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Preface

Competency-based education is an educational model that focuses on credentialing based upon demonstrated competence rather than an amassment of course credits. In the single article in this issue, Boyer, Mason, Cleary, and Telkamp present a survey study exploring the role of learner self-direction in competency-based programs for a convenience sample (n = 93) of first-time enrolled students in various online, undergraduate programs. Their findings suggest that self-directed learning capacity plays a role in program selection and that such programs may influence this capacity.

I thank these authors for sharing their work with our readership.

Michael K. Ponton, Editor

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CONTENTS

COMPETENCY-BASED EDUCATION AND LEARNER SELF-DIRECTION

Naomi R. Boyer, Jessica Mason, Michelle Navarre Cleary, and Julie Telkamp

Competency-Based Education (CBE) programs require the demonstration of competence rather than accumulation of credits, empowering learners to choose the process and pace of their experience. The current study investigated the role that self-direction plays in the success of students in CBE programs and the extent to which the cultivation of self-direction may vary based on CBE program design. CBE programs often are considered to be learner-centered and self-directed; however, there is limited knowledge about what qualities or skills make students more likely to be successful in CBE programs. This early exploratory analysis suggests that students who self-select into a CBE program have relatively high self-directed learning capacity particularly with respect to setting learning goals, identifying learning resources, and managing stress. Participation in a CBE program may also have an impact on students' self-directed learning capacity; however, additional study with a broader sample is recommended.

Keywords: competency-based education, learner characteristics, self-directed learning, learner success

Over the last decade, there has been steady growth in the number of competency-based education (CBE) programs. The 2019 National Survey of Postsecondary Competency-Based Education conducted by American Institutes for Research (AIR) identified 588 CBE certificate or degree programs (Mason & Parsons, 2019), an increase of 76 programs from the findings reported in the 2018 National Survey of Postsecondary Competency-Based Education (AIR & Encoura Eduventures Research, 2018; Lurie et al., 2019). Although definitions and implementation of CBE vary across institutions, CBE programs generally measure students' mastery of specific competencies (i.e., outcomes) rather than establish a set amount of time that must be spent in a classroom or learning the curriculum (Competency-Based Education Network, n.d.). This focus on measuring learning rather than credit hours promotes flexibility, accessibility, convenience, and individualized learning, which may draw students, particularly adult learners, to CBE programs (Long & McIntyre-Hite, 2020).

The majority of the 602 institutions that responded to the 2019 AIR survey of U.S. higher education institutions reported interest in implementing CBE programs

(Mason & Parsons, 2019). To date, existing research on CBE has mainly focused on describing the CBE landscape (e.g., where and how programs are offered) and assessing program quality (e.g., retention and graduation rates, program cost). Limited research has been conducted into the qualities or characteristics that may maximize students' success in CBE programs or how programs might support students differently based on those qualities or characteristics, information that could be instrumental in the development and improvement of CBE programs (AIR, 2020).

The current study addressed this research gap by investigating the role that self-direction plays in the success of students in CBE programs and the extent to which different CBE program designs help cultivate self-direction among students. CBE programs are often considered to be learner-centered and self-directed; however, beyond the experiences of coaches, faculty mentors, and single-program cases, little is known regarding the qualities or skills that make students more likely to succeed in CBE programs. In addition, there has been little research conducted into how programs might support students differently based on these qualities or skills. Therefore, the research questions explored were the following:

1. What is the self-directed learning (SDL) capacity of students, upon program entry, who have self-selected a CBE academic program?
2. Can CBE program design foster an increase in students' self-direction related to their learning process?
3. Are students who enter CBE programs with higher self-reported levels of self-direction more successful in learning and program completion than those students who enter with lower self-reported levels?

This article begins with a review of the literature related to CBE, SDL, and the intersection of these two domains. We then present an overview and preliminary findings from the first phase of the research in which data collected via a survey of incoming CBE students at one institution were combined and analyzed with data on respondents' progression and completion outcomes of program-defined learning segments.

Competency-Based Education

CBE is particularly conducive to learner self-direction. Compared to traditional programs, CBE programs tend to allow learners more flexibility regarding how, when, and where learning occurs. Instead of dictating how a student must learn, CBE focuses on identifying, supporting, and assessing the knowledge, skills, and abilities graduates of a program need in order to be competent. Thus, CBE is often contrasted with time-based measures of learning as in the Competency-Based Education Network's (n.d.) description of CBE as "an academic model in which the time it takes to demonstrate competencies varies and the expectations about learning are held constant" (para. 1). As a result, many CBE programs provide opportunities for self-pacing and invite learners to demonstrate the learning they have gained from personal and professional activities as well as prior academic experiences. Although there is no single agreed upon

definition of CBE, we posit the following three characteristics of CBE that make it attractive to learners who are or aspire to be self-directing:

- There tends to be no requirement about how, where, and when learning happens. CBE approaches focus on rigorous and authentic assessment of learning. This allows CBE to be transfer-friendly; open to prior learning assessment; customizable; flexible in delivery, pacing, and use of learning resources; and individualized (Competency-Based Education Network, n.d.).
- Program design starts with identifying what graduates need to know and be able to do and then builds the curriculum to achieve these ends. This backward design process (Wiggins & McTighe, 2005) frequently includes input from faculty, industry, national organizations, other experts, and learners themselves.
- It prioritizes application and the demonstration of the ability to use knowledge, skills, and abilities to act in the world (AIR, 2019).

The flexibility, opportunities for individualization, and the perceived personal and professional relevance of applied learning all appeal to adult learners who may also consider themselves self-directing (Knowles, 1984; Morrison, 2018; Navarre Cleary 2020). Moreover, we speculate that CBE programs aligned with the Competency-Based Education Network's (2017) quality standards may further develop learner self-direction by making learning goals and criteria explicit; by giving students the responsibility for making meaningful choices about how, where, and when they learn; and by scaffolding learners in identifying goals and implementing individualized learning plans. Depending upon the CBE program, the content and demonstration of competency may not involve choice and learner self-direction. However, programmatic elements will still require much more learner self-management, motivation, and self-direction in the process than in non-CBE programs (Long & McIntyre-Hite, 2020).

Some CBE programs have intentionally incorporated opportunities for self-direction to align with adult learning. In the 1960s and 1970s, a number of schools developed CBE programs to serve adult and other nontraditional learners as part of a movement to increase access to higher education (Book, 2014; Klein-Collins, 2012). The late 1990s gave rise to the advent of online learning and national concerns about completion, access, and quality. These drivers coupled with the escalating costs of higher education and increasing student debt fueled a second wave of CBE programs that prompted the founding of Western Governors University (Book, 2014; Klein-Collins, 2012). Large-scale, high-profile programs like Western Governors University, Southern New Hampshire University, and Northern Arizona University have helped fuel significant buzz about CBE.

The 2019 AIR and Eduventures survey of U.S. higher education institutions suggested that while there is significant interest in CBE and steady growth in the number of CBE programs, the overall number of institutions offering CBE programs is still relatively small (Mason & Parsons, 2019). Of the 602 respondent institutions, 89% reported that they were either implementing CBE or interested in doing so. Just over half were in the planning stage while only 11% reported offering one or more full CBE

programs. Despite the relatively small-scale implementation, the vast majority of institutions reported optimism about the future of CBE, expecting it to grow nationally in the next 5 years. Among those institutions that are implementing or interested in implementing CBE, just over half reported expanding opportunities for nontraditional students and supporting workforce readiness as key motivations for their interest in CBE (Mason & Parsons, 2019).

Self-Directed Learning

SDL has been defined in a number of psychological, behavioral, social, environmental, and cognitive contexts without broad consensus of a unified definition from within the field (Du Toit-Brits, 2018; Firat et al., 2016). The debate of whether a learner's self-direction is static or developmental (Grow, 1994), relative to formal or informal, situational or constant (Candy, 1991), associated with age or maturity (Reio & Davis, 2005), and independent or social (Brookfield, 1985; Merriam & Caffarella, 1999) continues within the discipline. The International Society for Self-Directed Learning (2020) recently developed a board-endorsed definition that defines SDL as "an intentional learning process that is created and evaluated by the learner" (para. 4). For the purpose of this research, SDL is defined, as is the noted Society definition above, based upon Knowles' (1975) action- and process-oriented definition "in which individuals take the initiative with or without the help of other[s], to diagnose their learning needs, formulate learning goals, identify resources for learning, select and implement strategies, and evaluate learning outcomes" (p. 18). Essentially, learners establish initiative of personal control over the learning process, often stimulated by motivation and self-efficacy.

While self-direction has been hypothesized to be contrary to formal learning environments, many researchers have investigated interventions that leverage the benefits of self-direction in educational settings. Garrison's (1997) model integrates contextual, cognitive, and motivation factors as it relates to the facilitation of SDL and identifies self-direction as a means for improving student learning outcomes in educational settings. Garrison suggested that self-directed behaviors can be exhibited in the learning process in situations where the instructional design is conducive to such learner empowerment. Learning environments can be intentionally designed to incorporate elements that influence learner control over the learning process (Sumuer, 2018). The integration of interface design principles to facilitate SDL (Firat et al., 2016) include "being user-directed, ensuring variety, being supported by learning analytics, being motivational and being sharing-oriented" (p. 41). Some behaviors and traits that have been associated with higher levels of self-direction are time management, goal setting, initiative, persistence, autonomy, curiosity, confidence, and desire (Khiat, 2017; Ponton & Carr, 2000). This list is not exhaustive; however, many of the same elements for success have been noted in the personalized learning environments used in many CBE programs (Haynes et al., 2016).

Intersection of CBE and SDL

The particular focus of this article is on adults engaged in higher education, specifically CBE programs. While research into the demographics of CBE program participants is limited, the majority of students appear to be adult learners who are at least 25 years old (Kelchen, 2015; Mason & Parsons, 2019). Self-direction and andragogy are two components of the adult learning knowledge base (Firat et al., 2016; Merriam, 2001; Mezirow, 1985). Learners in academic programs have motivation, of some sort, to complete a credential; many adult, nontraditional learners—those who are not aligned to the 18- to 22-year-old, full-time student—choose CBE programs because they value the flexibility, convenience, and adaptability of delivery (Parsons et al., 2016). Similarly, Knowles (1970, 1984) asserted that adult learners crave meaningful and relevant learning that capitalizes on their experiences. An underlying assumption is that the process of facilitating adult learning in formal education settings should also spur the development of learner self-directedness beyond the instruction of specific content areas (Merriam, 2001; Mezirow, 1981).

Despite the assertion through the adult education literature that adults prefer to be empowered and engaged as part of the learning process, many enter higher education with an anticipation of being taught and a comfort associated with passivity or obedience (Center for Inspired Teaching, 2018; DeWitt, 2016; Ecker, 2020; Harvey, 2000). Unfortunately, the traditional K-12 instructional structures facilitate bulk industrialized learning that situates 20 or more students of similar age level in a classroom, all subject to a common instructional schedule, teaching methods, learning objectives, and assessment techniques. "The present system of schooling almost guarantees that some students will remain passive and overly dependent upon the teacher for direction" (McCaslin & Good, 1992, p. 14). The instructional design and curriculum utilized to facilitate instruction in this environment can limit student engagement and agency, minimizing workforce readiness and the cultivation of lifelong learners (Goodyear & Ellis, 2007). Many educational technologies that had the potential to personalize learning to create autonomous lifelong learners have instead been developed by the influence of the persona of the compliant learner (Goodyear, 2000). Thus, the existence of the compliant learner that has been validated through academic success is further endorsed by the traditional higher education experience.

As new models of personalized, individualized, adaptive, and mastery-based learning emerge into the landscape of higher education, learners will need to actively engage in the learning process to be successful. Online delivery of content in both formal and informal contexts has been noted to require self-direction through additional learner engagement/active learning, time management, and personal motivation for successful achievement and completion (Holder, 2007; Karimi, 2016; Kim et al., 2014; Schrum, 2002; Shea & Bidjerano, 2010; Song et al., 2004). "By scaffolding student learning in personalized ways, we uplift the education experience and improve student effectiveness" (Bucic et al., 2018, p. 21). Similarly, CBE, regardless of delivery modality, also requires learner characteristics, capabilities, and behaviors that are different from those currently cultivated in traditional educational design in order to facilitate the learning process (Exter et al., 2019).

Given the aforementioned nature of the compliant learner that has been cultivated by the traditional academic structures in the United States, significant emphasis should be put on advising and support systems to transition learners into a more independent, flexible, personalized design (Kim et al., 2014). Manning (2007) suggested "that teaching strategies should take into account differences in style, time, place, and pace" (p. 105).

SDL requires certain personal attributes that lead to engaging in associated processes, which may or may not be cultivated in the instruction models, structures, and flexibility of CBE programs. The purpose of this research was to explore self-direction as a characteristic that both (a) promotes success in CBE programs and (b) develops over time as a function of the CBE program design. The following section presents details of the design of the preliminary, exploratory study to investigate the hypothesized intersections between SDL and CBE.

Method

To understand students' SDL capacity and its relationship to participation in CBE programs, we surveyed students enrolled in CBE programs at a private, for-profit postsecondary institution in the United States with primarily online course offerings. CBE offerings at this institution are course-based with each course comprised of multiple competencies. We adapted the survey instrument from a validated survey of SDL developed for adult learners in online course settings (Khiat, 2015). The original survey measured, tested, and validated dimensions related to SDL: study and self-regulation skill, assignment management, online learning proficiency, stress management, technical proficiency, procrastination management, online discussion proficiency, seminar learning proficiency, comprehension competence, examination management, and time management. For the current study and with permission from the survey's author, we adapted these dimensions to ensure relevance to learners in CBE programs, condensing some measures and adding concepts that are related to CBE (e.g., ability to demonstrate competencies). This allowed exploration in SDL capacity in different areas in order to understand whether the relationship between CBE and SDL capacity varies across the different facets of SDL. The nine dimensions of SDL included in this survey are as follows with the number of items for each dimension in parentheses:

- Comprehension competence: Ability to understand and critically engage with learning materials to achieve course objectives, demonstrate competency, and meet personal learning goals (2 items).
- Identifying learning resources: Identifying resources, including human, text, technologies, activities, and other resources, that the learner uses to facilitate learning (4 items).
- Learning proficiency (asynchronous): Ability to engage in asynchronous class experiences through appropriate participation and interaction with professors, peers, and learning activities (3 items).

- Learning proficiency (synchronous): Ability to engage in synchronous class experiences through appropriate participation and interaction with professors, peers, and learning activities (3 items).
- LMS/technical proficiency: Ability to navigate the learning management system (LMS), utilize the associated tools, and operate the technology required to be successful in computer-mediated instruction (5 items).
- Managing procrastination: Implementing strategies to limit procrastination and support effective time management (5 items).
- Managing stress: Implementing strategies to limit anxiety and maximize learning (4 items).
- Planning learning: Preparing for participation in a learning project by establishing short- and long-term milestones, identifying and defining learning projects to accomplish these milestones, and determining project-specific goals and benchmarks (6 items).
- Setting learning goals: Establishing personal and professional goals related to a learning project identified by the learner (3 items).

To measure the SDL capacity of participating students across the nine survey dimensions, we implemented a 4-point scale for each survey item with 1 corresponding to *strongly disagree* and 4 corresponding to *strongly agree*. Additionally, we conducted analyses of internal consistency on each of the nine dimensions to ensure that changes made to the original instrument did not negatively affect internal consistency.

In addition to the survey data, the participating institution provided administrative student record-level data on demographic characteristics (gender, age, race/ethnicity, prior college experience, and Pell grant eligibility) and credit completion data (number of credits attempted and number of credits earned during the 12-week academic term) for each student who completed the survey. This allowed for the consideration of differences in outcomes across different program types and student characteristics and to understand what, if any, relationship exists between SDL capacity and credit completion and success outcomes.

We conducted analyses in spring and fall of 2019, focused on understanding characteristics of SDL and potential correlations between self-direction and credit completion and success. In this exploratory study, the analyses were primarily descriptive in nature. We used descriptive statistics related to student characteristics, course pass rates, and scores on survey dimensions. To determine whether there was a change in SDL capacity from the time of enrollment in the program to the end of the 12-week academic term (i.e., after completion of one unit of content as defined for this institution and study), we conducted repeated measure *t* tests, and we used simple correlations and logistic regression to test potential relationships between credit completion and SDL capacity (Hoy, 2009). For the logistic regression, the dichotomous dependent variable was completion of all credits attempted (i.e., completed all or did not complete all).

Sample

The convenience sample included 93 newly enrolled students from one private, for-profit postsecondary institution that offers primarily online CBE programs. Students who were entering online, undergraduate CBE programs in business, education, health sciences, technology, and design for the first time received the survey, which was sent by administrators at the participating institution at the time of enrollment and again at the completion of a 12-week academic term. The survey response rate was 12%. The final sample included those students who completed the survey at the time of entry and for whom we had demographic and credit success data.

The majority of the sample were women (74.2%) and adults over the age of 25 (82.8%); 11.8% of students were Black, 11.8% were Latinx, and 52.7% were White. In addition, 36.6% of students had some college credit but no credential, 27.9% had an associate's degree, and 8.6% had a bachelor's degree; 69.9% were eligible to receive a Pell grant. The sample included students from several disciplines: primarily business (54.8%) and education (38.7%) and smaller numbers from health sciences and other disciplines. Table 1 presents descriptive statistics for student characteristics in more detail. These characteristics of students surveyed mirror the common perception that CBE programs often serve adult students with prior college credit.

Table 1

Student Demographics

Variable	*n*	*P*
Gender		
Male	12	12.9
Female	69	74.2
Not reported	12	12.9
Age		
19 and younger	0	0.0
20–24	16	17.2
25–29	19	20.4
30–39	31	33.3
40–49	22	23.7
50 and older	5	5.4
Race/Ethnicity		
American Indian or Alaska Native	1	1.1
Asian	2	2.2
Black	11	11.8
Latinx	11	11.8
White	49	52.7
Two or more races	1	1.1
Not reported	18	19.3

Highest credential earned		
High school diploma	15	16.1
GED	1	1.1
Some college, no credential	34	36.6
Certificate	3	3.2
Associate's degree	26	27.9
Bachelor's degree	8	8.6
Graduate degree	1	1.1
Other	5	5.4
Discipline		
Business	51	54.8
Education	36	38.7
Health Sciences	4	4.3
Nondegree or other	2	2.2
Pell eligibility		
Eligible	65	69.9
Not eligible	28	30.1

Findings

Based on analyses of internal consistency, all dimensions had sufficiently high measures of internal consistency (Cronbach's alpha of .69 or higher with the majority being .80 or higher) with the exception of the managing stress dimension. Because this study is exploratory in nature, we included the managing stress dimension despite its low internal reliability; future studies should consider how to adjust this dimension's survey items to measure this concept more accurately and utilize additional statistical methods to explore the strength of the dimensions (Lance et al., 2006; Nunnally, 1978). Table 2 presents internal consistency statistics for all nine survey dimensions.

Table 2

Cronbach's Alpha for Survey Dimensions

Dimension	α
Comprehension competence	.92
Identifying learning resources	.87
Learning proficiency – asynchronous	.69
Learning proficiency – synchronous	.77
LMS/technical proficiency	.75
Managing procrastination	.81
Managing stress	.51
Planning learning	.86
Setting learning goals	.88

Research Question 1: What is the SDL Capacity of Students, Upon Program Entry, Who Have Self-Selected a CBE Academic Program?

To investigate the SDL capacity of students at program entry, we examined descriptive statistics for each of the nine survey dimensions. For students who self-selected into CBE programs, the three dimensions in which SDL capacity was the highest were setting learning goals, identifying learning resources, and managing stress. Table 3 presents descriptive statistics for each of the SDL capacity dimensions for students at the time of entry to the CBE program.

Table 3

SDL Capacity Scores at Program Entry

Dimension	*n*	*M*	*SD*
Comprehension competence	85	3.09	.82
Identifying learning resources	89	3.48	.63
Learning proficiency – asynchronous	80	3.03	.65
Learning proficiency – synchronous	65	3.07	.69
LMS/technical proficiency	86	3.15	.60
Managing procrastination	87	3.10	.54
Managing stress	88	3.38	.42
Planning learning	93	3.08	.58
Setting learning goals	87	3.51	.63

Note. Because none of the survey questions were required, some respondents may have skipped certain questions thereby leading to different sample sizes for the dimensions. In some cases, this may be due to respondents not participating in a certain activity (e.g., synchronous learning opportunities).

Research Question 2: Can CBE Program Design Foster an Increase in Students' Self-Direction Related to Their Learning Process?

To investigate whether there were any meaningful changes in students' SDL capacity after completion of one unit of content, we looked at changes in the dimension scores between the presurvey and the postsurvey for those students who completed both surveys. Just over half (n = 53) of the 93 students who took the presurvey also completed the postsurvey. We conducted repeated measure t tests to assess whether changes in scores were statistically significant. Changes in SDL capacity were both negative and positive across domains (see Table 4) with the largest changes in the mean observed for comprehension competence (.26, t = -2.36, p < .05), LMS/technical proficiency (.16, t = -2.56, p < .05), and asynchronous learning proficiency (-.18, t = 1.80, p < .1).

Table 4

Pre and Postsurvey Scale Means

Dimension	*n*	Pre *M*	Post *M*	Difference
Comprehension competence	48	3.26	3.52	.26*
Identifying learning resources	49	3.63	3.72	.09
Learning proficiency – asynchronous	44	3.17	2.99	-.18**
Learning proficiency – synchronous	28	3.25	3.13	-.12
LMS/technical proficiency	48	3.25	3.41	.16*
Managing procrastination	48	3.21	3.11	-.10
Managing stress	48	3.44	3.36	-.08
Planning learning	51	3.21	3.28	-.07
Setting learning goals	48	3.60	3.63	.03

Note. Because none of the survey questions were required, some respondents may have skipped certain questions thereby leading to different sample sizes for the dimensions. In some cases, this may be due to respondents not participating in a certain activity (e.g., synchronous learning opportunities).
*$p < .05$. **$p < .1$.

Research Question 3: Are Students Who Enter CBE Programs With Higher Self-Reported Levels of Self-Direction More Successful in Learning and Program Completion Than Those Students Who Enter With Lower Self-Reported Levels?

To best understand potential relationships between SDL capacity and credit completion, we explored students' credit completion ratios—the share of attempted credits students completed within the designated academic term—for relationship to SDL capacity. First, we ran simple correlations between the credit completion ratio and each dimension score, yielding very weak correlations (the highest correlation was $r = .25$; cf. Asuero et al., 2006). Results of the logistic regression suggested similarly weak correlations with no statistically significant coefficients.

Although these findings do not provide strong evidence of a relationship between SDL capacity and credit completion, there are several important contextual factors to consider. First, the postsurvey was administered after only one academic term, a relatively short period of time in students' learning journeys. Second, there was very little variation in the credit completion ratio. Of those students who completed both the pre and postsurveys, 96% of students completed all attempted credits, and 84% of students in the full sample completed all attempted credits. While these are very positive student success outcomes, they leave little variation to potentially be explained by SDL capacity or other factors. Future studies that consider outcomes after a longer period of time (e.g., from entry to program completion) may have more variation in student outcomes and shed more light on potential relationships.

Discussion

The goal of this study was to explore SDL as a characteristic that promotes success in CBE programs and whether the CBE program develops SDL capacity in students. The early exploratory analyses suggest that students who self-select into a CBE program perceive their SDL capacity to be relatively high (as evidenced by mean scores above 3 indicating that participants agree or strongly agree with statements about SDL capacity). This is particularly true with respect to setting learning goals, identifying learning resources, and managing stress. Participation in a CBE program may also have an impact on students' SDL capacity. Changes, both positive and negative, were observed in survey scale scores for the different dimensions of SDL capacity after completion of one unit of content.

The comprehension competence and LMS/technical proficiency dimensions had the highest positive, statistically significant changes ($p < .05$), which could possibly relate to students' increased comfort and confidence with the technology over time. It is reasonable to expect positive changes on these two dimensions given that students had participated in a mostly online program that likely led to the development of the skills needed for successful outcomes in an online course (i.e., navigating the LMS and other technical requirements) along with increased comprehension after the completion of coursework. The negative observed change in asynchronous learning proficiency ($p < .1$) is somewhat contradictory; however, we posit that this may reflect students having an inflated sense of competency at the start of the program without being familiar with asynchronous learning environments; that is, they don't know what they don't know. Another explanation could be that their preference was for synchronous versus asynchronous learning environments. Finally, in terms of the potential relationship between SDL capacity and credit completion, we were unable to reach any conclusions based on the current sample. Additional research is needed to better understand potential relationships between SDL capacity, credit completion, and success. In particular, longitudinal studies that cover a longer time period and studies using a larger, random sample will provide deeper insight into these relationships. Further, inferential research with a random sample will allow for conclusions and recommendations pertinent to many institutions and types of learners extending this work beyond the case of one institution.

Still, the research process thus far has provided some important implications for researchers exploring SDL. CBE programs and many other learning modalities that support SDL (e.g., online learning) often differ from traditional models of postsecondary education on important characteristics that make research and measurement difficult. For example, in CBE programs that allow students to progress at different paces not tied to the credit hour, measuring student progression and making meaningful cross-program comparisons is challenging (Smither et al., 2019). This will be an important consideration as the analysis and investigation of potential relationships between SDL capacity, program progression, and program completion continues.

Another key consideration in this research process has been the common practice in CBE programs of offering rolling admissions to students. While we report on the results of this study at one institution, the study began with several participating

institutions nearly all of which offered some type of rolling admission periods, including programs that admitted students on a weekly or more frequent basis with several students infrequently enrolling at once. This makes a traditional survey administration window and traditional research techniques more challenging and establishing a postsurvey administration after one unit of content logistically difficult. Ultimately, these challenges resulted in only one institution being able to complete the pre and postsurveys for a significant number of students. We share this as an important lesson learned for CBE researchers.

As is typical of any emergent innovation disruptive or otherwise, there is much to be learned by educators and others interested in CBE. Empowering individuals in personalized and unique ways necessitates the development of new techniques to investigate the impact of these techniques on learners. Previous models of institutional research have employed methods that are more easily facilitated by educational organization, which at the crux do not align to the transfer of the learning logistics, process, and outcomes to the learner. In short, programs built for individual learner self-direction are not precise programs that align to research methods based upon standardized, time-based, bulk measurement. Educational research methods need to emerge that align with the adaptability of educational design and instructional delivery.

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