanzo, Ion, and Cano (2012) found the use of formative assessment and feedback through blogs

to be a valuable asset to student assessment and learning within competency-based programs. In addition to varying perspectives regarding the role of formative assessment in competency-based models; competency-based programs differ in their use of self-assessment to determine competency. Some researchers utilized vetted psychometric pre- and posttest assessments while others utilized informal student self-reporting of competency (Choi & Bakken, 2013; Galambos et al., 2014; Galt, 2013; Piscotty, Grobbel, & Abele, 2013). Research shows that authentic, problem-based assessments are often utilized within course-based competency models and note their capacity for accurately assessing competency and promoting learning (Cassidy et al., 2012). However, there is great variation in the research regarding how to assess student competency within course-based programs.

In addition, I found limited research regarding the use of resources in competency-based programs; however, the limited research provides insight into potential guidelines and best practices for using resources in competency-based programs. Specifically, Johnstone and Soares (2014) provided descriptive guidelines for using resources in a competency-based model; however, there is no research regarding how to leverage resources in a model in which resources may not be required if a student is able to demonstrate mastery of a competency.

There is no consensus in the research literature regarding the best ways to develop competencies, assessments, or resources within competency-based course models. In

addition, there are no available research studies regarding effective practices for developing competencies, assessments, and resources in a competency-based model in higher education. This study addresses the gap in the literature and determines effective practices for developing competency-based programs in higher education.

Problem Statement

There are 600 U.S. based universities in the process of designing competency-based programs (Fain, 2015). The push to re-evaluate the credit hour as a measure for student learning is one reason for the increasing number of universities developing competency-based models (Johnstone & Soares, 2014; New America Foundation, 2012). In addition, there is a prevailing notion in current research that competencies may lead to improvement in student outcomes (Adams, 2012). There are varying approaches in the research literature to developing a competency-based curriculum; however, the research literature is predominantly confined to course-based contexts (Baughman et al., 2012; Cydis, 2014; Galt et al., 2013; Scholtz, Cilliers, & Calitz, 2012). The limited literature related to developing competency-based learning programs in higher education outside of course-based contexts is descriptive in nature, and based on one institution's approach (Johnstone & Soares, 2014). The Carnegie Foundation, in an effort to re-examine the use of the credit hour, acknowledged that competency-based approaches occur in various contexts, and when comparing different models there are "huge variations" (Silva, White, & Toch, 2015). Universities developing competency-based programs may rely on

research conducted within the context of courses and credit hours; however, there is no research related to effective program development where seat time or the credit hour is no longer the proxy to measure student learning and students can progress at their own pace. With the increasing number of universities developing competency-based programs, it is important to determine effective practices for developing this innovative learning model and to share best practices. Research has examined methods for developing competencies and assessments within the context of courses; however, I could not locate research that drew from experts in the field of competency-based program development or research that contributed to distilling effective practices for program development.

Purpose of the Study

The purpose of this qualitative Delphi study was to explore effective practices in developing competency-based degree programs in higher education. Reaching consensus regarding effective practices and identifying areas of disagreement provides a foundation for developing best practices in competency-based program development. This research can help curriculum developers and leaders in higher education reach a common framework for program design. By interviewing experts in competency-based program development, I hoped to create a common framework to inform the effective design and development of this innovative curriculum model.

Research Questions

The following research questions informed this study:

- What do experts identify as important to the development of competencies in a competency-based learning model for higher education degree programs?

- What do experts identify as important to the development of assessments and rubrics in a competency-based learning model for higher education degree programs?

- What do experts identify as important to the development and implementation of learning resources in a competency-based learning model for higher education degree programs?

Competency-based learning models are an innovative approach to teaching and learning since they remove the traditional requirements for seat time and acknowledge the prior learning students bring to an academic experience. However, this innovative approach lacks a cohesive view of best practices for effective development of competency-based learning models. While the Department of Education is still considering how to handle funding and accreditors are still identifying indicators for what makes a competency-based model valid, identifying effective practices in competency-based models in higher education is a foundational step to moving the field toward a common definition of this innovation.

Conceptual Framework

The conceptual framework for this study combined the social constructivist framework of Vygotsky (1978) with Knowles, Holton, and Swanson's (2005) theory of

andragogy. In addition, the study incorporated experiential knowledge through the lens of

Reason's (1994) critical subjectivity. Maxwell (2013), advocated for the incorporation of

personal experience and existing theory in the design of a conceptual framework. This

study incorporated my experiential knowledge related to developing competency-based

programs. The contribution of my experiential knowledge was guided by Reason's

(1994) critical subjectivity, which is defined as awareness in which we do not suppress

our primary experience, nor do we allow ourselves to be swept away and overwhelmed

by it, but rather we raise it to consciousness and use it as part of the inquiry process (p.

10).

A social constructivist framework served as the theoretical foundation for this

study. The Delphi method relied on participants' collective views related to effective

practice, which is a key tenet of social constructivism (Vygotsky, 1978). In addition to

experiential knowledge and social constructivism, the conceptual framework was

informed by Knowles, Holton, and Swanson's (2005) theory of andragogy. Specifically,

their theory of adult learning acknowledges that as adult learners mature, they need

opportunities to be self-directed, using their experience in learning (p. 62). Self-direction

and being able to apply experience in learning are key tenets of competency-based

learning models. Using this conceptual framework, the purpose of this study was to

explore effective practices in developing competency-based degree programs in higher

education. Chapter 2 provides a more detailed explanation of the theoretical framework and its application to this study.

Nature of the Study

This research focused on examining effective practices for developing competency-based programs in higher education. A qualitative Delphi method was used. The methods for gathering data included interviews and questionnaires so that the individuals with experience and expertise in developing competency-based models could share their insights and knowledge. The goal was that through an analysis of themes and patterns between participants, there would be consensus regarding effective practices for developing competency-based programs.

The Delphi method relies on examination of an issue with the understanding that multiple viewpoints are incorporated and valued (Dalkey & Helmer, 1963). In addition, the Delphi method is one in which the researcher asks experts to respond multiple times to a specific topic in an effort to reach consensus about an issue (Yousuf, 2007). The use of this method is well-suited for identifying effective practices in the emerging educational field of competency-based programs. This approach is integral to this research study since it relied on the views of those with experience and expertise in developing competency-based programs in higher education. The research began with an open-ended interview protocol based on the research question with 10 individuals who have experience and expertise in developing competency-based programs in higher

education. These individuals were recruited from my professional network of peers who developed competency-based programs in higher education. After the initial responses were gathered, more interview items were developed. My goal was that refinement of the questioning process would result in a set of effective practices that may be applied to the development of competency-based learning models

Definitions

Competency-Based Education: A personalized learning experience that requires the "critical convergence of multiple vectors: the right learning model, the right technologies, the right customers, and the right business model" (Weise & Christensen, 2014, p. iv). Competency-based programs do not measure time spent on task. "Learning is fixed, time is variable, pacing is flexible" (Weise & Christensen, 2014, p. 12). The operational definition for the purpose of this research study is based on the definition developed by the Competency-Based Education Network (C-BEN). According to C-BEN,

> Competency-based education combines an intentional and transparent approach to curricular design with an academic model in which the time it takes to demonstrate competencies varies and learning is held constant. Students acquire and demonstrate their knowledge and skills by engaging in learning exercises, activities and experiences that align with clearly defined programmatic outcomes. Students receive proactive guidance and support from faculty and

staff. Learners earn credentials by demonstrating mastery through multiple forms of assessment, often at a personalized pace (Competency-Based Education Network, 2016, para. 1)

Assumptions

Participants were selected based on experience developing competency-based programs in higher education. There was an assumption that those with experience developing this type of learning model have gained expertise that can contribute to a better understanding of competency-based program development. There was also an assumption that participants would answer questions thoroughly and honestly. Due to the early stages of competency-based program development, the assumptions regarding experience and expertise are necessary to complete the study.

Scope and Delimitations

The scope of this study was to determine effective practices in the development of competency-based programs in higher education in the United States. Specifically, the effective practices focused on effective methods for developing competencies, assessing competencies, and leveraging resources. The emphasis on these three areas served to direct the study to programmatic concerns at a curricular level. This focus was chosen because themes from the research literature revealed varying approaches to developing competencies, assessments, and resources in course-based competency programs. The research study was bound to higher education contexts and excluded consideration of

competency-based models in vocational programs or K-12 settings. Including these contexts would have resulted in a study with too broad a scope and research focus. The results of this study have the potential to be transferred to universities seeking to develop a competency-based program.

Limitations

The small number of potential participants presented limitations to the study. The data were based upon the input from a limited number of people with experience developing online competency based learning models. Each person was situated in a unique context, making it difficult to generalize the applicability of the results to across all program development contexts. Another limitation of the study was that consensus was not reached in every area. Experts shared their opinions that were limited, to some extent, by the universities where they had experience developing competency-based education programs. Approximately 6 weeks were allotted for data collection.

Significance

This research addresses an aspect of higher education that is emerging and under-researched. In a report from the Carnegie Foundation critiquing the century-old credit hour standard, Silva et al. (2015) acknowledged that with the increasing potential for new technology to provide data analytics and personalized learning, it is logical to consider how a revised unit of measurement, based on student competency instead of time spent in a course, can improve student outcomes. While there is research regarding competency-

based curriculum in traditional, course-based models, there is no research at the time of

this dissertation publication date regarding effective ways to develop competency-based

programs in higher education based on the definition presented. The results of this study

may provide insights regarding effective practices for the development of higher-

education competency-based models that do not award degrees based on seat time

requirements, but award degrees based upon competency. Many competency-based

models can lead to faster degree completion and students can transition to the workplace

more quickly and at a lower cost (Weise & Christensen, 2014). When students can apply

their learning in authentic contexts with shorter time-to-degree completion, they can start

to make a positive difference in their lives and in the community sooner, without

spending time demonstrating mastery of content they already know. Insights from this

study may inform future curriculum-development efforts in higher education and provide

universities with a theoretical basis from which to design competency-based curriculum.

Summary

In Chapter 1, I included an introduction regarding competency-based models in

higher education. The problem statement described the need for research to address the

changing landscape in higher education in regard to competency based models. Unlike

the existing research described in the background, this study sought to solicit the opinions

of those with experience and expertise in developing competency-based models to arrive

at a set of common effective practices for developing such programs. The research question is aligned with the goal of this study.

I applied theoretical perspectives of andragogy, social constructivism, and experiential knowledge. Andragogy acknowledges the unique needs of adult learners while social constructivism and experiential knowledge acknowledge that meaning is coconstructed based on individual lived experiences. This theoretical framework aligned well with the qualitative Delphi approach which seeks to incorporate multiple perspectives in order to arrive at consensus.

In Chapter 2, a review of current literature related to the development of competency-based models in higher education is presented. In Chapter 3, the methodology for the study is described along with how it was applied to the study. In Chapter 4, the results of the study are presented, and in Chapter 5 the interpretation of the findings, along with recommendations and conclusions, are discussed.

Chapter 2: Literature Review

The purpose of this qualitative Delphi study was to explore effective practices in developing competencies, assessments, and learning resources in competency-based degree programs in higher education. At the time of this dissertation, there was a research gap. Multiple studies addressed how to develop competencies in course-based models; however, none of these studies addressed how to develop competencies in a competency-based model (Fater, 2013; Mangelsdorff, 2014; Steinhaeuser, Chenot, Ross, Ledig, & Joos, 2013; van der Lee et al., 2013; Zeind et al., 2012). While Pittenger, Westberg, Rowan, and Schweiss (2013) explored the importance of utilizing job-embedded, authentic assessments within competency-based models, this research is limited to course-based competency models. Finally, there are only two research studies related to utilizing learning resources in a competency-based model; however, these are limited to course-based programs as well (Calzone et al., 2011; Kelly & Bishop, 2013). There has been no research published about effective practices for developing competency-based learning programs in higher education using the definition of competency-based education presented in chapter one.

Sources used to access information regarding competency-based education, and program development were Education Research Complete, ProQuest Central, and ERIC. Key terms used to find information were *outcome-based education, competency-based*

education, social constructivist approach, andragogy, direct-assessment, assessment, rubric, research or report, and *higher education.*

This literature review is divided into the following sections:

- A brief overview of the theoretical foundation for the study.

- Research related to competency-based models in health care.

- Research related to competency-based models in other academic fields.

- Research related to assessment in competency-based models.

- Research related to the use of learning resources in competency-based models.

- Summary and Conclusions.

Conceptual Framework

I synthesized perspectives from Knowles et al.'s (2005) theory of andragogy, Vygotsky's (1978) social constructivist framework, and Reason's (1994) idea of critical subjectivity. Much of the research about adult education has been centered around Knowles et al.'s (2005) theory of andragogy. Specifically, their theory of adult learning acknowledges that as adult learners mature, they need opportunities to be self-directed and to use their experience in learning (p. 62). Self-direction and being able to apply experience in learning are key tenets of competency-based learning models. In a many competency-based models, students are entirely self-directed and are no longer bound by deadlines. The learner is empowered to work as much or as little as they prefer. A hallmark of a competency-based model is that "students can set the pace, taking more

time on material that is challenging and unfamiliar or less time on material they have already mastered" (Klein-Collins, 2013, p. 8). While further studies are needed to determine the relationship between previous experience and time-to-degree completion, the underlying principle of competency-based degree programs is that students may be able to apply their professional experiences to demonstrate competency and potentially earn a degree sooner than a course-based model. The theory of andragogy applied to this study since self-direction and applying prior experiences and knowledge are the foundation of competency-based models. A competency-based learning model acknowledges that students bring learning from work and life experiences and that learning can result in moving through competencies more quickly than a traditional, course-based, time-bound program may allow (Klein-Collins, 2013; Southern Association of Colleges and Schools Commission on Colleges, 2014; Weise & Christensen, 2014). Studies that measure effective practices in adult education typically base their analysis on Knowles' (1980) basic tenants of andragogy: (a) the adult learner wants to self-direct his or her own learning, (b) the adult learner wants to call upon life experiences as an asset to learning, (c) the adult learner wants to align their learning needs to their roles in society, (d) the adult learner wants to apply knowledge immediately, and (e) the adult learner is internally motivated. Although a competency-based learning model is relatively new, its basic framework relies on these assumptions. Students in a competency-based model are able to move at their own pace to complete

competencies that are relevant to employer needs and allow for complete self-direction, and potential shorter time to completion if a student is able to apply his or her prior experiences. The use of this existing theory was guided by Maxwell's (2013) notion that using existing theory provides a framework for making sense of what is seen in a given study. In addition, Maxwell noted that a qualitative study must consider "the theories and perspectives of those studied, rather than relying entirely on established theoretical views or the researcher's perspective" (p. 53).

While andragogy was the one part of the conceptual framework guiding this study, social constructivist frameworks play a critical role. A social-constructivist framework acknowledges that reality is constructed through individual lived experiences and interactions (Vygotsky, 1978). A social constructivist framework in research acknowledges this cooperative construction of meaning through the use of interviewing and other methods to reach consensus. This philosophical framework acknowledges that knowledge is shared and constructed, while focusing on individual meanings and points of view. A qualitative approach is aligned with a social-constructivist framework since qualitative methods acknowledge that meaning is generated from data, while a quantitative approach posits that there is an absolute truth or objective reality that can be measured or tested. Not only is a qualitative approach well-aligned with the research question and conceptual framework, the Delphi method is the most appropriate qualitative approach. Since the Delphi method relies on participant's views related to

effective practices in developing competency based learning models, it is in alignment with the social-constructivist framework that acknowledges that reality is based on individual meanings and points of view. There are approximately 600 colleges in the design phase for building competency-based programs (Fain, 2015). With so many universities beginning development, the social constructivist approach to researching effective practices acknowledges the potential for a shared meaning regarding effective competency-based program development. The qualitative Delphi method collected data from individuals with experience in developing competency-based learning models, making it an appropriate method of qualitative inquiry for the study.

In addition to andragogy and social-constructivist frameworks, the study drew upon my experiential knowledge. Maxwell (2013) advocated for the incorporation of personal experience and existing theory in the design of a conceptual framework. This study incorporated experiential knowledge related to developing online, competency-based master's degree competency-based programs. The contribution of experiential knowledge was guided by Reason's (1988) critical subjectivity, which is defined as awareness in which researchers do not ignore their own experience; but they do not allow themselves to be overcome by it; rather they are aware of it and use it as part of the inquiry process (p. 12).

Competency-Based Models in Health Care

The health care industry is well known for utilizing professional competencies to inform curriculum development (Fater, 2013; Mangelsdorff, 2014; Steinhaeuser et al., 2013; van der Lee et al., 2013; Zeind et al., 2012). Because of the health care industry's extensive use of competencies to inform curriculum development, an analysis of methods for developing competencies in health care is presented. While the development of competencies takes place within the confines of a traditional course-based model of instruction in the research literature presented, there is relevant research regarding the development of competencies and how they can inform curriculum development that may be applied to a competency-based learning model both inside and outside the health care field.

Competency-Development in Health Care Curriculum

The Massachusetts Department of Higher Education Nurse of the Future Nursing Core Competencies Committee identified 11 core competencies related to knowledge, attitudes, and skills, essential to nursing; however, a gap analysis showed deficiencies in competencies related to safety and quality improvement (Fater, 2013). The gap analysis included input from university faculty, graduate students, and a hospital-based practitioner. The research indicated a need to balance professional competencies with employer needs when developing a competency-based program. It is common in the health care field for competencies to be developed outside of a university or program, and

oftentimes they are developed by external stakeholders and it becomes the responsibility of the university or program to incorporate the already-developed standards (Zeind et al., 2012). Using a survey, Zeind et al. sought to determine the extent of implementation of the Institute of Medicine competencies within the doctor of pharmacy curriculum at 115 U.S. colleges and schools of pharmacy. Their results indicated that progress was made in regard to two competencies; however, competencies like informatics, interdisciplinary teaming, and quality improvement were lagging in terms of curriculum integration. The authors noted that part of the reason for the lag in key competency areas was due to the lack of a unified commitment to address the competencies. This study demonstrates a potential risk to developing competencies outside of a university and imposing them upon a university program.

Another approach for developing competencies in the health care field is the Delphi method. Experts from the health care field were interviewed and surveyed until consensus was reached regarding cross-role competencies. This approach was used by academic professionals in Korea to help identify competencies required for physicians, nurses, social workers, and spiritual care providers in hospice and palliative care practice in Korea (Kang et al., 2013). While their study notes that the participants were experts, there was no information regarding whether they were experts working in academia or in the health care field. However, this approach to competency development in the research literature is unique in that the researchers included participants from multidisciplinary

areas to derive competencies that could be used across different sectors of hospice and palliative care professionals.

Other research indicates the need to blend approaches when developing a competency-based program. In analyzing Army Baylor University's core curriculum to train federal health care commanders, Mangelsdorff (2014) suggested that any programs considering developing a competency-based learning model should start with an established competency model, assess students' baseline knowledge and competency, and provide intensive curriculum that emphasizes team work, problem solving, decision making, communication, quantitative analysis, and leadership (p. 124). Frequent feedback and buy in from stakeholders are also key components of the Army Baylor University model. The need to include frequent stakeholder input and feedback can be problematic though. Research from van der Lee et al. (2013) indicated that there can be a disconnect between medical competency frameworks (specifically CanMeds, a professional set of competencies guiding medical practice in Canada, but also used worldwide to inform the design of medical education programs) and the perspectives of other stakeholders such as practitioners and patients. Their case study research documented the difficulty doctors and educators reported in implementing the CanMeds competencies in to their daily practice. In addition, they noted the differing perspectives between stakeholders and the CanMeds framework in regard to which competencies were of utmost importance. These studies indicate the need for a blending of approaches that

includes employers, professional competencies, and stakeholder feedback (Mangelsdorff, 2014; Fater, 2013; van der Lee, 2013).

Stakeholder involvement in competency development in the health care industry typically includes employers as stakeholders; however, the student may be another stakeholder in the development of competencies. Using a case study approach, Whitehead et al. (2014), examined two role-based competency models in Canada and the Netherlands. In this role based model, competencies were categorized by the role a physician fulfills (i.e., advocate, medical expert, collaborator, manager, communicator) rather than the specific competencies they should demonstrate. Student input in both case studies revealed the need for a "person" as a role within this competency-based framework. In a role-based competency model, making a role explicit in a competency framework defines it and implies that it must also be taught and assessed. The assumption is that students will learn to demonstrate the behaviors attached to that role. According to Whitehead et al. (2014), "naming the 'person' in a competency framework, therefore, represents a powerful statement to the effect that acknowledgement of the personhood of the care provider is required for medical competence" (p. 787). This study adds to the debate regarding effective practices in developing specific competencies and whether the competencies should be role-based or based on specific skills and dispositions.

Regardless of the method used for developing competencies in health care, there is research regarding the importance of validating and revisiting competencies after they

have been developed to determine their usefulness in the field (Bridges et al, 2013; Steinhaeuser et al, 2013). Bridges et al. (2013) conducted a mixed methods study to determine whether the competencies developed for a doctor of physical therapy program were essential to successful work in the field. Using descriptive research, observation, survey, and open-ended questions, the authors determined that participants rated the competencies as being essential and that they encompass the skills graduates of the program need to be successful in the field. Another method for validating the competencies after development is to use a pilot or test version of the competency-based curriculum with students. Steinhaeuser et al. used multiple stakeholder input to develop competencies in a medical program at a German university, but after the competencies were developed, the curriculum was available for free online. As of the date of this dissertation research, the evaluation results of the free curriculum were not available; however, the authors noted that the feedback would inform a finalized competency-based curriculum. The validation process for competencies after they have been developed is the subject of little research, with most of the research literature focusing on how to develop competencies with multiple stakeholder input.

Comparing Competency-Based and Traditional Models

While little research is available to compare competency-based and traditional learning models in the health care field, Kerdijk, Snoek, van Hell, and Cohen-Schotanus (2013) conducted a comparative study between a competency-based curriculum and

active learning curriculum in an undergraduate medical course. Although there was no significant difference found between the two courses in terms of the final, benchmark test, students in the competency-based curriculum reported feeling better prepared to put a patient problem in a broad context of political, sociological, cultural, and economic factors −which addresses the aim of medical education to develop professionals who are responsive to societal needs. Students in the competency-based model were frequently informed of what was expected of them and were explicitly asked to reflect on their performance, remedy their deficiencies, and to formulate ways to improve (p. 7). Therefore, students in the competency-based model were more aware of their own competences and incompetence. While this study alone does not prove the merit of competency-based programs in higher education; it indicates that there may be unintended benefits in terms of students' metacognition related to their own learning.

Competency-Based Models in Other Academic Fields

Outside of the health care field, designing a competency-based curriculum typically begins with gathering employer input regarding the skills and competencies needed for new graduates to be successful in the workplace (Baughman et al., 2012; Cydis, 2014). In two different case studies, universities created competencies by initially identifying workplace competencies students would need upon graduation. Baughman et al. used a case study approach and found that the university they chose collaborated with Development Dimensions International, a global provider of competency-based

performance management tools, to identify core workplace competencies within the field

of Information Technology. The university used the identified core competencies to

develop a course to foster the identified competencies. Unlike a competency-based model

that eliminates the need for seat time and course requirements, students who took the

course based on the competencies progressed through a traditional university course

tailored to address the competencies, using performance-based assessments to drive

learning. Similar to the Baughman et al. (2012) case study, Scholtz et al. (2012) used a

case study approach to analyze how a university developed a competency-based

curriculum related to Enterprise Resource Planning. The competencies the university

developed in the Scholtz et al. case study were based on a skill gap identified by

employers in South Africa. Employer input, whether through gap analysis or solicited

feedback, is a key feature of competency-based models in the research literature.

Incorporating employer perspectives and feedback are features of competency

development; however, Jackson and Chapman (2012) suggested a disconnect between

employers' "wish list" (p. 542) for graduate competencies in business and what a

university program can deliver. Specifically, they solicited competency input from 112

Australian and 104 United Kingdom business program academics to compare non-

technical or soft-skill competency priorities between academics and employers. Their

study revealed that culturally similar business program faculty prioritized soft skills like

problem solving, critical thinking, much like the employer stakeholders; however, roles

emerged from the study related to specific soft skills. These roles were manager, people person, and business analyst. Depending on the role a graduate would serve, certain competencies would be more important. For example, for a manager nontechnical competencies of most importance were communication, leadership, and organizational skills whereas the business analyst role included competencies like problem solving higher on the list. The study illustrates the need for more direct efforts to develop soft-skills in ways that address employer needs while being feasible within the confines of a university program. In addition, the notion of transfer of non-technical skills in the workplace is one of debate, with some stating it will naturally occur within the workplace while others state that transfer should be facilitated in conjunction with the university, the graduates, and employers (Jackson, 2013; McNamara, 2013). In essence, development of competencies and relevant curricular experiences is one part of the program; however, whether those specific competencies transfer to the workplace is not the subject of current research. Although Jackson and Chapman (2012) noted a potential disconnect between employer and academic perspectives on competencies, Lunev, Petrova, and Zaripova (2013) indicated that employers, academics, and graduates in Russia and four other European countries had similar points of view regarding which general competencies developed by a consortium group were of importance. In this instance, competencies were developed by a board of Russian and European Union "experts and

specialists" (p. 545), but no further information was provided in regard to how the competencies were developed that were rated.

van der Lee et al. (2013) indicated that there can be a disconnect between competency frameworks and stakeholder perspectives in the health care field. However, this potential disconnect was also noted in a Veterinary Neurology program. In a veterinary curriculum at the European College of Veterinary Neurology, a Delphi approach was used to define job competencies for graduates of the program (Lin et al., 2015). The Delphi analysis revealed that the expectation for the majority of the agreed upon competencies is that students should attain an expert level of mastery; however, the academics involved in the Delphi study more often noted that the level of mastery is likely to be advanced or even entry level for some competencies. Specifically, "experts working in private specialty practice expected for all competencies, which differed significantly, higher mean rating than experts in academica" (Lin et al., 2015, p. 7). The Delphi method was also used to develop competencies for distance education professionals in China using experts from various universities in the region (Xiaoying, Lu, & Yao, 2015).

Much like the health care field, there are instances in which competencies are derived from professional standards, which are often informed by employer input. Specifically, Cydis (2014) analyzed course-based syllabi for evidence of professional standards from the Teacher Education Accreditation Council. Although the competencies

were not directly derived from employer input, Teacher Education Accreditation Council standards did include employer perspectives. While employer input is a commonality when it comes to developing competency-based models, there is variation regarding what universities do with this input and how identified competencies impact course design. Two universities used the employer-informed competencies to create a new, traditional course that taught the identified competencies (Baughman et al., 2012; Scholtz et al., 2012), while another university simply used the professional standards to identify key competencies and evaluate their own course-based model for evidence of the professional standards (Cydis, 2014). There is a need for more research regarding how to apply competencies, after they are identified with employer input, to the development of a competency-based model.

Another unique approach to competency-development is an approach in which competencies are solely derived from academic leaders, and not based on employer input. Humanitarian logistics is one field in which competencies have been developed at the university level in an effort to professionalize the humanitarian services field (Bölsche, Klumpp, & Abidi, 2013; Burkle et al., 2013). Bölsche, Klumpp, and Abidi (2013) used a survey approach to determine competencies in humanitarian logistics. While their survey included respondents from multiple countries and various sectors of humanitarian logistics service providers, the input was primarily from academics within the field. While the authors acknowledged this was a limitation of the research, they suggested that

the competencies could be used to help professionalize the humanitarian logistics field while informing future research related to developing new curriculum related to the competencies. In addition, the authors note that competencies in humanitarian logistics need to be "tailored to the conditions and frameworks in specific countries" (p. 121), which may make the specific, tailored competencies more difficult for university programs to address. The Harvard Humanitarian Initiative conducted an independent survey of online and residential humanitarian programs and noted common core competencies were being offered, some allowing for simulation experiences, which may lead to the development of more standardized humanitarian competencies (Burkle et al., 2013). Burkle et al. and Bloshe, Klumpp, and Abidi both indicated that within the humanitarian field, that the development of competencies is believed to help lead to professionalization of the field. However, competencies may need to be developed in a way that is specific to the countries where the humanitarian work occurs.

Another unique method for developing competencies noted in the research literature was the use of a Behavioral Event Interview (BEI) combined with a Delphi approach to determine competency in a mechatronics technology program at a university in Taiwan (Shyr, 2012). Using the BEI as a guide, researchers interviewed experts in the field of mechatronics to distill their knowledge, skills, and abilities and compare the performance of "outstanding experts with that of ordinary individuals" (p. 196). After the BEI was complete, researchers used the Delphi approach to develop consensus among ten

experts related to the competencies within the field. While the use of the Delphi approach is not unique in developing competencies, the combination of the BEI with the Delphi approach is unique. Shyr's research is another indicator that there is little consensus regarding the best methods for developing competencies in higher education programs. Although this literature review presents competency development between health care and other academic disciplines in different sections due to the amount of research related to competency-development in the health care field, it is important to note that there are instances of overlapping approaches between health care and other fields. Specifically, the University of the Incarnate Word developed competencies for a Master's in Health Care Administration and undergraduate business marketing program using the same approach for both programs: leveraging expertise from advisory boards (De Los Santos, Dominguez, & LaFrance, 2011). Regardless of the program content area, each advisory board consisted of industry executives and representatives from various settings within the field. The advisory board was more than a method for soliciting stakeholder input. The advisory board was used to gather input, but also to validate the results of other small group discussions in competency development.

Competency-Based Assessment

There is much debate around how competency-based education differs from awarding students credit for something they already know, also known as prior learning assessment. Lawmakers have noted concerns about providing students credit for

something they already know instead of ensuring students are increasing their knowledge and skills (Berett, 2014). According to Joan Mitchell, Western Governors University's vice president for public relations, awarding credit for knowledge a student already has is a feature of prior learning assessments, but not of Western Governors University's competency-based model. In addition, Pamela Tate, president of the Council for Adult and Experiential Learning noted that students who already know or understand certain concepts will go on to learn at a "higher level, where they belong, rather than wasting their time on things they've already mastered" (as cited in Berrett, 2014, para. 15). The research presented here includes research about assessment in competency-based, traditional models since no research exists related to assessment in competency-based learning models. However, the assessment research within a competency-based framework can lend insight in to the development of further research related to effective assessment practices in a competency-based model.

Formative Assessment

The nature of many competency-based models is high stakes in that students must pass a complex assessment in order to demonstrate competency; however, the role of formative assessment within the confines of competency-based curriculum is subject to analysis within the health care field, given the high-stakes nature of the work medical professionals must be prepared to do postgraduation. Bok et. al (2013) designed and tested a competency-based assessment program for a 3-year clinical and six-year

undergraduate curriculum with formative and summative assessments to assess key health care competencies. Students were ultimately assessed on a final, summative assessment aligned with competencies; however, students still perceived the formative, low-stakes assessments as high-stakes because the clinical supervisor was also the summative assessment assessor. Also, students perceived the formative feedback as high-stakes in nature as the final, summative assessment. However, students did note that peer feedback was more formative and helpful than formative feedback from their clinical supervisor. Although the curricular team in this study shifted from assessment of learning to assessment for learning, the research shows a need for better student understanding of the role of summative assessments in guiding students from novice to competent.

Carbonell et al. (2012) conducted research with students enrolled in the Open University of Catalonia indicated that a blog can be an effective means of formative competency assessment. Specifically, students reported that the blog was an effective method for fostering learner's own awareness about their learning process sand competence in specific content areas. Also, faculty feedback related to the blog indicated that feedback was a key component in fostering students' metacognition. There is currently no research on the use of formative assessment in a model in which students are only formally assessed on one or multiple summative assessments; however, since formative practice can still be part of a competency-based model if a student chooses to

practice, it is an important area of assessment to consider when developing a competency-based model.

Self-Assessment

Research related to the use of self-assessment in measuring student competency appeared throughout the literature (Choi & Bakken, 2013; Galambos, Curl, & Woodbury, 2014; Galt, Parr, & Jagannath, 2013; Piscotty et al., 2013). Specifically, the nursing field has utilized self-assessment of competency via standardized scales (Choi & Bakkken, 2013; Piscotty et al., 2013). Using the Self-Assessment of Nursing Informatics Competencies Scale, Choi and Bakken sought to determine the reliability and validity of the scale for students with diverse demographic and educational backgrounds, noting the need for self-assessment scales to be validated across student populations. While they concluded that the scale was "psychometrically sound" (p. 279) they did note that nursing students' informatics competencies might be lower than reported due to a student's tendency to rate his or her self at their desired level of performance, rather than their actual level of performance. In addition, Piscotty et al. validated the use of the Nursing Quality and Safety Self Inventory used to assess quality and safety competencies and found that it was also psychometrically valid. They noted that while the self-assessment tool is valid, there is a need for more research related to measuring nursing quality and safety competencies. In short, self-assessment is one competency-based assessment method, and not a sufficient one to determine true competence.

Saint Louis University Department of Health Management and Policy used a course-based competency model, but rather than only relying on self-assessment for competency assessment, the self-assessment was supplemented with an oral comprehensive examination (Lomperis, Gillespie, Evashwick, & Turner, 2012). Faculty scored the oral examination using a rubric, and research indicated that the Pearson correlation coefficient between student final self-assessment and oral examination score was .224, which was not statistically significant (p. 292). However, the competency-based oral examination did "provide an important option for externally validating, or at least modifying students' competency self-assessments…by exposing them to the faculty's evaluation of how far they have traveled along the program's competency development continuum" (p. 292).

When students self-assessed their competency at the beginning and end of a course, there was reported growth in competency in most instances in the research literature (Galt et al., 2013; Glambos et al., 2014). However, a student's self-assessment rarely impacted a course grade. Oftentimes, self-assessments, whether in the form of pre- and posttests or written reflections, were used by faculty to make adjustments in the course-based structure in order to foster competency development. Galt et al. (2013) advocated for the use of self-assessment in a competency-based model. However, research indicates that students may self-assess at higher rates than their true competency (Choi & Bakkken, 2013; Piscotty et al., 2013); therefore, it is difficult to determine

whether this is an effective means of competency assessment or more of an effective way to measure course effectiveness or adapt teaching strategy.

The use of pre- and posttests to analyze student learning over time is not a new measurement of learning strategy. Glambos et al. (2014) conducted a pre and posttest analysis of 51 students enrolled in a Master's of Social Work program at a large Midwestern university. The students were enrolled in a competency-based gerontology course and were given the Geriatric Social Work Competency Scale II at the start of the term and again at the end. The results indicated that student self-rating of competencies increased over the course of the term, illustrating the benefits of a competency-based curriculum. It is important to note; however, that this measurement of learning within a competency-based curriculum took place within a course-based structure.

The research literature also revealed one instance in which pre and posttest were used outside of the confines of a course experience. Boneck, Barnes, and Stillman (2014) conducted a study of an experiential, service-learning project in assessing competencies in an accounting curriculum. Specifically, students self-assessed their own tax preparation competencies before and after a service learning experience. The results indicated that students not only reported an increase in tax preparation competencies after the experience, they also reported a positive attitude toward community service in the accounting field. This study lends insight in to the role of self-assessment outside of the confines of a specific course.

In addition to pre and posttest, another self-assessment of competence strategy utilized in the research literature is through the use of blogs (Ion, Cano, Silva & Iranzo, 2012). Students at a European university were asked to create a blog entry reflecting on the competency they had been studying within a course-based model, and faculty then assessed the blog related to the competency. Student interviews revealed that 57% of students stated that the blog was useful for their own learning, but there were no interview questions related to whether the blog assessed student competency. Students did report that the blog assessment made them "more aware of the competencies to be attained" (p. 247), but the study did not measure whether the blog itself assessed true content competency. This study reinforces an important distinction between course-based competency models and recent competency-based models. While the blog may make for an important self-reflection activity in a course-based model, its function within a competency-based model may not be relevant. If the competency were related to use of technology or web tools, then the blog may have assessed a competency; however, since the content competencies were being assessed in this study, there was no evidence that creating a blog indicated achievement of a content competency.

Problem-Based, Authentic Assessment, and Simulations

Job-embedded, authentic assessments to determine competency are often utilized across academic disciplines (Baughman et al., 2012; Bay, Bagceci, & Cetin, 2012; Cassidy et al., 2012; Curran et al., 2012; Cydis, 2014; Hermanns, Lilly, & Crawley, 2011;

Keltner, Grand, & McLernon, 2011; Pittenger et al., 2013; Scholtz et al., 2012; Webster,

Seldomridge, & Rockelli, 2012). This is an important commonality that applies to the

development of a competency-based model. Many current competency-based models also

utilize job-embedded, problem based assessments; however, this happens outside of the

confines of a course with specific deadlines and seat time requirements.

Regardless of the modality of problem-based, authentic assessments, Cassidy et

al. (2012) indicated challenges from faculty perspective in regard to assessing such

rigorous tasks. Ireland's nursing program has utilized a competency-based approach to

nursing education since 2002 and used assessments developed by universities in

partnership with health service partners since 2009 (Cassidy et al., 2012). Using a mixed

methods approach, Cassidy et al. explored faculty perspectives regarding the problem-

based competency assessments four years after their implementation. The focus group of

faculty members revealed that while assessors valued the flexibility of the competency

model to allow assessors more time to work with students to achieve competency, they

noted that while competency-based assessments "promote positive student learning" they

can result in high levels of student stress (p. 348). It is important to note that the

competency assessments took place within the confines of clinical field experiences;

however, the challenges can provide insight in to the development of assessments in a

competency-based model. Faculty noted that competency assessment was time

consuming; however, it provided the opportunity for one-to-one guidance and mentoring

between the faculty and students. The authors also noted that more research is needed in the area of competency assessment, stating that "reviewing competency documentation to find a common language for student assessment as well as promoting greater student skill development within competency frameworks is critical to the enhancement of clinical assessment skills" (p. 350). While this observation is in the context of a nursing program in Ireland, the implications are relevant. Additionally, research from Curran et al. (2012) indicated that simulated clinical examinations are an effective method for assessing competency for entry-level family physician residents, but they do caution that inter-rater consistency during evaluation is a concern. They advocate for the use of checklists or rubrics in addition to faculty training when assessing student performance (p. 109). The role of faculty expertise in assessing performance-based assessments is the subject of research from Berndonk, Stalmeijer, and Schuwirth (2013). Using a grounded study approach, the authors sought to determine how assessors arrived at judgements about student performance within the context of performance-based assessments in education. The study revealed that the assessor's own characteristics, their perceptions of the task, and the context of the assessment all played a part in helping determine student performance on an assessment. This study reinforces the important role of the assessor's expertise and experience within performance-based assessment.

While problem-solving and inquiry based assessment approaches are common in competency-based programs, there is evidence of the benefit of social constructivist

assessment approaches on learner's problem solving and metacognitive skills. Bay et al. (2012) compared 48 teacher candidates' problem solving and metacognitive levels with one group subjected to authentic, task-based learning experiences while the control group was exposed to meaningful learning assessment approaches which included more traditional assessment and learning experiences. The results indicated that the social constructivist informed practices yielded higher levels of problem-solving and metacognition based on pre and posttests of each group. Li (2013) illustrated the value of utilizing a social constructivist framework to develop and assess student global competence through the use of a joint assignment between students in China and students in the United States attending an undergraduate business program. Students were given a joint assignment to collaborate to solve a global business issue. Since the goal of the assessment was to assess student global competence, a measurement instrument was developed to assess global competence before and after the group project. The results indicated that global competence improved through the collaborative project, which may point to collaborative assessments being an effective formative means of assessment, but may not be enough to determine true competence in and of itself.

Creating authentic, job-embedded tasks to assess competency is a challenge within the competency-based curriculum and one way this challenge has been addressed is through the use of simulations. Simulations are often used to help students in health care practice competencies in a standardized way. Specifically, the use of actors as

patients to provide a standardized experience for students to interact, followed by self-reflection and discussion are common in the health care field (Hermanns et al., 2011; Keltner et al., 2011; Webster et al., 2012). In order to assess nursing competencies, one standardized simulation case study was analyzed to determine its effectiveness in assessing students' knowledge, skills and attitudes of patient-centered care. The study concluded that the simulation, in conjunction with a faculty-led conference with students about their interaction helped foster the competency of patient-centered care (Webster et al., 2012). While standardized simulations have been shown as an effective method for assessment of competency in health care, developing high-quality simulations is a challenge. Although simulations provide a method for assessing competency, the biggest barrier to the use of simulations in pharmacy program assessment practices is the cost (Vyas, Bray, & Wilson, 2013). Through a survey of 88 universities in the United States, over 50% of participants noted the high cost of simulations as a barrier to their use. The survey also revealed that 330 of the colleges used simulations for high-stakes assessment, 57 for low-stakes assessment, and 34 for formative assessment. Fifteen of the schools used the simulations for all 3 types of assessment. Most commonly, simulations were used to teach or assess core competencies within the advanced pharmacy practice experience domains. Although the researchers acknowledge the barriers related to cost, they advocate for the use of simulations to assess competency-based skills (p. 1).

Research from Hensel and Stanley (2014) used a pilot study to determine how a group-simulation serves as an authentic assessment of Quality and Safety for Nurses competencies for undergraduate nursing students. Groups of students were assigned and given a study guide in regard to the types of patients their team may encounter in the simulation. In addition, the assessor used a rubric to assess the simulation in relation to safety, communication, teamwork, assessment, and interventions. The student groups completed a written part of the assessment related to the competencies in addition to participation in the simulation. The written portion included questions about what aspects of the simulation went well, what they would have done differently, and specific questions about student perceptions related to whether the group worked well as a team and met the standards for patient centered care, used evidence based practice, and other competency-related reflection questions. Students graded their own group's performance using the same rubric the assessor used and the study revealed that student and instructor's scores matched in every instance. Student interviews revealed that students "agreed that the simulation provided a real-world assessment of group skills" (p. 67); however, the group simulation did not accurately measure individual student abilities. As professional skills like collaboration become increasingly important, competencies in the workplace, it is imperative that models incorporate methods for assessing collaboration competencies in authentic contexts.

The use of simulations is not unique to health care. Using a case-study approach, Neely and Tucker (2013) examined the methods one university used to decide which predeveloped simulations to use in an online Masters in Business Administration program. As the university working group in the case study identified what students needed to learn (competencies), they attempted to identify ways students' achievement could be assessed using authentic assessments. Specifically, the working group used Guliker's (as cited in Neely and Tucker, 2013) five dimensions of authentic assessment to determine whether specific simulations could be used to assess MBA competencies in the program and to identify which simulations were best for assessing the competencies. The five dimensions included task criteria, physical context, social context, result/form, and criteria (p. 134). The group analyzed 17 business simulations, and data from each committee member was compiled and averaged. Using Guliker's framework, the group identified six potentially usable simulations. Neely and Tucker's research implies that if the expectation of the simulation or assessment is clearly defined in the beginning and subject matter experts review the simulations, they can be used for formative assessments, but they caution against the use of marketplace available simulations as a summative assessment. According to the authors, "competency-based education continues to be a focus in higher education as the pressure to illustrate demonstrable skills continues to mount. Simulations may play a role in helping students obtain

competencies in specific areas, but their ability to assess competencies acquired warrants further research" (p. 137).

Simulations are just one of the various problem-based, authentic assessment types utilized in assessing competency in the health care field. Using a mixed-methods approach, Pittenger et al. (2013) analyzed a diabetes management course with content based on Interprofessional Education Collaborative competencies. Specifically, students utilized web-based collaboration programs (i.e., social networking, video conference) to work as an interprofessional team to create a plan for coordinating and collaborating on the care of diabetes patients in a specific setting. The results of the study indicated that students reported an increased understanding of the roles and responsibilities within interprofessional teams. Student understanding was assessed by pre and postcourse surveys (student self-assessment). This research indicates that there may be additional assessment types to leverage when it comes to creating authentic tasks that require collaboration as a competency.

Another method for assessing competency found in the research literature is the use of workplace-based assessment. However, this was only found in medical education research since part of the course-based program includes clinical rotations (Olupeliyawa, Balasooriya, Hughes, & O'Sullivan, 2014). Researchers analyzed the impact of a performance-based assessment within clinical rotations in order to measure teamwork competencies (Olupeliyawa et al., 2014). The assessment was implemented with 25

medical students who were in their final clinical rotations. Using semi-structured interviews with assessors and students, the study concluded that the workplace-based assessment assessed collaborative competencies, and students reported that the assessment helped to promote collaborative skills in the workplace. The assessment also included self-evaluation and plans for improvement. While workplace-based assessment may not be feasible for many undergraduate and master's programs in higher education, the study demonstrates the value of workplace-based performance tasks when possible to promote collaboration, assess collaboration, and to help students engage in self-reflection and assessment.

Workplace-based assessments can be difficult for university programs to scale, since they typically require a field placement office to assist students in finding appropriate workplace settings. Another strategy is for university programs to find local businesses and professionals to partner with in order to provide students workplace experiences without as rigid of a structure as an internship or clinical experience. Waller and Papadopoulos (2015) analyzed a competency-assessment method in which student groups were assigned to work with a local public health professional within a public health organization to address a public health issue. The student groups collaborated with the professional to create a business plan addressing the issue. The results of the surveys and focus groups indicated that students either strongly agreed or agreed that the

assessment experience was effective in promoting their core competencies in public health.

When workplace-based assessments or simulations are not feasible, another method for competency assessment noted in the research literature is to use task-based assessments, particularly in online educational environments. Fent, Lu, and Yao (2015) researched methods for developing task-based assessments in a master's level course for distance education professionals in China. The research revealed that performance-task assessments that simulated roles and real issues a distance education practitioner may encounter were an effective method for assessing competency of distance education practitioners; however, the performance task was only related to a single role and did not take in to account the various roles students may pursue after degree completion. Their study reinforces the importance of considering who the target audience is when developing performance-based tasks in a competency-based model. The researchers recommend the development of performance task assessments that allow for multiple roles to be assessed in order to provide a comprehensive picture of competency regardless of the role a student may pursue after graduation.

Rubrics to Assess Competency

Regardless of the type of performance-based assessment utilized to assess competency, rubrics are often used to measure student performance. Ringstad (2013) examined the use of a competency-based scoring rubric to measure student competency

development in the field of social work. Rubrics that included numerical scores and

descriptors were provided to instructors for evaluation, and the results of the research

indicated that the overwhelming majority (over 93% scored at or above the targeted

proficiency score. This result forced the question regarding whether that many students

were truly exceptionally competent or whether the scoring rubrics were valid. In addition,

the researchers questioned whether instructors were prone to giving high scores because

they were motivated to ensure all students passed to avoid any implication that they were

not effective instructors. While no research was conducted related to these questions, the

research does indicate a need for more guidance when it comes to developing

competency-based performance rubrics.

As noted in the previous section, simulations may provide an authentic way to

assess competency; however, the method in which the simulations are assessed was the

subject of research by Ashcraft, Opton, Bridges, Caballero, and Veesart (2013). The

authors conducted a two-year research study related to the use of a rubric in assessing

nursing simulations. The study revealed that a well-designed rubric in a simulation

context helped to measure student performance in a holistic way and provided objective

criteria for evaluation. The authors noted that simulations provide a method to evaluate

students, "but a well-constructed rubric is needed to assess competency" (Ashcraft et al.,

2013, p. 122).

Within the context of higher education administration, Ott, Baca, Cisneros, and Bates (2015) conducted a case study that analyzed the approach Arizona State University used to develop assessments for their Higher Education Administration graduate degree program. In this case study, faculty derived competencies from professional standards and then developed three rubrics to assess students' competency based on assignments used throughout the course. The effectiveness of this approach in assessing student competency was not described in the case study; however, the approach to rubric and competency measurement is unique in that faculty derived competencies and then applied a rubric to assess evidence of student competency.

Task-Based and Computer Scored Assessments

Task-based online tests are another way to assess student competency in the online learning environment (Ding & Ma, 2013). Using a quantitative controllable experiment, students in an undergraduate program in China were provided an online test to assess their competency in searching the web effectively and efficiently. The test was shown to have both content and construct validity while revealing student competency in the field of information literacy. While the purpose of this study was to determine competency within the student population, the results indicated that the use of a task-based online test can be an effective way for measuring student competency in an online environment.

In addition to task-based online tests, online competency assessments using case studies are also noted in the research literature. Van Zuilen, Kaiser, and Mintzer (2012) conducted a study related to an end-of-year competency assessment for medical students. The assessment included a case study and students were allotted a text box in which to type their responses. In addition to the online case study assessment, there was a 45-minute end of year geriatric assessment covering additional competencies. Although the assessment was entirely online and task-based, it was scored by faculty. The authors described the blended curriculum approach that led to the online competency assessment. This approach included a self-study computer tutorial, a small-group simulation with faculty leadership, and then the final online assessment. The study reinforces the importance of a cohesive curriculum design when developing competency assessments, regardless of whether the content is presented in a course-based or competency-based model.

Mobile technology has been utilized to assess student competency in undergraduate medical education programs (Coulby, Hennessey, Davies, & Fuller, 2011). Students used a personal digital assistant (PDA) to complete competency assessments while engaged in a work-based placement. The participants conducted 196 total competency assessments, each taking approximately 15 minutes to complete. The PDA also had chat features enabled for students to be able to chat with faculty and send questions while engaged in the job-placement. Student perception of the PDA for

assessment was overwhelming positive, with students indicating that the total number of

assessments was overwhelming, but the microtized nature of the assessments and

immediate feedback added value to the work experience while assessing student skills (p.

260). As of this date, this is the only study that addressed using mobile technology to

assess competencies.

Resources in the Competency-Based Model

A competency-based model leverages learning resources regardless of whether it

is a competency-based, or traditional, course-based model. Much of the research

literature regarding competencies does not include information regarding how resources

are curated or provided to students. Johnstone and Soares (2014) developed a narrative

describing how Western Governor's University approached development of a

competency-based model. While this was not a research study, it is part of the small body

of literature regarding the use of resources in a competency-based model. The guiding

principle for Western Governor's University (WGU) use of resources is that the resources

must be available at any time, be reusable and be "high quality, accurate, engaging, at the

appropriate level of difficulty, well matched to the learning objectives designed for the

course, and compatible with the institution's technology platform" (p. 17). This narrative

description regarding how WGU approaches resources in their competency-based

curriculum provides some guideline regarding how resources might be leveraged in a

competency-based model.

Regardless of the guidelines for resource inclusion, another dilemma is to determine how a student might be directed to approach learning resources when time is not measured and students have the freedom to choose which resources they may want to experience. Calzone et al. (2011) conducted a usability study for a software system designed to capture resources in a searchable database linked to individual competencies within the genomics field. The study revealed that users were able to successfully obtain resources sorted by competency; however, these resources were for faculty teaching the competencies within a course-based structure. Regardless of whether a competency-based model is course based or not, learning resources are still presented to students. However, in a many competency-based models, there is freedom of choice in regard to the degree to which students engage with the resources. Specifically, a student can choose to skip the learning resources and go straight to the assessment or a student can choose which resources to interact with in order to assist in achieving competency.

Research from Kelly and Bishop (2013) sought to determine whether providing students explicit guidance regarding a learning sequence or allowing complete free choice would improve performance on an assessment related to motor skill competency in an undergraduate kinesiology program. The research study indicated that students who were required to follow the recommended learning sequence and interact with tutorials before taking the competency assessment did not enhance their performance when compared to the group who had free choice to interact with the resources. (p. 29). The

study pointed to indications that requiring interaction with resources in a specific sequence may have actually hindered performance; however, the authors note that more research is needed to determine whether prescribing access to resources truly hinders performance. Research from Calzone et al (2011) and Kelly and Bishop indicate that more research is needed regarding how resources can be effectively presented to students related to specific competencies they need to master.

Summary and Conclusions

There are differing approaches in the research literature regarding how to develop competencies, how to develop assessments of competencies, and how to leverage learning resources in competency-based models. The health care field has a long tradition of utilizing competencies to inform curriculum development (Fater, 2013; Mangelsdorff, 2014; Steinhaeuser et al., 2013; van der Lee et al., 2013; Zeind et al., 2012); however, within this field, there is variation regarding how to develop the competencies. Fater (2013) analyzed professional competencies and conducted a gap analysis to determine areas in which competencies did not address employer needs. The research demonstrated a need to balance the use of professional competencies with employer needs. In addition, Zeind et al. (2012) noted that it is often the case in health care that competencies are developed outside the university, but then it is the responsibility of the university to implement the competencies within the curriculum. Both studies point to the potential risks involved when simply adapting professional competencies in to university

programs. When competencies were developed at the university level, research revealed that a Delphi approaches to reach consensus regarding the competencies a university may address was helpful in developing competencies (Kang et al., 2013). Regardless of how competencies were developed, research from the health care field indicates the need to balance employer input, professional competencies, student, and stakeholder feedback (Mangelsdorff, 2014; Fater, 2013; Steinhaeuser et al, 2013; van der Lee, 2013; Whitehead et al., 2014). In addition, research from the health care field revealed that at some times competencies were based on what a student should know and do after graduation, whereas other times the competencies were based on roles a student would need to fulfill (Whitehead et al., 2014).

Research in academic areas like business or humanitarian services revealed a different approach for competency development due to a lack of professional competencies already in place to guide development. Competencies were developed at the university level using surveys from experts and academics within the field or through the use of the Delphi approach in an effort to develop competencies that could be used in a course-based model (Bolsche et al, 2013; Burkle et al., 2013; Shyr, 2012). While researchers in both health care and other academic fields sought the input of multiple stakeholders, the approach for developing competencies varied greatly between individual contexts.

Once competencies are developed the next consideration is how the competencies will be assessed. It is important to note that all research regarding assessment of competencies was conducted within the confines of the course-based, credit hour model. There was no research regarding effective methods for developing assessments within a competency-based model. However, the research indicated that formative assessments within competency-based models were viewed with some trepidation from students. Specifically, students perceived formative competency assessment as high-stakes as the summative competency assessment; making it difficult to provide low-stakes practice for students to master a competency (Bok et al., 2013). However, formative faculty feedback was effectively applied in other instances in which students were self-reporting their own achievement of competency within the context of a blog (Carbonell et al., 2012). More research is needed regarding how to effectively apply formative assessments within a competency-based model. Self-assessment was also utilized to assess competency; however, the research revealed great variation within this approach. Some academic fields utilized vetted psychometric inventories while others utilized student self-reporting (Choi & Bakken, 2013; Galt, 2013; Galambos et al., 2014; Piscotty, Grobbel, & Abele, 2013). In many instances, self-assessment was done at pre and postcourse intervals. In a competency-based model this approach may be utilized pre and post competency.

Research also revealed a common approach across academic fields when assessing competency: authentic, problem-based assessment (Baughman et al., 2012; Bay

et al., 2012; Cassidy et al., 2012; Curran et al., 2012; Cydis, 2014; Hermanns et al., 2011; Keltner, Grand & McLernon, 2011; Pittenger et al., 2013; Scholtz et al., 2012; Webster et al., 2012). Although there are challenges to assessing complex simulations and authentic assessments, it is noted that they are an effective way to assess student competency and promote learning (Cassidy et al., 2012). A final theme in the research literature is the use of learning resources in a competency-based model. Johnstone and Soares (2014) provided descriptive guidelines based on one university's approach to resources, including the need for resources in a competency-based model to be engaging and well-aligned. However, there has been no research regarding how to leverage resources in competency-based programs, particularly when engaging with resources is optional.

As the research presented indicates, competency-based learning models in higher education are most often analyzed within the context of courses offered at a university. The context of this research is helpful in understanding how competencies are identified and how they inform course development; however, more research is needed regarding the effective development of competency-based models that eliminate seat time or traditional course requirements. The merit of utilizing a competency-based approach rather than a traditional, course-based approach is one of debate within the field of health care education (Kerdijk et al., 2013). Some argue that the credit hour is not a valid measure of student learning (New America Foundation, 2012), and that competencies may lead to improvement in student outcomes (Adams, 2012). In addition, the evolving

policies around the credit hour or Carnegie Unit mark a unique era in higher education. As the century-old unit of measurement for learning is under review from the Carnegie Foundation, it is an appropriate time to determine effective practices for developing competency-based models that have the potential to disrupt the prior proxy for measuring student learning (Silva, White, & Toch, 2013). With one state abolishing the Carnegie Unit altogether and only awarding credit based on mastery of skills rather than seat time, the field of higher education is in need of best practices to help guide the development of programs that measure competency (Carnegie Foundation, 2014).

While effective practices are broad in scope, the research literature revealed common patterns in course-based competency development related to how competencies are developed, how assessments and rubrics are leveraged in competency-based models, and how learning resources are utilized. Although there is research related to how to develop and assess competencies, each research study relied on a traditional-course based program for either its context. There is a gap in the research literature due to the innovative nature of competency-based programs in higher education. The research from traditional models provides a solid foundation for framing effective practices in course-based competency programs; however, this study was intended to address the research gap regarding effective practices for developing competency-based programs. A common set of effective practices regarding developing competencies, developing assessments,

and leveraging resources in competency-based models would benefit future program development.

In the next chapter, a detailed discussion of the qualitative Delphi method is presented along with a detailed explanation of the research methodology. Due to the lack of research regarding effective practices for developing competency-based programs in higher education, the use of the qualitative Delphi method is used in an effort to find consensus regarding effective practices as a basis for further research.

Chapter 3: Research Method

The purpose of this qualitative Delphi study was to explore effective practices in developing competency-based degree programs in higher education. In this chapter I describe the research design and rationale, explain the research question, define central concepts, and provide a rationale for using the Delphi method of inquiry. Also, the role of the researcher is described. As part of the description of the research methodology, a rationale for how participants were selected, a justification of the participants, and a rationale of the Delphi method, questions, and data collection are presented.

Research Design and Rationale

The central topic for the research was to explore what experts identify as important to the development of competency-based learning models in higher education. Experts with experience in developing programs in higher education were asked to address the process for developing competencies, assessments, and learning resources in a competency-based model in an effort to reach consensus regarding how to effectively develop competencies, assessments, and learning resources in this innovative learning model. The research questions are:

- What do experts identify as important to the development of competencies in a competency-based learning model for higher education degree programs?

- What do experts identify as important to the development of assessments and rubrics in a competency-based learning model for higher education degree programs?

- What do experts identify as important to the development and implementation of learning resources in a competency-based learning model for higher education degree programs?

Using andragogy, social constructivism, and experiential knowledge, the purpose of this study was to explore effective practices in developing competencies, assessments, and learning resources in a competency-based degree programs in higher education. Creating competency-based online programs is innovative, unique, and based upon the experiences and interactions of those doing the work of creating programs.

A qualitative research design was chosen because it provides an opportunity to explore themes and questions whereas quantitative research is best suited for testing theory through statistical analysis. Recent models for competency-based programs in higher education have not been the subject of enough research in order to conduct a quantitative analysis of effective practice. In addition, when determining effective practices for developing competencies, assessments, and learning resources, a number cannot be assigned to the practices. Also, the goal was not to determine one practice that is most effective; the goal of the study was to determine effective practices. Using interviews allowed for determining various effective practices. While grounded theory

provides a way to collect data and expand upon a theory, it was not chosen because the goal of the study was not to refine a theory related to competency-based learning. In addition, case study was not chosen because I am interested in gathering the perspectives of a variety of experts instead of seeking the insights of one person with experience in developing competency-based programs in higher education.

The Delphi method is well-suited for understanding effective practices in developing these programs in a way that acknowledges the input from experts in the field, with the understanding that reality is based on individual viewpoints. Originally developed at the Rand Corporation, the method relies on examination of an issue with the understanding that multiple viewpoints are incorporated and valued (Dalkey & Helmer, 1963). The Delphi method is one in which the researcher asks experts to respond multiple times to a specific topic in an effort to reach consensus about an issue (Yousuf, 2007). One challenge related to this approach is that there is little consensus regarding the best approaches to conducting a Delphi study. The Delphi method is a preferred qualitative approach since there is little consensus regarding how to effectively develop a competency-based model, and each university approaches its program in a unique way. The Delphi method allowed the opportunity to harness multiple voices to determine whether there is a broader consensus related to competency-based program development.

Since competency-based learning models are an innovative, emerging model in higher education, this method was particularly appropriate in order to ensure multiple

perspectives are considered when it comes to effective development practices. The incorporation of multiple realities and the negotiation of effective practices are in alignment with a social-constructivist framework. The goal was to find where these individual perspectives converge, and what commonalities may exist. These commonalities may inform an emerging set of best-practices that could be used by universities wishing to develop a competency-based learning program.

In this study, three rounds of e-mail and/or phone interviews took place. The participants were anonymous. The process was an iterative one that required evaluation and re-evaluation of data by determining possible themes and common ideas from the participants. After round one questions were asked, questions for round two asked participants to identify areas of agreement, areas of disagreement, and any additional effective practices. Round three questions followed the same format until consensus was reached regarding effective practices.

Role of the Researcher

As Patton (2002) noted, the researcher in a qualitative study is the instrument. I have worked to develop competency-based programs in higher education, so it was imperative that I acknowledge my own potential biases and consider my own experiential knowledge as part of the conceptual framework. Maxwell (2013) supported this idea of incorporating experiential knowledge as long as it is guided by critical subjectivity. In order to ensure my own experience did not influence data interpretation and to

incorporate critical subjectivity, I kept a reflexive journal while the research was being conducted. This ensured my experience did not influence the interpretation of data. My role in this Delphi study was to find appropriate participants, interview participants, collect, transcribe and analyze the data, and work toward building consensus.

Participant Selection and Recruitment

There are no strict guidelines for sample size in a Delphi study. However, Hasson and Keeney (2011) noted that the larger the panel size, the higher the reliability of the respondent group. In addition, Rowe and Wright (2011) suggested using a snowball sampling approach to identify panelists and to strengthen panelist retention. According to Patton (2002), a snowball strategy is appropriate for finding information-rich participants. Initial participants were recruited from my professional network of peers who have developed competency-based programs in higher education. More participants were recruited via snowball sampling strategy. An expert within the confines of this study was defined as an individual with experience developing competency-based programs. I verified that the program they developed met the definition of competency-based by reviewing available program-level information online or through asking specifically about the program via e-mail or phone. Since the research topic is narrow (effective practices in developing competency-based learning programs), the field of potential participants was limited to those with experience developing this specific learning model. Since qualification of participants were more important than the number of participants,

the focus remained on qualifications. Metastudies of Delphi panels reveal sample sizes ranging from 3 to 98 experts (Rowe & Wright, 1999).

In an effort to manage the results of the research study and obtain enough information to make valid conclusions, 25 participants were recruited with the goal of obtaining a minimum sample size of 10. Patton (2002) recommended researchers should specify a minimum sample based on "expected reasonable coverage of the phenomenon" (p. 246). The minimum sample of 10 generated reasonable coverage given the limited number of people with experience developing competency-based learning models while maintaining the feasibility and validity of the study. Participants were contacted via e-mail. The e-mail included a description of the study (Appendix A) and a consent form that was mailed after participants expressed interest. Returning the consent form documented acceptance to participate in the study.

<div align="center">**Instrumentation and Data Collection**</div>

The research questions were best answered by soliciting effective practices from experts who have developed competency-based programs in higher education. The best way to solicit effective practices is through interviews. A survey or ranking system was not applied to this study because the goal was to determine effective practices, not which practice is most effective. For all interview rounds, I used an interview guide, included in Appendix B, and used a semistructured approach. I conducted interviews via phone or e-mail. Maxwell (2013) advised that it is "worth keeping in mind that you can lay out a

tentative plan for some aspects of your study in considerable detail, but leave open the

possibility of substantially revising this if necessary" (p. 89). While some qualitative

researchers advise against any structuring, as a novice researcher, it was important to use

some structuring to ensure the interview yielded usable data. However, there is some

flexibility within the approach. Staying attached to a specific structure may result in

"methodological 'tunnel vision'" (Maxwell, 2013, p. 88) and the inability to acknowledge

new insights. Therefore, a semi structured approach was used in an attempt to maintain

flexibility through the data collection process.

Round 2 interview questions were developed based on the data collected in Round

1 and after common themes were derived. Similarly, Round 3 was conducted in order to

seek clarification and to explain agreements or disagreements in order to arrive at

consensus (Appendices B, C, & D). Round 1 included recorded interviews lasting

approximately 1 hour each. After the interview, participants were asked to review their

individual transcripts for accuracy. This review took place via e-mail with an

approximate time to completion of 2 weeks. Round 2 questions were developed based on

the responses to Round 1 questions and any common themes that arose from the

interview. Common themes were derived from Round 1, which informed the questions

for Round 2 (Appendix C). I used phone interviews but remained flexible if participant's

time limited interviews and only allowed for e-mail response. Round 3 included

additional questions and allowed for any clarification and explanations regarding areas in

which participants agreed or disagreed. It took me approximately 6 weeks to collect all of the data.

Data Analysis

According to Patton (2002), doing one's own interview transcriptions "provides an opportunity to get immersed in the data, an experience that usually generates emergent insights" (p. 441). After audio recording the interview and transcribing the data, open coding was used using MAXQDA. After the initial interview, participants reviewed their individual transcripts for accuracy. Round 2 questions were developed based on the responses to Round 1 questions and any common themes that arose from the interview. Prior to Round 2 interviews, participants received the group's list of methods for developing competencies, assessments, and learning resources. In Round 2, participants were asked to identify the methods for developing competencies, assessments, and learning resources that they agreed with, those they disagreed with, or any that they would add to the list. Round 3 required participants delete, add, and identify which methods were important in an effort to reach consensus.

With each round of interviews, the categories were revised in order to arrive at precise categories that eliminate any redundancies. Using MAXQDA, data from each round were analyzed for common ideas, with notations regarding similar and discrepant responses. Although the goal was to obtain consensus, all data are reported, including

discrepant cases. However, discrepant responses were not used as common themes in the final results.

Issues of Trustworthiness

I used member checking as a way to establish consensus in each round of interviews in an effort to establish credibility and trustworthiness. Data were validated through member checking. Member checking aided in developing consensus as each round progresses. Participants verified responses and made any changes or corrections as needed. Participation in the study was voluntary, and as indicated in the interview protocol, participants may have ended their participation at any time. In addition, participant identity remained confidential. Responses were shared among participants so that each participant could review responses in an effort to reach consensus; however, the identity of the participants remained confidential. Pseudonyms were used if needed to discuss the findings from the group.

Transferability was addressed in the study through the dissertation committee who helped in the selection and implementation of appropriate data collection and analysis techniques. Experience and expertise in developing competency-based programs were verified for each participant. Thorough descriptions of the data collection, analysis, and interpretation helped ensure the study can be repeated. In addition, a panel of peer-reviewers checked the research plan and its implementation for bias and personal

influence on the data. The peer-reviewers consisted of colleagues who have developed competency-based who were not part of the participant group.

Dependability was addressed through the consistency of the findings. Future researchers will have the ability to follow the data collection procedures and decisions made throughout the study through audit trails. The use of peer reviewers and the dissertation committee who checked the research plan and implementation helped ensure dependability.

Validity of the results were determined by their usefulness in guiding future standards for developing competency-based programs in higher education. Specifically, if the results can be used to guide effective practices for developing competencies, assessments, and learning resources in competency-based programs, the results are valid.

Confirmability relates to how the research findings are supported by the data that was collected. Two peer reviewers and the dissertation committee reviewed the data collected to ensure there was no bias in the analysis. In addition, an audit trail was used throughout the study to illustrate how decisions were made in regard to the data collected.

Ethical Procedures

Participation in this study was voluntary, and participants could have decided to end their participation for any reason at any point in the study. Participants were provided with informed consent forms that noted I was a doctoral student conducting research to fulfill requirements for a doctoral degree at Walden University (Appendix B).

Participants' identities and responses remained confidential; however, responses were shared between participants in order to reach consensus. I was the only person with access to the raw data except for the data shared with members of the dissertation committee. There were no outside ethical considerations, no conflicts of interest, and no use of incentives for participation. An agreement to gain access to participants and data were included in the IRB application. Per the IRB, the data were stored in a password protected computer and will be destroyed in 5 years. The IRB approval number for this study was 01-05-17-0315749.

Summary

Chapter 3 included a review of the research design, a rationale, the researcher's role, participant selection and recruitment, instrumentation, data collection and analysis, issues of trustworthiness, and ethical procedures. In addition, a plan for data collection was outlined. In Chapter 4, the results of the study are presented.

Chapter 4: Results

The purpose of this study was to explore effective practices in developing competency-based degree programs in higher education. Experts were asked to address three areas of program development: developing competencies, developing assessments, and use of learning resources. Below are the research questions that guided the study.

- What do experts identify as important to the development of competencies in a competency-based learning model for higher education degree programs?

- What do experts identify as important to the development of assessments and rubrics in a competency-based learning model for higher education degree programs?

- What do experts identify as important to the development and implementation of learning resources in a competency-based learning model for higher education degree programs?

In this chapter, I describe the setting, specifically any personal or organizational conditions that influenced participants or their experiences at the time of the study. I review participant demographics relevant to the study. Data collection methods including the number of participants, location, frequency, how data were recorded, variations in data collection indicated in chapter 3, or any unusual circumstances are discussed. Data analysis is described. Evidence of trustworthiness in relation to the strategies included in

Chapter 3 is addressed. The results of the research questions are included as well as any discrepant data.

Setting

There were no personal or organizational conditions that impacted participation or participant experiences at the time of this study. Participants were located throughout the United States. Contacts were made via e-mail and phone interviews.

Participant Demographics and Characteristics

Location was not a condition relevant to the study; however, participants were recruited throughout the United States. Expertise and experience in developing competency based programs were the guiding criteria for recruitment. The 10 participants in the study came from California, Virginia, Utah, Tennessee, Minnesota, Pennsylvania, Arizona, Washington, and Montana. Eight of the participants held either a PhD, EdD, and/or a JD, and two participants had a master's degree. Participant experience in creating competency-based programs in higher education spanned from 2 to 15 years of experience. Four of the participants had experience developing accredited direct-assessment, competency-based programs in higher education. Three participants were male and the remaining seven participants were female.

Participant recruitment spanned four weeks, beginning with 25 invitations to people with experience developing competency-based learning programs. E-mail

information from my professional network, along with recommendations from other professionals and colleagues in the field led to the initial invitations to participate.

Data Collection

The Delphi methodology guided data collection. Those with experience developing competency-based models were included in order to reach at least 10 participants with experience. Twenty-five recruitment e-mails were sent and some declined to participate. One person agreed to participate after Round 1 data collection was complete and that person was not included in this study. Ten participants agreed to participate in the study. Data collection utilized a qualitative approach and while an interview protocol was used, the research questions were explored with responses to broad prompts related to competency development, assessment development, and resource development (Appendix B). Throughout the second and third rounds of data collection, participants were invited to review responses, change responses, add responses, or ask clarifying questions.

All invitations were sent via e-mail and 10 participants confirmed agreement by returning a consent form. Eight participants preferred phone interviews, which I transcribed for data analysis. Two participants preferred to respond via e-mail and in those instances data were electronically based using a Word document. There were no unusual circumstances encountered through the data collection process. However, the responses sent via a Word document were notably shorter and less detailed than the

responses collected via phone interviews. Ten participants (with pseudonyms Maribel, Derek, Julie, Joshua, Janelle, Kamilah, Erin, Michelle, Pat, and Ella) participated in all three rounds of the study.

From the initial 25 participants recruited, eight never responded in spite of two follow up e-mails and one phone message. Six participants responded stating they did not have the time to devote to the study. I responded to those participants asking if perhaps e-mail correspondence would influence their participation and all stated they did not have the time to participate. One participant declined participation out of concern that her responses would put the university in which she worked at a competitive disadvantage if she shared her perspective. Although I assured her confidentiality would be maintained and sent sample interview questions to illustrate that the interview questions were not proprietary in nature, she opted to decline participation. The remaining 10 participants responded by e-mail with their consent, and a phone interview was scheduled for each, with the exception of two participants who chose to send responses via e-mail.

Data collection for all three rounds spanned approximately 6 weeks. Round 2 and Round 3 were conducted entirely via e-mail. When responses were not received within the 1-week response window, a reminder e-mail was sent requesting that participants provide their input.

Data Analysis

The iterative nature of the Delphi methodology resulted in initial participation influencing the remaining rounds of data collection. Specifically, participants added and deleted information throughout the rounds. Sample responses from each round are provided throughout this chapter.

I used a spreadsheet to track participant recruitment and dates in which key milestones were achieved. Participants were given pseudonyms to ensure confidentiality. The spreadsheet consisted of participant names, locations and e-mail addresses. In addition, columns were used to note when recruitment e-mails and follow up requests were sent, when responses were received, when interviews were scheduled or responses were received, when transcripts had been reviewed, and when Round 2 and 3 responses were received.

Round 1

Round 1 interview questions were guided by the research questions. Responses from 10 participants were received via a phone interview and two were received via e-mail response in a Word document. Round 1 interviews were completed within 4 weeks. The following interview questions served as a guide for the phone interviews whereas they were sent as noted below for e-mail responses:

- Bring to mind the process you used to develop and identify the competencies in the model(s) you developed. As you reflect on that process, what effective practices emerge? What would you do differently?

- Bring to mind the process you used to develop assessments. As you reflect on that process, what effective practices emerge (i.e., effective practices regarding assessment types; number of assessments; etc.)? What would you do differently?

- Bring to mind the process you used to develop rubrics and/or scoring guides. As you reflect on that process, what effective practices emerge? What would you do differently?

- Bring to mind the process you used to identify and implement relevant resources and learning activities that supported students in achieving competency. As you reflect on that process, what effective practices emerge? What would you do differently?

- Are there any other effective practices that come to mind regarding developing competency statements, assessments, or leveraging learning resources and activities that you have not shared yet?

I taped each phone interview using Tape-A-Call and took notes during the interview. Transcripts were sent to each participant for verification within one week after the interview. Responses received via e-mail on a Word document were not sent to

participants for verification. Each participant responded to all items with varying degrees of detail.

Using MAXQDA, I coded participants' responses regarding the development of competencies, assessments and rubrics, and learning resources and activities. Many participants described effective practices in a narrative form as they described the processes they used to develop competencies, assessments, and learning resources. During this narrative discussion, I probed or asked follow up questions in order to ensure participants were describing an effective practice instead of simply recounting their own development experience. As participants described effective practices, their responses could be categorized in one of the sub-categories indicated in Table 1.

Table 1

Coding Categories by Research Question

RQ1: What do experts identify as important to the development of competencies in a competency-based learning model for higher education degree programs?	RQ2: What do experts identify as important to the development of assessments and rubrics in a competency-based learning model for higher education degree programs?	RQ3: What do experts identify as important to the development and implementation of learning resources in a competency-based learning model for higher education degree programs?
Effective practices related to the process of developing competencies. Effective practices related to the competency statement. Effective practices related to employer involvement and needs. Effective practices related to the use of data and standards.	Effective practices related to types of competency assessment. Effective practices related to competency-assessment strategies. Effective practices related to formative assessments. Effective practices related to rubrics.	Effective practices related to identifying learning resources. Effective practices related to providing guidance to students.

Effective practices were listed according to the category with which they aligned. For example, one effective practice related to the process of developing competencies provided by Maribel was that "extensive training may be needed, including training on the philosophy and unique characteristics of competency-based education programs." This effective practice was categorized under "practices related to the process of developing competencies." A detailed list of Round 1 effective practices, by category, is

provided in Appendix C. This list was sent to participants via e-mail for them to review for agreement, disagreement, and/or changes for Round 2.

Round 2

Participants were asked to review the responses from the participant pool as shown in Appendix C and add any additional information or remove any practices with which they did not agree via e-mail. If there were no changes, participants responded by stating there were no changes to the initial responses. Participants who had changes replied by attaching the information provided in Appendix C with comments and/or track changes. Round 2 responses were requested within one week.

Nine of the 10 participants requested change to the practices listed in Round 1. Changes ranged from minor wording clarifications to noting complete disagreement with specific practices. Two participant's feedback indicated agreement with some practices, but noted that the practice may be effective for one competency-based program, but not another. For example, Joshua explained that the use of objective assessments and how formative assessments are used varies from program to program and Janelle noted that some practices are dependent upon an institution's philosophical approach to competency-based program development. Participants explained their reasons for disagreement with practices to varying degrees. Some practices resulted in multiple participant comments. For example, the practice of beginning with what students need to do in the workplace resulted in three participants expressing disagreement. Erin noted

that competencies should not be limited to the workplace and should include skills that are needed to be successful in life, as did Joshua and Derek. Another practice that garnered debate from multiple participants was the use of psychometricians in creating valid and reliable assessments. Erin, Pat, and Maribel expressed disagreement regarding using psychometricians as an effective practice. Specifically, Erin noted that every program may not have access to one; Pat expressed concern over the cost; and Maribel noted she had mixed results when using a psychometrician.

The use of absolute phrases like "must" was a point of disagreement for Erin who explained in her Round 2 responses that phrases like "must" should be used sparingly when developing effective practices. She advocated for the use of phrases like "can" or "should" in future rounds. Her feedback was applied to the Round 3 queries shown in Appendix D.

Two participants added effective practices related to the process of developing competencies, the structure of the competency statement, the types of competency assessments, competency assessment strategies, rubric development, identifying learning resources, and providing guidance to students. These practices were added to Round 3, as shown in Appendix D. The list of effective practices that were accepted by the group, with minor language clarification or wording changes were distributed and listed as accepted practices. Areas of disagreement were noted within each category, along with

the requested additions. See Appendix D for the complete list of practices provided to participants for Round 3.

Round 3

Round 3 included further comments from three participants, the areas of disagreement, and the accepted practices (Appendix D). The information in Appendix D was sent via e-mail to participants for a final review and final opportunity to make changes to the identified practices. I indicated I was hopeful that agreement could be reached; however, due to the unique contexts of competency-based programs, I acknowledge that there may be some areas in which consensus would not be reached.

Four participants responded indicating agreement with the practices as outlined in Appendix D. Three participants provided comments to explain why they either agreed with or disagreed with the areas of disagreement. One participant did not agree with the addition of an effective practice from another participant, and that practice was removed from the final list of accepted practices. One participant did not respond to Round 3 questions.

The three rounds of member checking used through the Delphi study led to the creation of a final list of agreed-upon effective practices for developing competencies, assessments, and learning resources in competency-based programs in higher education. The final results summary, including areas of disagreement, are included Appendix E. A compilation of agreed-upon effective practices are listed in Appendix F.

Evidence of Trustworthiness

This study used member checking as a way to establish consensus in each round in an effort to establish credibility and trustworthiness. Data were validated through member checking during Round 2 and Round 3 of the study. Member checking is used in the Delphi method as a way to reach consensus throughout each round of interviews. Participants reviewed answers for each round and made any corrections or changes. They were asked to reflect on the responses from the participant pool and either agree, disagree, or add to the list of practices. The participants reflected confidentially on the responses from the other participants.

Transferability was addressed through a panel of peer reviewers. The dissertation committee served as reviewers in addition to two colleagues in the field with experience developing competency-based programs. In addition, descriptions were provided regarding how data were collected, analyzed, and interpreted. These descriptions assist in determining how the study may be repeated.

Dependability was addressed through the consistency of the findings. The use of open coding of responses using MAXQDA enabled me to condense repeated responses and ensure that future researchers can follow the data collection process and the decisions made throughout the process through audit trails. Colleagues, who served as peer reviewers, checked the research plan and implementation in order to ensure

dependability. Pseudonyms were used while peer reviewers checked the summary of results from each round.

Confirmability was ensured through the use of peer reviewers and the dissertation committee who helped to ensure I limited bias in the analysis. In addition, an audit trail was used throughout the study to show how decisions were made when analyzing the data. The validity of the study is determined by its usefulness in creating future standards for developing competency-based programs in higher education.

Results

Results from this study are qualitative and were derived from an analysis of participant responses for themes, patterns, and relationships. The results indicated that there are effective practices for developing competencies, assessments and learning resources that all participants agreed upon. This qualitative data represents the perspectives of those with experience developing competency-based education programs in higher education. Due to the unique contexts and perspectives of each individual, consensus was not reached on every practice identified by participants. Complete lists of areas of agreement and disagreement are presented in Appendix E. The final, agreed upon accepted practices are presented in Appendix F.

Research Question 1

RQ1: What do experts identify as important to the development of competencies in a competency-based learning model for higher education degree programs?

When asked to describe effective practices for developing competencies, participant responses were about the process for determining competencies, the wording of the competency statement, the inclusion of potential employers within the degree program, and/or the use of standards and data. Regarding the process for developing competencies, the agreed upon effective practices after Round 1 included the need for *strong leadership and collaboration skills*, use of *external experts and stakeholders*, a *common understanding of competency-based education*, and the need to *be open to feedback and oversight*. Participants agreed that developing competencies is an *iterative process* and *should be done at the outset of program development* with potential *employer input*.

In regard to the competency statements, participants agreed that they should be written in a way that is specific, actionable, and measurable, and they should reflect the knowledge, skills, abilities, and dispositions an individual will need to be successful within the degree field. Participants also agreed that competencies should be written in a way that makes sense to potential employers. As the competencies are written, the team developing the competencies should consider how they will support the claim of the competency statement in an assessment. This was a recommended strategy for ensuring the competency statement is measurable and able to spawn measurable objectives.

Participants had differing points of view regarding whether to leverage resources from existing programs when designing competencies. While this practice was identified

by eight participants as an effective practice, Janelle explained that she was concerned that creating competencies from an existing program would potentially "dilute the effort" of developing competencies that met employer needs and were specific, actionable, and measurable. Derek expressed disagreement with Janelle's point of view, stating that "the danger of not using existing curriculum and faculty is that you could lose buy-in and expend resources unnecessarily."

Another area of disagreement was related to whether competencies should build up to program outcomes. Janelle explained that program outcomes are "inapplicable in a competency-based education model" because they are so broad and not directly measurable. However, Derek noted that program outcomes may be inapplicable in some direct-assessment models, but "there are many different versions of CBE." The notion of varying opinions due to the unique contexts of competency-based programs was also noted by Ella who said "I believe the disagreements relate to the general philosophy of the programs, which can be different."

Other areas of disagreement included whether it was important to have a clear assessment philosophy prior to developing competencies, the use of benchmarking against other degree programs, and whether to use labor statistics and data when developing competencies. Specific participant comments related to each of the areas of disagreement are included in Appendix E.

Research Question 2

RQ2: What do experts identify as important to the development of assessments and rubrics in a competency-based learning model for higher education degree programs?

When asked to identify effective practices for developing assessments, participant responses were related to the summative competency assessment, formative assessments, and rubrics. Participants agreed after Round 1 that *assessments should be piloted before being released to students* and they *must be clearly aligned to the competencies and provide evidence of student competency*. Similarly to the design of competencies, participants agreed that assessments should be part of an *iterative review process* to ensure *authentic, valid, and reliable* assessments.

In regard to assessment rubrics, participants agreed that they must be clear and transparent, specific, allow for inter-rater reliability, and be well-aligned to the assessment. Participants agreed that students should know ahead of time how they will be scored on an assessment, and that they must achieve every part of the rubric in order to achieve competency. One participant did not agree that rubrics must be normed, tested and validated, mostly due to the time and cost commitment to such an effort; however, most participants did agree that this is an effective practice in spite of the commitment required of universities.

Assessment practices yielded the most areas of disagreement among participants. Specifically, the use of psychometricians, objective assessments, and whether to have a

one-to-one correlation between competency and assessment were all points of

disagreement. In regard to the use of psychometricians, Erin explained that not every

program has access to psychometricians while Pat noted that it tends to be "too

expensive". Maribel also explained she had "mixed results" when using a

psychometrician to validate assessments. Derek explained that psychometricians are

expensive; however, they are needed to guard against unreliable and invalid assessments.

Like Derek, Michelle viewed the use of psychometricians as a needed step in order to

prove the validity of assessments. She noted that in a competency-based model, where

credentials are earned only if there is a demonstration of competency, the assessment

methods must be valid.

Other areas of disagreement regarding validity were noted amongst participants.

Michelle advocated for the use of multiple assessments to measure competency; however,

Janelle noted that she disagreed with the notion due to complexities that arise if a student

fails one assessment and passes another. Michelle noted that if you have valid

assessments, the results should not be inconclusive.

Janelle noted that some of the areas of disagreement related to assessment and

rubric practices are likely due to variations in program models, noting that disagreement

may stem from "whether the model is philosophically an outcomes based model or an

instructional model." Janelle went on to explain that if a model is a true outcomes-based

model, it is "really competency-based education" and formative assessments have no

place in such a model and should be referred to as learning activities. Specific participant comments related to each of the areas of disagreement are included in Appendix E.

Research Question 3

RQ3: What do experts identify as important to the development and implementation of learning resources in a competency-based learning model for higher education degree programs?

When asked about identifying and leveraging learning resources, participants agreed that resources must *provide students with all the information they need to successfully achieve the competency* and *represent a variety of learning modalities*. Participants also agreed that learning resources should be *identified and developed after competencies and assessments are developed*, and that *quality*, *not quantity, should guide resource selection*. Participants agreed that *open educational resources*, *content repositories*, and *vendor partnerships* can help programs provide a *variety of low-cost resources*; however, *faculty should curate, review, and approve the resources* included in the program.

Participants agreed that learning resources should provide students the *opportunity for choice*; however, that *choice should be guided by faculty* who are familiar with students' strengths and areas in need of improvement. While participants agreed that *engaging with learning resources is optional* for students, there was agreement that programs should *provide students with a suggested path through the learning resources*.

There were two areas of disagreement related to learning resources. One participant noted it was an effective practice to use librarians to identify resources; however, two participants disagreed with this practice. Also, mobile accessibility was identified as an effective practice, but consensus could not be reached regarding this practice because some higher education institutions' learning management systems do not support mobile accessibility. Specific participant comments related to each of the areas of disagreement are included in Appendix E.

Summary

Participants agreed on eighteen principles for effective practice regarding developing competencies; fifteen principles for effective practice regarding developing assessments; and sixteen principles for effective practice regarding identifying and leveraging resources. While consensus was the goal of the study, the areas of disagreement reflected the unique contexts of individual competency-based education programs. Interestingly, when areas of disagreement were noted, participants explained it was sometimes due to time or budget constraints or philosophical differences in approaches to competency-based education.

In Chapter 5, I discuss the interpretation of the findings, recommendations for future research, and the implications of the research. In addition, the importance of this study in future research and competency-based program development is presented.

Chapter 5: Discussion, Conclusions, and Recommendations

The purpose of this qualitative Delphi study was to explore effective practices in developing competency-based degree programs in higher education. This research focused specifically on effective practices related to developing competencies, assessments, and learning resources. The Delphi method focusing on the use of qualitative data was used. Interviews and e-mail responses related to effective practices allowed experts to share their perspectives in an organized manner. Analysis of themes and patterns in an effort to reach consensus revealed effective practices that experts agreed upon; however, this analysis also revealed specific areas in which there continues to be disagreement regarding effective practice.

Interpretation of the Findings

At the time of this research study, there was no research regarding effective practices for developing competency-based programs as defined in Chapter 1. While the health care field has a long tradition of utilizing competencies to inform curriculum development (Mangelsdorff, 2014; Steinhaeuser, Chenot, Ross, Ledig, & Joos, 2013; van der Lee et al., 2013; Zeind et al., 2012), the research literature was confined to course-based programs and did not address effective practices in developing competencies in competency-based programs. In this study, the effective practices for developing competencies in competency-based programs were addressed. Specifically, 20 effective practices for developing competencies were agreed upon by 10 participants with

experience developing competency-based programs in higher education. Fater (2013) and Ziend et al. (2012) noted that oftentimes competencies do not adequately address employer needs and the goals of the university. This study reinforces their research as participants indicated that employer and workplace needs must be considered when developing competencies; however, they must be balanced with the competencies relevant to a graduate of liberal education. One participant, Ella, captured a recurring sentiment from participants: that competency-based education programs "come closer to fulfilling the promise of the degree in this country more than any other degree program I have ever worked on because it is so purposeful and it really focuses students on what they need to know and be able to do."

Throughout the research literature, competencies were developed through a wide array of processes, ranging from being entirely faculty developed, to adopting professional competencies, to only leveraging outside experts (Bolsche et al, 2013; Burkle et al., 2013; Shyr, 2012; Zeind et al., 2012;). A common theme from this study included gathering input from multiple stakeholders (i.e., employers, professional standards, and faculty) and training the team developing competencies on the unique philosophy and characteristics of competency-based programs. In addition, the research participants focused on the skills and dispositions needed to effectively develop competencies. Specifically, they noted that strong leadership and collaboration skills are needed when developing competencies, along with the ability to be open to feedback,

criticism, and oversight. As of the date of this publication, no research study addressed the dispositions needed for a team to effectively develop competencies in a competency-based program.

At the time of this study, there was no research regarding effective methods for developing assessments within a competency-based program; however, there was research regarding the use of formative assessments (Bok et al., 2013; Carbonell et al., 2012), self –assessments (Choi & Bakken, 2013; Galt, 2013; Galambos et al., 2014; Piscotty et al., 2013), and authentic assessments in course-based models (Baughman et al., 2012; Bay et al., 2012; Cassidy et al., 2012; Curran et al., 2012; Cydis, 2014; Hermanns et al., 2011; Keltner, Grand & McLernon, 2011; Pittenger et al., 2013; Scholtz et al., 2012; Webster et al., 2012). This study identified twelve agreed-upon effective practices for developing assessments and rubrics. Although self-assessment was noted in the research literature as a method for assessing competency, this practice was not mentioned by any participants as an effective practice. Common themes related to assessment development included creating authentic assessments that exemplify what a student would do in the field upon degree completion while clearly aligning the assessment to the competency.

Leveraging resources in competency-based programs yielded the least research at the time of this study. Johnstone and Soares (2014) provided descriptive guidelines based on one university's approach to resources, including the need for resources in a

competency-based model to be engaging and well-aligned. However, there was no research regarding how to leverage resources in competency-based programs when engaging with the resources is optional. Twelve effective practices for identifying and leveraging learning resources in competency-based programs were identified in this study. A common theme was that learning resources should be of high quality, clearly aligned, but they should provide students with choice. That choice, however, should be accompanied by a suggested learning path based on a student's individual needs.

This research was based on Knowles et al.'s (2005) theory of andragogy. Knowles (1980) basic principles of andragogy acknowledge that the adult learner wants to self-direct his or her own learning and apply it to the real-world and is internally motivated. This research study indicated that effective practices for developing competency-based programs are in close alignment with Knowles' theory. However, the effective practices build upon these tenants. Specifically, though a basic tenant of andragogy is that the adult learner wants to direct his or her own learning, participants agreed that while an effective practice is to allow for student choice and self-direction based on learner needs and interests, this self-direction must be guided by faculty who are familiar with a student's strengths and areas in need of improvement. The use of authentic assessments and application of knowledge in real-life contexts are hallmarks of the effective practices identified in the study, and are also key tenants of andragogy.

Limitations of the Study

The limited number of participants with experience developing competency-based programs in higher education was a limitation of the study. The results are based on the experiences and opinions of the participants who may have a limited point of view based on the specific higher education contexts in which they had experience. Researcher preconceptions constituted another limitation. I did not realize that some recruited participants may view their participation as placing their own university at risk for sharing proprietary information.

Recommendations

Further research on effective practices for developing competency-based programs in higher education is needed. Specifically, as more students complete competency-based degree programs, future research can help determine whether the practices identified in this study positively impact student outcomes. While this research study was needed to distill effective practices based on current practice, continued research efforts from the perspective of students, faculty, and employers can inform competency-based program development. In addition, future research regarding whether competency-based program graduates better meet employer expectations is recommended.

Implications

As more universities develop competency-based programs, my work provides an important foundation for effective practice. This foundation can guide competency-based program development as it continues to grow. The areas in which consensus was reached can provide a resourceful list of effective practices that university leaders can use to guide their development efforts. This list of effective practices is included in Appendix F. Competency-based programs have the potential to shorten time-to-degree completion (Weise & Christensen, 2014). However, it is the responsibility of leaders in higher education to develop programs that can live up to this promise while maintaining program integrity and quality. This study can contribute to positive change in higher education by providing an emerging and initial list of effective practices that can be used to develop programs that help students graduate sooner with a degree and accompanying skill set relevant to employers.

Conclusion

This research has identified effective practices that can be used to develop competency-based education programs in higher education. Although consensus was not reached in the study, the research indicated that variations are likely due to the individualized philosophy behind a university's approach to competency-based education. As more universities develop competency-based programs, this research can

inform development efforts as leaders in higher education continue to explore effective

practices in the development of competency-based models.

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Appendix A: Participant Recruitment E-mail

Dear _____,

Greetings. I am a student at Walden University working on a dissertation regarding effective practices for developing competency-based programs in higher education. You have been identified as a person with experience and expertise in developing competency-based programs in higher education. I am conducting a research study to find out your views regarding effective practices for developing a competency-based program. Please note, this study explores direct-assessment from a curriculum design standpoint, not from a regulatory standpoint. It is important that your views are included in this research so that the results are representative of experts in the field.

For this research study, I am using a qualitative Delphi method, which includes a minimum of three rounds of interview questions. Your participation in the study will require at least two interviews, and I estimate the study will require up to 3 hours of your time.

Confidentiality will be maintained, and I will use pseudonyms or discuss the findings from the group. There are no known risks associated with this study. The main inconvenience will be the time it takes to complete the study.

If you are willing to participate in this study, please respond to this e-mail. I will send an official consent form and then we can proceed with the study. I am happy to

answer any questions you might have before you agree to participate. You may also

contact my chairperson with any questions you might have.

    Sincerely,

    Lisa McIntyre-Hite, M.Ed.

    Candidate for PhD in Learning Instruction and Innovation

    Walden University.

Appendix B: Round One Interview Questions

- Bring to mind the process you used to develop and identify the competencies in the model(s) you developed. As you reflect on that process, what effective practices emerge? What would you do differently?

- Bring to mind the process you used to develop assessments. As you reflect on that process, what effective practices emerge (i.e., effective practices regarding assessment types; number of assessments; etc.)? What would you do differently?

- Bring to mind the process you used to develop rubrics and/or scoring guides. As you reflect on that process, what effective practices emerge? What would you do differently?

- Bring to mind the process you used to identify and implement relevant resources and learning activities that supported students in achieving competency. As you reflect on that process, what effective practices emerge? What would you do differently?

- Are there any other effective practices that come to mind regarding developing competency statements, assessments, or leveraging learning resources and activities that you have not shared yet?

- Are there other experts you would recommend to participate in this study?

Appendix C: Queries for Round 2

In the first round of the study, participants identified effective practices for

developing competencies, assessments, and learning resources in competency-based

programs in higher education. Combined answers from Round 1 informed the questions

for Round 2.

- Which of the methods for developing competencies that were identified by the group do you support?

    o Which of the methods do you think are inaccurate?
    o What other ideas for developing competencies would you add to the list?

- Which of the methods for developing assessments and rubrics that were identified by the group do you support?

    o Which methods do you think are inaccurate?
    o What other ideas for developing assessments and rubrics would you add to the list?

- Which of the methods for developing learning resources that were identified by the group do you support?

    o Which of the methods do you think are inaccurate?
    o What other ideas for developing learning resources would you add to the list?

Round 2 - Queries

What do experts identify as important to the development of competencies in a competency-based learning model for higher education degree programs?	
The Process	- Use external CBE experts as needed. - Identify stakeholders before beginning to write competencies. Get the right people at the table early on in the development of competencies. - Train the team working to develop the competencies on the philosophy and unique characteristics of competency-

	based programs.
	• Ensure the competency-development team has a thorough understanding of competency language and how competencies differ from program learning outcomes and student learning outcomes.
	• Strong leadership and collaboration are important team characteristics in the competency-development process.
	• Define competencies first. This should be done at the outset of program development.
	• If creating from an existing program, leverage faculty and instructional resources to inform competency development.
	• Use a backwards design process; begin with what students need to do in the workplace.
	• Ensure competencies build up to program outcomes.
	• Engage in an iterative review process with faculty and employers when writing competencies.
	• Have a clear assessment philosophy when creating competencies.
	• Be open to feedback, criticism, and oversight as you develop competencies.
	• Benchmark the competencies you develop against what other institutions may include in their degree programs.
The Competency Statement	• Competencies must reflect what is needed in the workplace today.
	• Competencies should be written in a way that makes sense to potential employers.
	• Ask how you will support the claim the competency statement is making in an assessment. This will help ensure the statement is measurable.
	• Use a clear and deliberate structure for competency statements.
	• Competency statements must be specific, actionable, and measurable.
	• Competencies must indicate the knowledge, skills, abilities, and dispositions an individual will need to be successful within the degree field. The "knowing" is often subsumed in the "doing" when writing competencies.

Employer Needs	• Gather information from multiple employers within the degree field to ensure the competencies capture the variety of potential expectations within the field and use that information to write competencies.
Use of Data & Standards	• Use labor statistics and data from labor organizations (i.e., Burning Glass, The Department of Labor) to inform competency development. • Use industry and professional standards or competency frameworks and align to them when applicable. Competencies should simultaneously fit employer needs and align with any standards or credentialing needs.
What do experts identify as important to the development of assessments and rubrics in a competency-based learning model for higher education degree programs?	
Types of Competency Assessments	• Create authentic, job-embedded assessments that exemplify what a student will do in the field upon degree completion. • Objective assessments are used sparingly, if at all, to demonstrate competency. They are only used when knowledge may be the required competency.
Competency Assessment Strategies	• Use psychometricians to assist in creating valid and reliable assessment instruments. • Engage in standard setting exercises and test pilots prior to releasing assessments en masse. • Assess competency not curriculum content. • Assessments must be clearly aligned to the competency and provide strong and relevant evidence of a student's competency. • Authentic, rigorous assessments must stretch students, not simply assess prior learning. • Engage in an iterative review process with subject matter experts, psychometricians, instructional designers, and employers to ensure an authentic, valid, and reliable assessment. • Use the assessment type most appropriate for supporting the competency statement. For example, if a competency is about knowledge, an objective assessment may be more appropriate. If it is about application, a performance assessment is more appropriate.

	• If an existing program, leverage course-based assessment content if applicable. • Use multiple assessments to validate the claim the university is making regarding student competency. • Use faculty to develop assessments in partnership with assessment development experts. • The competency assessment is both formative and summative. Allow for multiple attempts in which students are provided with feedback that indicates areas in need of improvement.
Formative Assessments	• Formative activities and assessments are prime places for faculty interaction. A CBE program is not self-taught. Formative activities allow faculty to monitor student progress and discuss with students how to work toward competency. • Formative assessments are optional, practice activities. • Formative assessments are learning activities, a way to practice the skills for the competency assessment
Rubrics	• Rubrics must be clear and transparent for students. • Rubrics serve as a teaching tool and a way to provide guidance to students regarding the skills they need to practice in order to achieve competency. • Rubrics include specific, qualifiable and quantifiable information. • Rubrics must be well aligned to the assessment task. Students know ahead of time how they will be scored and what to do to achieve the competency. • Students must achieve or meet the desired standard on every part of the rubric in order to achieve competency. • Rubrics are consistent for the competency, regardless of who is assessing the student work. • Rubrics must be normed, tested, and validated.
What do experts identify as important to the development and implementation of learning resources in a competency-based learning model for higher education degree programs?	
Identifying Learning Resources	• Review resources based on student feedback. Remove, adjust, add resources as needed based on student data. • Resources must provide students with all the information they need to successfully achieve the competency.

	• Resources are tightly aligned to the competency and the assessment.
	• Resources should include various modalities (i.e., articles and videos) to accommodate different learner preferences.
	• Use librarians to help identify resources.
	• Faculty curate, review, and approve the list of identified resources.
	• Leverage open educational resources.
	• Learning resources should be accessible on mobile devices.
	• Do not begin development with resources. Begin development by developing the competency and assessment. Then identify the resources that will assist students in achieving the competency.
	• Quality, not quantity, should guide resource development.
Providing Guidance to Students	• Learning resources provide students the opportunity for choice; however, that choice is guided by faculty who is familiar with the students' strengths and areas in need of improvement.
	• Faculty guide students to and through specific resources based on available data analytics and/or assessment attempt results.
	• If resources are well-aligned to the assessment, students are more likely to engage with them. It is likely students will not be able to achieve competency without understanding the resources that are provided.
	• Provide students with a suggested path through learning resources. Even highly independent learners can get lost.

Appendix D: Queries for Round 3

This round is your final opportunity to provide feedback on the practices identified by the group before I compile the final results. Please review the accepted practices, areas of disagreement, and additions and let me know if you have any final comments.

Round 3 - Queries

What do experts identify as important to the development of competencies in a competency-based learning model for higher education degree programs?
The Process
Accepted Practices

- Use external experts (including subject matter experts, employers and/or those with CBE experience) as needed.
- Identify stakeholders before beginning to write competencies. Get the right people at the table early on in the development of competencies.
- Train the team working to develop the competencies on the philosophy and unique characteristics of competency-based programs. Ensure an understanding of why and how the program will implement CBE.
- Ensure the competency-development team has a thorough understanding of competency language and how competencies differ from program learning outcomes and student learning outcomes.
- Strong leadership and collaboration are important team characteristics in the competency-development process.
- Define competencies first. This should be done at the outset of program development. The competencies are revised and modified as needed throughout the development process.
- Use a backwards design process; begin with what students need to know and be able to do to be successful. While informed by what is needed in the workplace, it is not limited by the workplace (may include skills necessary for success in various life activities).
- Engage in an iterative review process with faculty and employers when writing competencies.
- Be open to feedback, criticism, and oversight as you develop competencies.

Areas of Disagreement

- If creating from an existing program, leverage faculty and instructional resources to inform competency development. *(Participant comment: I would not create competencies from an existing program for fear of diluting the effort. I also would not use existing faculty who are not trained in CBE; must be careful that it's an authentic process)*
- Ensure competencies build up to program outcomes *(Participant comment: The notion of program outcomes is inapplicable in a CBE model. The term PO has traditional connotation where the outcomes are so broad and not directly measurable; competencies should drive program outcomes).*
- Have a clear assessment philosophy when creating competencies. *(Participant comment: Sometimes the assessment measures (not philosophy) can be identified after the competencies are defined)*
- Benchmark the competencies you develop against what other institutions may include in their degree programs. *(Participant comments: Environmental scan can be useful; also need to determine how your CBE program relates to existing programs; I would be careful with this as you may not be comparing apples to apples).*

Additions (please highlight if you disagree with the added practices)

- Establish a timeline so everyone is working toward an end goal.

The Competency Statement

Accepted Practices

- Competencies, including liberal learning or general education competencies, should reflect what is needed in the workplace today and necessary competencies for success after graduation.
- Competencies should be written in a way that makes sense to potential employers and is measurable.
- Ask how you will support the claim of the competency statement in an assessment. This will help ensure the statement is measurable.
- Use a clear and deliberate structure for competency statements.
- Competency statements should be specific, actionable, and measurable.
- Competencies should indicate the knowledge, skills, abilities, and dispositions an individual will need to be successful within the degree field.

Additions (please highlight if you disagree with the added practices)

- Should be able to spawn measurable objectives.
- Competency statements should be organized/grouped so that they scaffold learning.

Employer Needs
Accepted Practice
• Gather information from multiple employers within the degree field and different market verticals to ensure the competencies capture the variety of potential expectations, positions, and roles within the field and use that information to write competencies. Employers should be active participants during CBE design.
Use of Data & Standards
Accepted Practices
• Use industry and professional standards, competency frameworks, and/or national accrediting and disciplinary body standards and align to them when applicable. Competencies should simultaneously fit employer needs and align with any standards or credentialing needs.
Areas of Disagreement
• Use labor statistics and data from labor organizations (i.e., Burning Glass, The Department of Labor) to inform competency development. *(Participant comments: Not sure about the utility of this in the development of competency statements; Be careful with this data, since it is often misleading or difficult to interpret.)*
What do experts identify as important to the development of assessments and rubrics in a competency-based learning model for higher education degree programs?
Types of Competency Assessments
Accepted Practices
• Create authentic assessments that exemplify what a student will do in the field upon degree completion.
Areas of Disagreement
• Objective assessments are used sparingly, if at all, to demonstrate competency. They are only used when knowledge may be the required competency. *(Participant comments: if knowledge is the [only required competency, it's not a competency but a learning outcome; I disagree with this as there is a place for objective type (OT) assessments when created well. OT measure certain lower order skills and are acceptable measurements of certain types of competency domains; This varies from program to program. Some heavier on objective and some heavier on subjective - usually project based).*

Additions (please highlight if you disagree with the added practices)   • Performance based assessments are critical in measuring higher order cognitive skills.

Competency Assessment Strategies

Accepted Practices   • Engage in standard setting exercises and test pilots prior to releasing assessments en masse.   • Assessments should be clearly aligned to the competency and provide strong and relevant evidence of a student's competency.   • Engage in an iterative review process with subject matter experts, psychometricians, instructional designers, and employers to ensure an authentic, valid, and reliable assessment.   • Use the assessment type most appropriate for supporting the competency statement.   • Use faculty to develop assessments in partnership with assessment development experts.

Areas of Disagreement   • Use psychometricians to assist in creating valid and reliable assessment instruments. *(Participant comments: Not every program will have access to psychometricians – this relates more to objective types of assessments; costs too much; have had mixed results with this. Most important, in my view, is to have a clear and well-developed assessment philosophy).*   • Assess competency not curriculum content. *(Participant comments: Assessments should be developed to incorporate knowledge of content. In other words, you can't just test competency of driving, without assessing if the driver knows the rules of the road; can be one and the same; impossible to assess content itself, though may assess content knowledge. However, we are always assessing a student's performance and especially at the bachelor's level, this may mean assessing performance at knowledge level).*   • Authentic, rigorous assessments should stretch students, not simply assess prior learning. *(Participant comments: I think this depends on what you are assessing; Pure CBE is agnostic as to how the learning occurred. It is focused on providing opportunities for students to demonstrate their competencies; good idea, though it is theoretically impossible that we are just measuring prior knowledge. However, not likely to often be the case)*   • If an existing program, leverage course-based assessment content if applicable. *(Participant comments: I disagree with this; I would still put it through a psychometric process for validation).*

• Use multiple assessments to validate the claim the university is making regarding student competency. *(Participant comments: I disagree with the notion of multiple assessments. What if a student passes one and fails another that measures the exact competency? Is the student competent or not? Is it realistic?)* • The competency assessment is both formative and summative. Allow for multiple attempts in which students are provided with feedback that indicates areas in need of improvement. *(Participant comments: I disagree with this. Formative assessments are more learning activities and cannot be used to demonstrate competency outcomes. But again this is based on whether the model is philosophically an outcomes based model or an instructional model. If the former (which is the real CBE) formative assessments have no place in the model; Again, depends on whose program you are talking about).*
Additions (please highlight if you disagree with the added practices) • Ensure you are measuring the correct competencies at the correct levels and the measurement instruments reflects the actual skill level being measured.
Formative Assessments
Accepted Practices • Formative assessments are learning activities, a way to practice the skills for the competency assessment
Areas of Disagreement • Formative activities and assessments are prime places for regular and substantive faculty interaction. A CBE program is not self-taught. Formative activities allow faculty to monitor student progress and discuss with students how to work toward competency. *(Participant comments: not necessarily)* • Formative assessments are optional, practice activities. *(Participant comments: Depends on philosophy and approach of institution).*
Rubrics
Accepted Practices • Rubrics should be clear and transparent for students. This will also allow for inter-rater reliability. • Rubrics include specific, qualifiable and quantifiable information (quantifiable, if applicable). • Rubrics should be well aligned to the assessment task. Students know ahead of time how they will be scored and what to do to achieve the competency, without being given the answers.

- Students should achieve or meet the desired standard on every part of the rubric in order to achieve competency.
- Rubrics are consistent for the competency, regardless of who is assessing the student work.

Areas of Disagreement

- Rubrics serve as a teaching tool and a way to provide guidance to students regarding the skills they need to practice in order to achieve competency. *(Participant comments: If the competency assessment is a high stakes, robust assessment to demonstrate competency, the goal is not to use it to teach the student).*
- Rubrics must be normed, tested, and validated. *(Participant comments: In theory, maybe, in practice, this is a nearly impossible bar).*

Additions (please highlight if you disagree with the added practices)

- Determine if there are two levels of Competency – passed or passed with distinction.
- Develop an intentional rubric design for writing each cell of a rubric and use that approach consistently.

What do experts identify as important to the development and implementation of learning resources in a competency-based learning model for higher education degree programs?

Identifying Learning Resources

Accepted Practices

- Review resources based on student feedback. Remove, adjust, add resources as needed based on student data.
- Resources should provide students with all the information they need to successfully achieve the competency.
- Resources are tightly aligned to the competency and the assessment.
- Resources should include various modalities (i.e., articles and videos) to accommodate different learner preferences.
- Faculty curate, review, and approve the list of identified resources.
- Leverage open educational resources.
- Do not begin development with resources. Begin development by developing the competency and assessment. Then identify the resources that will assist

students in achieving the competency. • Quality, not quantity, should guide resource development.
Areas of Disagreement • Use librarians to help identify resources. *(Participant comments: I have found librarians to be helpful in teaching students how to use resources, but not necessarily helpful in identifying them).* • Learning resources should be accessible on mobile devices. *(Participant comments: in theory, but not all LMS support mobile; some provide capacity, but not all programs)*
Additions (please highlight if you disagree with the added practices) • The learning assets should complement and align closely with the competencies being measured. • Explore content repositories and vendor partnerships to leverage as appropriate (i.e., Creative Commons, publishing partners). • Consider copyright clearance issues at the start of selecting resources.
Providing Guidance to Students
Accepted Practices • Learning resources provide students the opportunity for choice; however, that choice is guided by faculty who is familiar with the students' strengths and areas in need of improvement. • Faculty guide students to and through specific resources based on available data analytics and/or assessment attempt results. • If resources are well-aligned to the assessment, students are more likely to engage with them. It is likely students will not be able to achieve competency without understanding the resources that are provided. • Provide students with a suggested path through learning resources. Even highly independent learners can get lost.
Additions (please highlight if you disagree with the added practices) • It is important for the learning platform to provide clarity and guidance in working through learning activities, using resources.

Appendix E: Final Results Summary

What do experts identify as important to the development of competencies in a competency-based learning model for higher education degree programs?
The Process

Accepted Practices

- Use external experts (including subject matter experts, employers and/or those with CBE experience) as needed.
- Identify stakeholders before beginning to write competencies. Get the right people at the table early on in the development of competencies.
- Train the team working to develop the competencies on the philosophy and unique characteristics of competency-based programs. Ensure an understanding of why and how the program will implement CBE.
- Ensure the competency-development team has a thorough understanding of competency language and how competencies differ from program learning outcomes and student learning outcomes.
- Strong leadership and collaboration are important team characteristics in the competency-development process.
- Define competencies first. This should be done at the outset of program development. The competencies are revised and modified as needed throughout the development process.
- Use a backwards design process; begin with what students need to know and be able to do to be successful. While informed by what is needed in the workplace, it is not limited by the workplace (may include skills necessary for success in various life activities).
- Engage in an iterative review process with faculty and employers when writing competencies.
- Be open to feedback, criticism, and oversight as you develop competencies.
- Establish a timeline so everyone is working toward an end goal.

Areas of Disagreement

- If creating from an existing program, leverage faculty and instructional resources to inform competency development. *(Participant comment: I would not create competencies from an existing program for fear of diluting the effort. I also would not use existing faculty who are not trained in CBE; must be careful that it's an authentic process; the danger of not using existing curriculum and faculty is that you could lose buy-in and expend resources unnecessarily. Sometimes CBE is not as different from our traditional curriculum as we think it is).*
- Ensure competencies build up to program outcomes *(Participant comment: The notion of program outcomes is inapplicable in a CBE model. The term PO has*

traditional connotation where the outcomes are so broad and not directly measurable; competencies should drive program outcomes; Perhaps they are inapplicable in some direct-assessment models, but there are many different versions of CBE).

- Have a clear assessment philosophy when creating competencies. *(Participant comment: Sometimes the assessment measures (not philosophy) can be identified after the competencies are defined)*
- Benchmark the competencies you develop against what other institutions may include in their degree programs. *(Participant comments: Environmental scan can be useful; also need to determine how your CBE program relates to existing programs; I would be careful with this as you may not be comparing apples to apples).*

The Competency Statement

Accepted Practices
- Competencies, including liberal learning or general education competencies, should reflect what is needed in the workplace today and necessary competencies for success after graduation.
- Competencies should be written in a way that makes sense to potential employers and is measurable.
- Ask how you will support the claim of the competency statement in an assessment. This will help ensure the statement is measurable.
- Use a clear and deliberate structure for competency statements.
- Competency statements should be specific, actionable, and measurable.
- Competencies should indicate the knowledge, skills, abilities, and dispositions an individual will need to be successful within the degree field.

Areas of Disagreement
- Should be able to spawn measurable objectives. *(Participant comment: Not necessarily, if the competencies themselves are clear and measurable)*
- Competency statements should be organized and/or grouped so that they scaffold learning. *(Participant comment: This implies a developmental view of competencies, which is not necessarily appropriate.)*

Employer Needs

Accepted Practice
- Gather information from multiple employers within the degree field and different market verticals to ensure the competencies capture the variety of potential expectations, positions, and roles within the field and use that information to write competencies. Employers should be active participants during CBE design.

Use of Data & Standards
Accepted Practices • Use industry and professional standards, competency frameworks, and/or national accrediting and disciplinary body standards and align to them when applicable. Competencies should simultaneously make clear what students can do with what they know and align with any standards or credentialing needs.
Areas of Disagreement • Use labor statistics and data from labor organizations (i.e., Burning Glass, The Department of Labor) to inform competency development. *(Participant comments: Not sure about the utility of this in the development of competency statements; Be careful with this data, since it is often misleading or difficult to interpret; Disagree with most of this comment. Agree to be careful and caution that data may not be up-to-date but institutions should look to external standards in setting competencies).*
What do experts identify as important to the development of assessments and rubrics in a competency-based learning model for higher education degree programs?
Types of Competency Assessments

Accepted Practices
    • Create authentic assessments that exemplify what a student will do in the field upon degree completion.
    • Performance based assessments are critical in measuring higher order cognitive skills.

Areas of Disagreement   • Objective assessments are used sparingly, if at all, to demonstrate competency. They are only used when knowledge may be the required competency. *(Participant comments: if knowledge is the [only required competency, it's not a competency but a learning outcome; I disagree with this as there is a place for objective type (OT) assessments when created well. OT measure certain lower order skills and are acceptable measurements of certain types of competency domains; This varies from program to program. Some heavier on objective and some heavier on subjective - usually project based; Too loaded with self-interest to find agreement).*
Competency Assessment Strategies
Accepted Practices • Engage in standard setting exercises and test pilots prior to releasing assessments en masse. • Assessments must be clearly aligned to the competency and provide strong and relevant evidence of a student's competency.

- Engage in an iterative review process with subject matter experts, psychometricians, instructional designers, and employers to ensure an authentic, valid, and reliable assessment.
- Use the assessment type most appropriate for supporting the competency statement.
- Use faculty to develop assessments in partnership with assessment development experts.
- Ensure you are measuring the correct competencies at the correct levels and the measurement instruments reflects the actual skill level being measured.

Areas of Disagreement

- Use psychometricians to assist in creating valid and reliable assessment instruments. *(Participant comments: Not every program will have access to psychometricians – this relates more to objective types of assessments; costs too much; have had mixed results with this. Most important, in my view, is to have a clear and well-developed assessment philosophy; it is an expense, yes; but assessment philosophies do not guard against invalid and unreliable work; psychometricians can be and should be used on subjective assessments to take out subjectivity. Also, this will be an area where institutions must prove the validity of their assessment. Remember, credentials earned only if there is a demonstration of competence so your demonstrations must be valid).*
- Assess competency not curriculum content. *(Participant comments: Assessments should be developed to incorporate knowledge of content. In other words, you can't just test competency of driving, without assessing if the driver knows the rules of the road; can be one and the same; impossible to assess content itself, though may assess content knowledge. However, we are always assessing a student's performance and especially at the bachelor's level, this may mean assessing performance at knowledge level).*
- Authentic, rigorous assessments should stretch students, not simply assess prior learning. *(Participant comments: I think this depends on what you are assessing; Pure CBE is agnostic as to how the learning occurred. It is focused on providing opportunities for students to demonstrate their competencies; good idea, though it is theoretically impossible that we are just measuring prior knowledge. However, not likely to often be the case)*
- If an existing program, leverage course-based assessment content if applicable. *(Participant comments: I disagree with this; I would still put it through a psychometric process for validation).*
- Use multiple assessments to validate the claim the university is making regarding student competency. *(Participant comments: I disagree with the notion of multiple assessments. What if a student passes one and fails another that measures the exact competency? Is the student competent or not? Is it realistic? If you have good assessments, you should not have different results).*

- The competency assessment is both formative and summative. Allow for multiple attempts in which students are provided with feedback that indicates areas in need of improvement. *(Participant comments: I disagree with this. Formative assessments are more learning activities and cannot be used to demonstrate competency outcomes. But again this is based on whether the model is philosophically an outcomes based model or an instructional model. If the former (which is the real CBE) formative assessments have no place in the model; Again, depends on whose program you are talking about).*

Formative Assessments

Accepted Practices
- Formative assessments are learning activities, a way to practice the skills for the competency assessment

Areas of Disagreement
- Formative activities and assessments are prime places for regular and substantive faculty interaction. A CBE program is not self-taught. Formative activities allow faculty to monitor student progress and discuss with students how to work toward competency. *(Participant comments: not necessarily)*
- Formative assessments are optional, practice activities. *(Participant comments: Depends on philosophy and approach of institution; formative assessments can be automated and thus not prime for faculty).*

Rubrics

Accepted Practices
- Rubrics should be clear and transparent for students. This will also allow for inter-rater reliability.
- Rubrics include specific, qualifiable and quantifiable information (quantifiable, if applicable).
- Rubrics should be well aligned to the assessment task. Students know ahead of time how they will be scored and what to do to achieve the competency, without being given the answers.
- Students should achieve or meet the desired standard on every part of the rubric in order to achieve competency.
- Rubrics are consistent for the competency, regardless of who is assessing the student work.
- Develop an intentional rubric design for writing each cell of a rubric and use that approach consistently.

Areas of Disagreement
- Rubrics serve as a teaching tool and a way to provide guidance to students regarding the skills they need to practice in order to achieve competency. *(Participant comments: If the competency assessment is a high stakes, robust assessment to demonstrate competency, the goal is not to use it to teach the student).*   - Rubrics must be normed, tested, and validated. *(Participant comments: In theory, maybe, in practice, this is a nearly impossible bar; it is a challenge, yes, but not impossible).*
What do experts identify as important to the development and implementation of learning resources in a competency-based learning model for higher education degree programs?
Identifying Learning Resources
Accepted Practices   - Review resources based on student feedback. Remove, adjust, add resources as needed based on student data.   - Resources should provide students with all the information they need to successfully achieve the competency.   - Resources are tightly aligned to the competency and the assessment.   - Resources should include various modalities (i.e., articles and videos) to accommodate different learner preferences.   - Faculty curate, review, and approve the list of identified resources.   - Leverage open educational resources.   - Do not begin development with resources. Begin development by developing the competency and assessment. Then identify the resources that will assist students in achieving the competency.   - Quality, not quantity, should guide resource development.   - The learning assets should complement and align closely with the competencies being measured.   - Explore content repositories and vendor partnerships to leverage as appropriate (i.e., Creative Commons, publishing partners).   - Consider copyright clearance issues at the start of selecting resources.
Areas of Disagreement   - Use librarians to help identify resources. *(Participant comments: I have found librarians to be helpful in teaching students how to use resources, but not necessarily helpful in identifying them).*   - Learning resources should be accessible on mobile devices. *(Participant comments: in theory, but not all LMS support mobile; some provide capacity, but not all programs)*

Providing Guidance to Students

Accepted Practices
    • Learning resources provide students the opportunity for choice; however, that choice is guided by faculty who is familiar with the students' strengths and areas in need of improvement.
    • Faculty guide students to and through specific resources based on available data analytics and/or assessment attempt results.
    • If resources are well-aligned to the assessment, students are more likely to engage with them. It is likely students will not be able to achieve competency without understanding the resources that are provided.
    • May provide students with a suggested path through learning resources. Even highly independent learners can get lost.
    • It is important for the learning platform to provide clarity and guidance in working through learning activities, using resources.

Appendix F: Effective Practices for Developing Competency-Based Education Programs

in Higher Education

Effective practices for developing competencies:

- Use external experts (including subject matter experts, employers and/or those with CBE experience) as needed.
- Identify stakeholders before beginning to write competencies. Get the right people at the table early on in the development of competencies.
- Train the team working to develop the competencies on the philosophy and unique characteristics of competency-based programs. Ensure an understanding of why and how the program will implement CBE.
- Ensure the competency-development team has a thorough understanding of competency language and how competencies differ from program learning outcomes and student learning outcomes.
- Strong leadership and collaboration are important team characteristics in the competency-development process.
- Define competencies first. This should be done at the outset of program development. The competencies are revised and modified as needed throughout the development process.
- Use a backwards design process; begin with what students need to know and be able to do to be successful. While informed by what is needed in the workplace, it is not limited by the workplace (may include skills necessary for success in various life activities).
- Engage in an iterative review process with faculty and employers when writing competencies.
- Be open to feedback, criticism, and oversight as you develop competencies.
- Establish a timeline so everyone is working toward an end goal.
- Competencies, including liberal learning or general education competencies, should reflect what is needed in the workplace today and necessary competencies for success after graduation.
- Competencies should be written in a way that makes sense to potential employers and is measurable.
- Ask how you will support the claim of the competency statement in an assessment. This will help ensure the statement is measurable.
- Use a clear and deliberate structure for competency statements.
- Competency statements should be specific, actionable, and measurable.

- Competencies should indicate the knowledge, skills, abilities, and dispositions an individual will need to be successful within the degree field.
- Gather information from multiple employers within the degree field and different market verticals to ensure the competencies capture the variety of potential expectations, positions, and roles within the field and use that information to write competencies. Employers should be active participants during CBE design.
- Use industry and professional standards, competency frameworks, and/or national accrediting and disciplinary body standards and align to them when applicable. Competencies should simultaneously make clear what students can do with what they know and align with any standards or credentialing needs.

Effective practices for developing assessments and rubrics:

- Create authentic assessments that exemplify what a student will do in the field upon degree completion.
- Performance based assessments are critical in measuring higher order cognitive skills.
- Engage in standard setting exercises and test pilots prior to releasing assessments en masse.
- Assessments should be clearly aligned to the competency and provide strong and relevant evidence of a student's competency.
- Engage in an iterative review process with subject matter experts, psychometricians, instructional designers, and employers to ensure an authentic, valid, and reliable assessment.
- Use the assessment type most appropriate for supporting the competency statement.
- Use faculty to develop assessments in partnership with assessment development experts.
- Ensure you are measuring the correct competencies at the correct levels and the measurement instruments reflects the actual skill level being measured.
- Formative assessments are learning activities, a way to practice the skills for the competency assessment.
- Rubrics should be clear and transparent for students. This will also allow for inter-rater reliability.
- Rubrics include specific, qualifiable and quantifiable information (quantifiable, if applicable).
- Rubrics should be well aligned to the assessment task. Students know ahead of time how they will be scored and what to do to achieve the competency, without being given the answers.

- Students should achieve or meet the desired standard on every part of the rubric in order to achieve competency.
- Rubrics are consistent for the competency, regardless of who is assessing the student work.
- Develop an intentional rubric design for writing each cell of a rubric and use that approach consistently.

Effective practices for identifying and leveraging learning resources:

- Review resources based on student feedback. Remove, adjust, add resources as needed based on student data.
- Resources should provide students with all the information they need to successfully achieve the competency.
- Resources are tightly aligned to the competency and the assessment.
- Resources should include various modalities (i.e., articles and videos) to accommodate different learner preferences.
- Faculty curate, review, and approve the list of identified resources.
- Leverage open educational resources.
- Do not begin development with resources. Begin development by developing the competency and assessment. Then identify the resources that will assist students in achieving the competency.
- Quality, not quantity, should guide resource development.
- The learning assets should complement and align closely with the competencies being measured.
- Explore content repositories and vendor partnerships to leverage as appropriate (i.e., Creative Commons, publishing partners).
- Consider copyright clearance issues at the start of selecting resources.
- Learning resources provide students the opportunity for choice; however, that choice is guided by faculty who is familiar with the students' strengths and areas in need of improvement.
- Faculty guide students to and through specific resources based on available data analytics and/or assessment attempt results.
- If resources are well-aligned to the assessment, students are more likely to engage with them. It is likely students will not be able to achieve competency without understanding the resources that are provided.
- May provide students with a suggested path through learning resources. Even highly independent learners can get lost.
o It is important for the learning platform to provide clarity and guidance in working through learning activities, using resources.