Journal of Dietetic Education

Volume 2 | Issue 1 Article 2

2024

Stakeholder Perceptions of a Hybrid Competency-Based Education Program in Dietetics

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Cover Page Footnote

The study team would like to thank the students, faculty, and preceptors who participated this study, and Peter Madril for his support in hosting focus groups.

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Original Research

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ABSTRACT

As requirements for entry-level dietitians advance to the master's degree level, the Accreditation Council for Education in Nutrition and Dietetics has published a Future Education Model (FEM). At present, FEM utilizes Competency-Based Education (CBE) for optional program implementation at early adopter demonstration sites. A limited number of CBE programs exist within the field of dietetics, and there is little published literature on its use in this arena. The present study leverages focus groups with students and interviews with faculty and preceptors to evaluate use of a novel CBE program in dietetics and explore factors that facilitate or hinder implementation of such program. A series of focus groups (n=5) were conducted with FEM-engaged students over the course of the 2021-2022 academic year. Faculty (n=9) and preceptors (n=8) involved with training students in a FEM program were invited to participate in in-depth interviews to complement the student perception. Qualitative data collection was conducted and recorded with videotelephony software, and transcribed verbatim prior to analysis. Semi-structured focus group and interview guides and template analysis were used for data collection and analysis. Coding was conducted independently and compared by two trained reviewers. Facilitators of implementing a CBE program in dietetics included prior educational and work experience, support of coworkers, advancement of the profession, and efficient programmatic structure. Barriers included a lack of preceptor training, difficulty assessing competence, and the resource intensiveness of the program. CBE programs in dietetics should consider extra administrative resources, training of preceptors, and a programmatic-level assessment plan when implementing such programs.

Keywords: competency-based education, dietetics education, educational theory

INTRODUCTION

Healthcare professionals require a depth of didactic knowledge, but also must develop a multitude of skills for clinical practice. Competency-Based Education (CBE) is gaining momentum as a model for extending beyond classroom knowledge and comprehension and going into application and the skill mastery needed to perform well in work environments.[1–3] In CBE, learning outcomes are defined through competencies, or the demonstrated ability to perform a skill. Students are rated on their ability to achieve competence in a pass/fail manner, though quality may be taken into consideration. While grades target assessment of knowledge, competencies target assessment of skill. This poses a challenge in a standardized grading scheme, as competency ratings target assessment of the developmental path. While a 'novice' rating may be considered failing in a traditional grading system, it is appropriate at early stages of skill development. CBE programs are individualized to student needs, emphasizing synthesis of information both within and across courses and learning experiences, and may reduce time and cost of education.[4] Another key feature to CBE programs is the integration of experiential learning, or learning that incorporates a challenge or experience followed by reflection.[5] The World Health Organization and National Academy of Medicine recognize CBE as a strategic education model, advocating its effectiveness both in developed countries and in countries with less available resources as a strategy to improve patient care.[6,7]

Development of competence is a multifaceted and complicated task, as there are many components that encompass competence, including knowledge, skill, judgment, professionalism and attitudes.[8,9] While the Academy of Nutrition and Dietetics defines competence as an individual's skills and abilities, they define competency as the synthesis of knowledge, skills, abilities, behaviors and other characteristics an individual must demonstrate in order to function successfully in practice.[10] Beyond the complexity of competency development, there are various stakeholders involved in the process: faculty, students, and preceptors. Working with a preceptor has been noted to be the most effective clinical experience in the preparation of students for independent, entry-level practice.[11] Preceptorship has been defined in a variety of ways including role model, resource, teacher, mentor, facilitator, and evaluator.[12]

Sarcona et al.[13] defined an effective preceptor as "an individual who is able to provide a learning experience that assists students in meeting the required competencies outlined by a professional accrediting agency, in order to produce well-prepared entry-level healthcare practitioners."

Competencies, learning, and assessment must be synthesized across an educational experience within a CBE model; such frameworks can utilize social structures to develop the learner's competency in a step-wise fashion, shaping the sequence of learning experiences.[3,14] One such framework to facilitate development of competence is Adult Learning Theory (ALT). ALT posits that adult learners must understand the purpose and process of learning and have opportunities to be self-directed through this process (Table 1).[15] Adult learners also have the capacity to develop understanding of the methods and circumstances in which they learn best; this is known as awareness of metacognition.[16] Moreover, adult learners appreciate problem-oriented learning and seek to perform well in the roles they are training for.

While there are benefits to implementing CBE programs in an academic setting, there are several systemic barriers that challenge an unhindered implementation.[3,4] Professional training programs for allied health professions leverage knowledge of faculty members and clinical preceptors to train students; meanwhile, many of these stakeholders lack formal training in CBE, posing a challenge to its successful implementation. Furthermore, in the

Table 1. Principles of Adult Learning Theory and Examples of Implementation in CBE

Principle	Description	Example of Implementation
Need to Know	Adult learners need to understand the purpose of learning the material, what learning will occur, and how the learning process will be conducted.	Professors provide rationale for content and overview of the learning process using tools such as concept mapping.
Self-Concept	Adult learners are self-directed/self-starters: as they mature, they move from dependency to independent, taking initiative to master something (autonomy). Adults understand they are responsible for their education and actions and they want to exert that control. Adults want to be seen as a peer in the learning process.	Professors act as a guide and resource rather than solely 'teacher'.
Learner Experience	Adults utilize past experience as a resource for learning new material.	Leverage students' past learning experiences and use of transferable skills in course discussions and peer-to-peer activities. Use of prior learning assessments and self-assessments can be useful to determine what students already know, where education should be focused, and what students are interested in learning.
Readiness to Learn	As a person matures, their readiness to learn becomes oriented to the tasks of their social roles. Adults are ready to learn the things they need to know to cope effectively and developmentally move forward.	Plan low-risk activities / assignments, guide students in establishing productive routines, and facilitate understanding of metacognition and self-efficacy.
Problem-Oriented	Adults want opportunities to apply their knowledge to situations and experiences that are meaningful to them as a way to develop competence; their focus is on applicability of information.	Use of stories to link theory to practice such as in case studies or standardized patient experiences.
Motivation	Adults use a strong sense of internal motivation in learning to initiate and guide goal-oriented behaviors; they see intrinsic value and personal payoff in the process.	Encourage goal setting, and defining the student's '*why*' for entering this profession.

CBE = Competency Based Education
Note: Adopted from Knowles et al[15]

United States, the majority of higher education institutions function on a semester, trimester, or quarterly schedule, confining knowledge and skill acquisition to the academic calendar for the entire cohort of students.[3,4,17] Individualization of a learning experience may look different for each student, thus requiring more resources, including administrative costs, remediation plans, and individual student support. In a traditional CBE program, students can "test-out" of competencies prior to entering a program, negating the requirement for a certain number of course credits. Therefore, university registration, financial aid, tuition structure, and transcript-building in traditional systems must be accommodated to a competency-based style.[4] Alternatively, a hybrid-model of CBE may leverage foundational values of CBE, such as the learner-centered experience and focus on learning outcomes, while still being able to incorporate the program into existing university structures.

Historically, use of CBE in training medical doctors has proven to be successful, yet in other allied health professions, such as dietetics, it is only beginning to be implemented.[18] The Future Education Model (FEM) dietetics program was recently developed by the Accreditation Council for Education in Nutrition and Dietetics (ACEND) as a hybrid-CBE model for training future registered dietitian nutritionists (RDN). The FEM program allows for flexibility in the process of implementation; while there are

Table 2. Interview Questioning Guides

Audience	Questions
Faculty	• Can you tell me a about your current position? • Describe your experience with the FEM program so far. • What have you noticed about the students in the program? Has this posed any challenges/benefits for students without prior formal nutrition education? • Please describe your program's structure. • What methods are used to track student progress throughout the program? • How is competency achievement defined and evaluated? • What is your perception of the assessment process within the FEM? • What type/frequency of active learning methods are being employed? • What unforeseen challenges have you encountered? • What differences have been observed between traditional and FEM programs? • What are your overall attitudes of the FEM? • How do you see the FEM changing the profession of dietetics?
Preceptors	• Can you tell me about your current position? • On a national level, are you aware of the Future Education Model? Explain your understanding of the FEM. • Can you tell me about your experience with the FEM students thus far? • What have you noticed about the educational background of your FEM students? Has this posed any challenges/benefits for students without prior formal nutrition education? • What differences have you observed between traditional and FEM students • How is competency achievement evaluated in your rotations? How do you determine if a student is competent? • What type/frequency of active learning methods are being employed in your rotation?
Students	• What has been a personal highlight of the FEM program thus far? • What are the things you have done to make yourself successful as a dietetics student? • What has been your biggest obstacle when applying nutrition knowledge? Why? • What concepts have been challenging for you? • What has helped you the most in completing your case study assignments? What were the most challenging aspects of completing the case studies? • What are you most excited and nervous about, going into supervised practice in the clinical setting? • What is your understanding of assessment in the FEM program? • How do grades & competency ratings give you information about your progress in the program? • What are your thoughts on CBE? How do you see the course content building as you progress through the program? Where do you find it difficult to meet competency? • Describe your interactions with you professors and preceptors. • Describe interactions with your classmates. • Do you have any recommendations for changes to the program?

Table 3. Stakeholder Quotations Supporting Identified Themes

Faculty Facilitators	**Barriers**
"I think [the Competency Based Education model] is great. I personally think it's a step in the right direction, it makes complete sense to pair real life experiences with classroom understanding. And I think again, if we go back to Adult Learning Theory, that's how adults learn: they want to get their hands wet, they don't want to do busy work." (Profession Advancement)	"It started with identifying which competencies would go in which courses. … I think that's something that our program could have improved on, is starting from the 'ground-up' and realizing what needed to be tracked, what the competencies were, and then develop a program based on that. Whereas we took our existing structure and fit competencies into our classes. It might not necessarily be even... I think my class has 30 competency performance indicators and another class has three." (Program Planning) "I was not prepared for the amount of time investment it would take to be involved … with starting up this new program. … The time investment, I will say is large." (Resource Intensive) "Until the programs get it right, and are actually rating people 'competent' who are competent, it's not going to change. But once we get to the point where everyone understands what it looks like to demonstrate competence and we can help support everybody to get there, the field will be more effective... but we're not there yet" (Assessment)
Preceptor Facilitators	**Barriers**
"[The student] is a pharmacist, so she came in with a lot of previous clinical experience, which was a really different way for me to gauge how to teach. The biggest factor that I had to take into account was to remember that she had some of that experience and was used to working with patients already. Having that comfort level was really advantageous for her… we were able to talk more about the nutrition interventions in patients, so there was a bit of an accelerated teaching ability." (Prior Educational and Work Experience)	"I wouldn't say we have a formal definition of that… in my mind competence is if someone's making a handout to go along with a program and there might be grammatical errors or we might want to place things differently, but the content is nutritionally sound, I would call that competent." (Assessment) "Having an idea of what they've talked about in the classroom already, I think that would be really helpful. It's not something that's a complete barrier to being able to teach, but the idea of kind of piggybacking off of what's happening in the classroom would, I think, be a really effective way to help teach and reinforce some of these lessons with students." (Progression of Complexity)
Student Facilitators	**Barriers**
"It's hard for me to ask questions, sometimes I guess because I doubt myself, and I feel comfortable talking to all of the faculty. And it's also nice having a lot of the same professors for like multiple classes, I feel like I'm getting to know them more." (Faculty Support) "I do enjoy the competency-based education, and again, I still try my best even when I know that the assignment will be graded based on completion and not necessarily for points. I talked to one of my friends about this one assignment that I was stressing over, and she was like 'you know it's not for points, it's for completion' and I said 'I know, but I still want to do well on it, because I want to understand what I'm learning'." (Program Structure)	"You feel pressure to get a good grade because inevitably the grade is still a part of it, and you have to have a B- to get through (the program). Now, a lot of the stuff is competency—like a checkmark or 'competency-grade', but it's still an exam, and on those exams it's probably scenario-based or some sort of competency-based, but there's still a grade attached to it. So, you're still going to look for that B-, you're still going to look that I'm passing and I know what I'm doing, alongside of being able to do it, and apply it." (Assessment) "In supervised practice, it's up to us to know [about competencies] and I feel like sometimes we just don't know; it's very unclear… I've never encountered competency-based learning before, so I wish there were better examples of things you could do that would help you meet competency; more guidance on the whole process of having to do it ourselves. I like that it engages us in keeping us accountable for what we're learning and helping us see that, but there were some competencies I was looking at that we did talk about with our preceptor but there's some other ones I'm pretty sure this counts for it, but I also don't want to be false… it seems a lot more vague than it should be." (Assessment)

defined competencies that students must achieve, there are a variety of ways this can be accomplished. By overlaying CBE onto traditional dietetics education methods with room for flexibility, there will be opportunities for growth and the ability to address barriers in the process. Due to the novelty of this education model in the field of dietetics, a limited amount of literature currently exists. Therefore, this study aimed to explore facilitators and barriers to FEM program implementation from the perspective of students, faculty, and preceptors.

METHODS

A qualitative study on the implementation of CBE programs in formal dietetics education was conducted during the 2021-2022 academic year. Individual interviews were conducted with faculty and preceptors to provide depth of

information around individual experiences within different settings. Focus groups were conducted with students to obtain experiences of CBE implementation in dietetics education within a single program. The present study focused on the barriers and facilitators of CBE programs from the perception of each stakeholder. Institutional Review Board (IRB) approval for study procedures was obtained through the Office for the Responsible Conduct of Research at The Ohio State University, and informed consent was collected from each participant prior to any study-related procedures. Faculty, preceptors, and students were each compensated with a $15 gift card for their participation.

The study used a pragmatist worldview to capture data that are problem-centered and real-world oriented for the purpose of supporting future CBE programs in health and other skills-based professions.[19] Studying stakeholder perceptions inductively allows the possibility of revealing and exploring themes that have not yet been identified. When evaluating a new program for which very little data exist, thematic analysis is ideal for the investigation; the iterative and inductive approach will guide future directions for research investigations into this model while also informing model enhancements.[20]

Semi-structured interview and focus group guides were developed for each target population based on constructs of ALT in an effort to target components of the learning process. The questioning guide (Table 2) was developed with input of scholarly experts and pilot tested in a previous study cohort. Interview guides for faculty were designed to elucidate experiences of FEM program implementation at their respective institution, in addition to program structure and experience with FEM-engaged students. Preceptor interview guides targeted the respective preceptor's experience working with one or more students from a FEM program, and with evaluating student performance. Student focus group guides aimed to gain insight into the student experience of learning within a CBE program; questions around the experiential learning component were prioritized.

Participant Recruitment

While faculty members in this study were recruited from a national registry, students and preceptors in this study were recruited from a single university program. Faculty and preceptors were invited to participate in the study in December of 2021. FEM program director email addresses were accessed from the ACEND accredited program directory (n=44). Directors were encouraged to share the study opportunity with faculty members who were involved in teaching nutrition skills within a FEM program; thus, the invitation reached an unknown number of faculty. Clinical preceptors were recruited via a contact list from the university's rotation placement coordinator. An email was sent to 88 preceptors in December of 2021 inviting them to participate. A total of 37 faculty and preceptors responded to the invitation and completed a brief demographic questionnaire upon signing informed consent.

A portion of students (n=16 out of 30) from a single FEM program agreed to participate in this focus group research study as a part of a larger evaluation of the program. The study was introduced by a member of the study team during one of the students' required courses during the first semester of the program. Upon signing informed consent, students were asked a brief set of demographic questions, and focus groups were conducted across two timepoints, aligning with the beginning and end of the first academic year: September 2021 (2 focus groups, 11 participants) and April 2022 (3 focus groups, 15 participants). The focus groups consisted of 4-6 students each, and were conducted electronically via Zoom during the first year of the 2-year graduate program.

Study Procedures

Two dietitian-researchers were trained by an experienced qualitative researcher on how to

collect and analyze qualitative data. One of the authors (KH) conducted all interviews and focus groups, which were audio and video recorded through Zoom. Interviews were conducted until saturation was reached (n=8 preceptors, n=9 faculty, n=5 focus groups). Saturation was assessed through the presence of repetitive sentiments; upon the fifth preceptor interview, eighth faculty interview, and the third focus group, information provided was consistent with that provided in previous qualitative sessions.

Audio-recorded data were transcribed verbatim, and sentiments from distinct stakeholders de-identified with a numeric study identification code prior to analysis. To understand the facilitators and barriers to implementing CBE in an emerging dietetics model, a thematic analysis approach was used to analyze qualitative data, with 'facilitators' and 'barriers' defined as a priori codes.[21] Student focus groups, faculty interviews, and preceptor interview data were analyzed through separate processes; therefore, a separate codebook was developed for coding transcripts from each of the three stakeholders. Transcripts were coded by two members of the study team (KH and SF), leveraging expertise in the context of dietetics students and the primary FEM program of focus.

Transcript analysis was issue-focused and aimed to generate insights for use by other institutions, using processes defined by Corbin, Strauss, and Weiss.[22,23] Coding, sorting, and local integration characterized the analysis process. First, open coding identified the dominant topics and coded them with a concept label, allowing for similar events and interactions to be grouped together to create categories. Two trained coders (KH and SF) independently coded all focus group transcripts and a portion (30%) of faculty and preceptor transcripts. For each codebook, codes were reviewed together to resolve discrepancies, and establish a final codebook for each stakeholder population, which was applied to all data. Interrater reliability was calculated for focus groups, faculty interviews, and preceptor interviews as 90%, 66% and 88% agreement, respectively. Lower agreement was observed among faculty interviews due to the complexity of ideas and programmatic differences, often spanning multiple codes. Second, text segments from the transcripts for each theme were locally integrated using axial coding to define subcategories and generate subthemes. Third, selective coding was used to identify the relationships between subthemes to illustrate ideas related to CBE.

RESULTS

Faculty participants (n=9) represented six different FEM graduate program sites across the United States; these participants had an average of 13.4 years of teaching experience (range: 2.5-30 years). Clinical preceptors (n=8) interviewed were from four institutions, yet, all worked with the same FEM program site and had an average of 12.6 years of precepting experience (range: 1-22 years). Sixteen out of thirty first-year dietetics students enrolled during the 2021-2022 academic year agreed to participate in the qualitative portion of the study. The majority of the student population self-reported as female (94%) and White (94%), with a median age of 23.5 years (range: approximately 22-50 years). Approximately two thirds (69%) self-reported an undergraduate degree from an accredited didactic program in dietetics and 44% self-reported prior clinical experience. FEM programs represented in this research had been enrolling students for 1-3 years at the time of data collection.

Data from the focus groups and interviews were analyzed and reported by stakeholder group (i.e.: students, preceptors, faculty). A summary of major themes and accompanying quotations can be found in Figure 1 and Table 3, respectively.

Faculty Perceptions

Facilitators. Faculty identified two key facilitators: the prospect of professional advancement and the support of coworkers. Faculty members perceived the concept of CBE

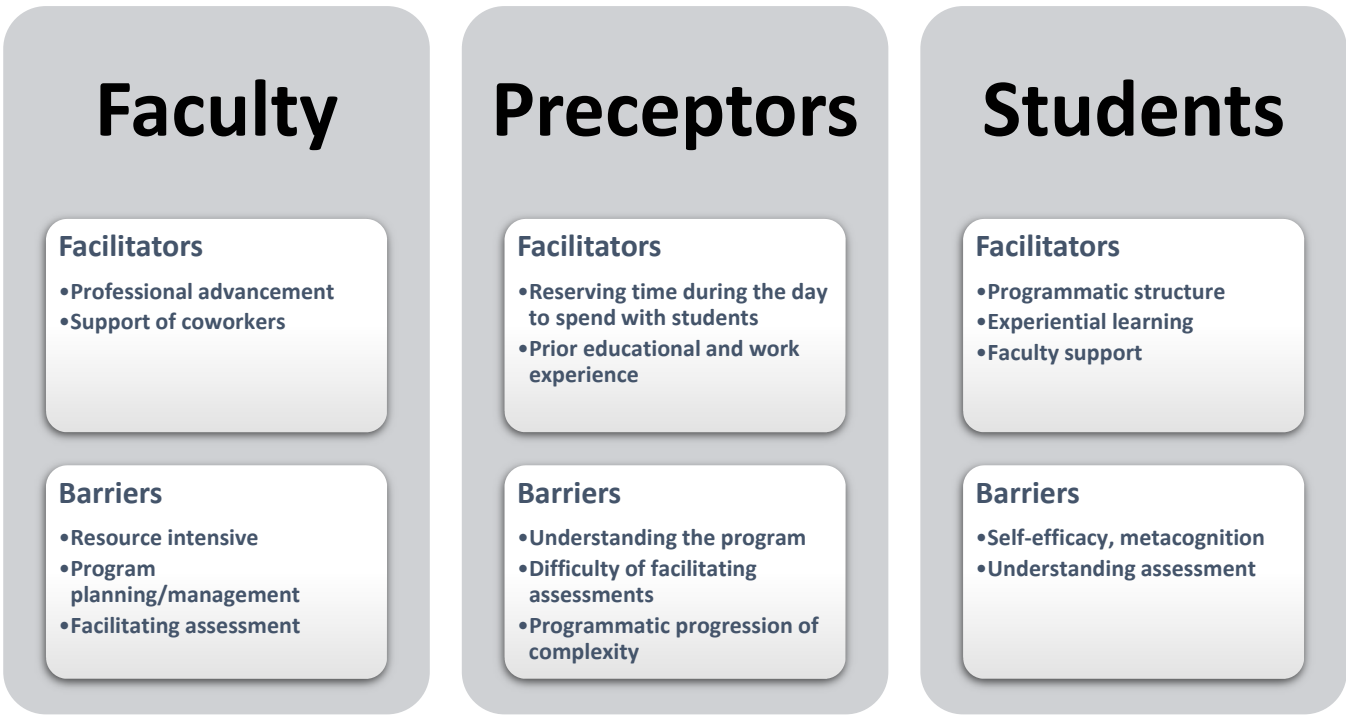

Figure 1. Thematic Summary of Barriers and Facilitators Considered when Implementing a Competency-Based Education Program in Dietetics

as beneficial for dietetics education because dietetics is a skills-based profession and CBE is a training model for skills development. Though challenges of program implementation were reported to fall heaviest on faculty members, faculty expressed a positive outlook on the future benefit of the program, particularly in the ability of the students to perform the competencies needed for entry-level practice. "I'm excited that we're doing something to help move our profession forward and show that we're evidence-based and that we can really make a difference." They also noted the benefit of leveraging expertise and support of their coworkers, and emphasized the positive role of collegiality and social interaction.

Barriers. Faculty perceived three primary barriers to CBE in dietetics: complicated program planning and management, resource intense implementation, and difficulty facilitating assessment. When asked to describe the implementation of a CBE program, the majority of faculty participants reported that it was 'challenging.' One challenge described related to retrofitting the CBE model into an existing dietetics program, which resulted in an imbalance of the distribution of competencies among the courses. In addition to complexity of program planning, faculty described the program as being resource intensive, particularly regarding the amount of time needed for course planning and management of student progression. Faculty noted that much more time was needed than was allocated in their job responsibilities. "It's a super challenge running a clinical research program on 33% of time with the new FEM program that takes up more than more than 100% percent of my time." Remediation of students was also noted as being resource intensive because of the individualization of the program; if one student fell behind in competency achievement, the student's remediation plan was very individualized based on their specific needs. If multiple

students fell behind in competency achievement, it could be like creating an individualized educational curriculum for each student. Other contributors to resource intensiveness were extra administration logistics, such as translation of competency achievement into a university-recognized grade, administering prior learning assessments, and working with other university departments to leverage resources like simulation labs. Faculty acknowledged that the current barriers of implementation challenge the benefits from being fully recognized. They noted that better understanding of CBE and standardized evaluation methods are needed to ensure program integrity.

Assessment of competence, and its integration into the university system, posed a challenge for most programs. Faculty members described the need to track competence achievement and grades in separate systems, as their university learning management system is not designed for evaluation of competence. "We are doing grades in one place, and then we are doing competencies in the other places; that's a frustration because there should have been a system created where all of those things could be together." Moreover, the method for evaluation of competence was not standardized, leading to variability across and within programs. In some programs, a grade of 80% or higher on an assignment may count as being competent, whereas in others, competency ratings are kept completely independent from course grades, and are rated on a 4–9-point Likert-type scale. Even within programs, assessment could look different in each course. Faculty reported understanding assessment methods in their respective courses, yet some expressed that they did not know how it was being tracked on a programmatic-level, and that both preceptors and students had trouble understanding the process of competency achievement and assessment as a whole:

> The competency-based grading procedures are very counterintuitive to what many of our students have experienced in the past.

> I do not think the students understand it, no matter how many times, I tried to explain to them like what competency-based education is, I feel that it's very foreign to them. And it's very foreign to preceptors, every year we try to explain it to them and it's just not clear.

Moreover, faculty noted that preceptor ratings of student competence remained consistently high, suggesting a misunderstanding of skill assessment along a developmental continuum.

PRECEPTOR PERCEPTIONS

Facilitators. Preceptors noted reservation of time during their work day and the prior educational and work experience of students as two facilitators to program implementation. To facilitate a successful student experience, preceptors found it necessary to reserve time during their day to spend with interns to prepare before a patient encounter and/or debrief after a patient encounter. "The best thing I did was blocking time prior to seeing patients, like a good 30 minutes or an hour to review everything [with the student]." Preceptors were willing to help and wanted to maximize learning experiences for their students; however, they noted that clinical dietitians are busy and need buy-in from management to allocate time in their schedules to mentor students effectively. Preceptors suggested scheduling student rotations to align with busier times in the hospital as a potential strategy to increase student exposure to clinical care, and mentioned that the educational experience is hindered when students are scheduled on non-consecutive days.

Though it was discussed as time-based skill development that occurs “by the end of their rotation,” accompanying detail described student gains in competence, autonomy, and increasing independence through their work after instruction/teaching by the preceptor.

Preceptors reported that the FEM cohort of students brought expertise in diverse areas, including content knowledge and previous work experience, which was beneficial to leverage in the learning process. However, prior content knowledge and work experience in other medical professions that the preceptor is less familiar with, such as pharmacy, was reported to be intimidating.

Barriers. Preceptors identified the following barriers: their personal understanding of the CBE program, progression of complexity within the program and how to assess competence. Preceptors were overall positive and welcoming to a new education program; yet, they equated the advancing master's degree requirement to the FEM. While they expressed interest in learning more about the program, preceptors expressed feeling out-of-the-loop regarding programmatic structure and expectations. "I am familiar that there is a new education model. I would say my awareness of the details is minimal." Conversely, preceptors reported open communication between the program and preceptors when it came to student placement and individual student needs. The perception of preceptors was that faculty members provided high quality education to the students and preceptors trusted that the program was optimizing student learning.

Preceptors saw it as a detriment that the hospitals do not always practice with evidence-based care at the highest level of dietetic licensure, such as writing problem/etiology/signs-and-symptoms (PES) statements, placement of nasogastric tubes, and ordering privileges. The progression of complexity or presenting clinical cases with increasing difficulty in supervised practice rotations was recognized as important, yet preceptors questioned the order of student rotations as they seemed inconsequent. Preceptors expressed lack of knowledge and poor self-efficacy on how to assess students' competence in a CBE program, including how assessment is defined, what assessment entails, and how to separate out different skills through an evaluation (i.e.: nutrition knowledge vs. professional behavior). Preceptors struggled to identify what constitutes demonstration of a competency, how that should be evaluated, and how to compare student performance to that of an entry-level dietitian.

Student Perceptions

Facilitators. Structure of the program, experiential learning and faculty support were facilitators identified by students. Students reported the programmatic structure of the FEM as a facilitator to their ability to participate and enter the field of dietetics, attributed to the efficient timeline, integrated didactic and supervised experiential learning, convenient geographical location, ability to leverage in-state tuition, and reputation of the school/hospital system as being advantageous. Experiential learning, such as mock counseling sessions, case studies, and the standardized patient were noted as positive contributors to the learning process and supported synthesis of information within and across courses. Students reported that faculty members within the program were a huge asset to their success and described faculty members as relatable, caring, responsive, invested, progressive in their teaching knowledge, up-to-date on research in nutrition care, and treated students like adults, which was appreciated and contributed positively to their learning experience. "[Professors] have been really amazing… she really cares about my education and how I'm learning and I really appreciate that. She's always very timely with her emails and I can say that about most of the other professors in the program as well." Students found faculty teaching methods to be especially helpful, such as writing scripts before engaging with standardized patients, practicing with classmates, role-playing, reading patient charts, guest-lectures, self-reflection, exposure to current trends in nutrition, and collaboration with other professionals through interprofessional workshops.

Barriers. Students identified low self-efficacy, lack in understanding of metacognition, and assessment methods as barriers in the FEM program. As they began the graduate program, students described struggling with their autonomy, especially when it came to study practices. They described not understanding how to practice applied skills, such as counseling theories, or talking to patients outside of the classroom environment. This type of studying was contrasted to what they had experienced in their undergraduate degree, which was heavily focused in acquisition and presentation of didactic knowledge. Receiving both competency ratings and grades was an adjustment for students who reported it being difficult to gauge their standing in the program based on competency ratings. However, students were encouraged by the competency nature of the program, because it stimulated learning and use of the material, rather than memorization. Students appreciated competencies that were presented in the classroom and evaluated by faculty members; yet, tracking and defining competencies independently during supervised practice rotations was unclear to students; they questioned what "counted" as competency achievement because of varied experiences across students. "I never encountered competency-based learning before, so I wish there were better examples of things you could do that would help you meet [the competencies], and just more guidance on the whole process."

DISCUSSION

Leveraging perceptions of faculty, preceptors and students to understand facilitators and barriers to program implementation provides evidence for building a more refined education program.[24] Such information can guide transitions from traditional modalities to CBE learning models by elucidating helpful resources, contextual factors, expectations, and unforeseen challenges; thus, contributing to a more impactful implementation process. Findings from this study emphasize the need for educating stakeholders on CBE, robust methods for assessment of competence, and additional resources and university-supported infrastructure needed for successful execution of a CBE program in dietetics. Moreover, the importance of experiential learning was emphasized as a means to support the learning process.

When considering how to approach implementation of a new education program, such as CBE, educational theory can provide insight.[25] Leveraging pillars of a notable learning theory, such as Adult Learning Theory (Table 1) , may support implementation of CBE programs in dietetics. For instance, instructors may consider providing course content that is accessible in a variety of formats such as written, auditory, game-based, etc., and asking students to self-reflect on which format is most effective in their learning process.[16] This metacognitive training strategy can support a student's understanding of their personal cognitive processes in learning, in addition to providing them an opportunity to develop autonomy: one of the pillars of ALT. For these reasons, a CBE program requires considerably more planning, communication, and time spent in course administration than previous education models. This idea was echoed by faculty participants during their interviews, who described the program as being complex, interconnected, and sequential in design. A student's desire to know how and why the process of education will be conducted is another ALT pillar.[15,26] In our study, students described difficulty understanding the competency assessment process and how to develop effective study strategies within their CBE program. Educating stakeholders on programmatic organization and the structure of how students will be evaluated may support bridging this gap in understanding. Creating resources such as a "how to" video or examples of completed competency tracking forms could help students understand evaluation structure on a programmatic level. Other examples of ALT principles and corresponding examples of implementation can be found in Table 1.

While building effective opportunities for students to develop competence is essential, how performance of the skill will be evaluated must also be taken into consideration. Assessment within a CBE model can be challenging due to the subjectivity of skill assessment.[3,27] CBE excels in measuring observable results; yet, evaluation of thought processes such as situational clinical decision making, critical thinking, or information synthesis are difficult to evaluate as many are situation-dependent. In our study, students and preceptors struggled to fully understand the assessment of competence; further, faculty participants in this study described that the calibration of competency scales was not consistent among evaluators, and the contribution of a skill-based assessment to overall standing in the program was unclear. Assessment of competence is not static; instead, it is multifaceted and dynamic. No single assessment can evaluate all the competencies within a complex educational program.[28] Assessments in CBE can be combined and leveraged in complementary ways, enhancing validity, feasibility, practical considerations, and fidelity to actual practice.[29] Though a variety of assessment methods may be necessary to accommodate different types of competencies, it could be confusing to stakeholders when different assessment methods are chosen at the instructor-level rather than a cohesive, programmatic-level. For example, use of a 9-point Likert scale in one course and a 4-point Likert scale in another course both within the same program could be confusing to evaluators and students alike. Assessment at the program-level has been proposed to enhance program quality, and is suggested as an effective method for evaluating CBE programs.[30] A model of programmatic assessment in nutrition and dietetics recently reported by Dart et al. enhanced confidence in assessment decisions, and increased value of assessment from the perspective of preceptors, students, and faculty through formation of a student progress committee.[31] Although comprehensive assessment programs are expensive to develop and maintain, they result in enhanced programmatic outcomes and should be considered in CBE programs.

Because integrated experiential learning is part of the CBE process to prepare entry level practitioners, the FEM will continue to integrate preceptors in student development. Preceptors play a key role in dietetics education as they provide an important resource to the learning process: supervised practice. In the literature, preceptors report understanding their expectations as a preceptor, many also indicate that training would be beneficial.[32] These findings parallel what was elucidated through preceptor interviews in our study. As many preceptors were unaware of the FEM or CBE, it would be advantageous to provide training both at the national and local levels to enhance awareness of these educational programs. National-level training on the FEM by ACEND could be communicated and delivered electronically to Academy members, while individual programs may consider creating training that targets program-specific curriculum, division of responsibility among stakeholders, and the process of assessing competence within the respective program.

Within the FEM program, there is flexibility in the division of responsibility between stakeholders when it comes to program development, implementation, and management. Because development of competence can be a multifaceted and complicated task, it is essential for each stakeholder to understand their role in the program. Roles and responsibilities were recurring and overarching themes from the three stakeholders in our study. Several faculty members described how the program's design placed a heavy responsibility of teaching competency-based curriculum, developing competence, and assessing competence on course instructors/faculty members. With more evaluative duties placed on faculty, their students were given multiple opportunities to meet competencies in the classroom prior to

supervised practice. Although the evaluation structure may not be similar for all FEM program sites, this model enhances consistency in evaluation and collection of evaluative data and reduces preceptor burden. Alternatively, for preceptors to conduct assessment within a CBE program would require significant time, training and resources to execute, including creating learning plans, assessing and reassessing of students, and incorporation of formative and summative assessment of competence. Such contributions from preceptors cannot be expected unless significant buy-in from institutional management is agreed upon. Moreover, considering institutional capacity and infrastructure prior to implementing a CBE program is critical to its success. Strategies to reduce burden when implementing such programs include capitalizing on existing programmatic infrastructure and modifying teaching methods to align with CBE and incorporate principles of ALT.[30] Supportive university infrastructure, such as a learning management system that can integrate assessment of competence with course grades and additional administrative support during the transition period to a CBE program is needed.[3]

This study may be limited by its central focus on a single program from the perceptions of students and preceptors, who reside within the same, well-resourced metropolitan area, and are involved with the same academic program. Faculty and administrative support were available to conduct the evaluation, which facilitated the work presented herein. Future research may consider a survey component to capitalize on key themes and capture quantitative descriptors of CBE program implementation, such as division of responsibilities among faculty and preceptors, or types of assessments being used to capture student progress within CBE programs.

IMPLICATIONS FOR DIETETIC EDUCATION

Though structure and methods of training healthcare practitioners change, the endpoint of training remains the same: preparation of entry-level clinicians. Data collected in this study elucidated facilitators and barriers of a graduate CBE program in the health profession of dietetics by exploring perceptions of faculty, preceptors, and students. Skill-based professions considering use of a CBE model should recognize a sizeable increase in administrative duties when transitioning from a traditional program. Furthermore, clear and effective communication strategies among program leadership during the process of implementation are paramount due to the complexity of the program and variety of stakeholders involved.

Although faculty members may not have formal training in CBE, they can leverage understanding of educational theory to facilitate successful implementation of this education model. ALT can be used in shaping CBE programs in dietetics, as many constructs between ALT and CBE parallel each other. Despite initial barriers, this study supports the use of CBE as an acceptable method for training RDNs. Further research may consider leveraging implementation science as a strategy for enhancing facilitation of transition from traditional program modalities to CBE programs, as implementation science offers both the study of methods and strategies of change implementation in an effort to accelerate integration of evidence-based interventions into a routine setting.[33]

CONFLICT OF INTEREST

Partial support to conduct the research was provided by an unrestricted grant from the Ohio Academy of Nutrition and Dietetics Special Projects Grant. The authors report no conflicts of interest.

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