

Competency-Based K–5 Science and Mathematics Teaching Endorsements at Valdosta State University

A CBE case study

This case study is part of a series on competency-based degree programs that have been emerging in recent years. The case studies are prepared by the Council for Adult and Experiential Learning (CAEL) with funding from Lumina Foundation.

AN OVERVIEW

Launched in the spring semester of 2016, the competency-based education (CBE) program at Valdosta State University (VSU) is the first of its kind in the state of Georgia. The University System of Georgia (USG) selected VSU as the system's pilot institution for the development and implementation of CBE programs.

The CBE program was developed by VSU's College of Education and Human Services, had support from the USG and the Georgia Department of Education (GaDOE), and benefitted from a collaboration with local school districts. The initial offerings of the CBE program are two post-baccalaureate teaching certification endorsements: one in science and another in math. The endorsements are designed for currently employed K–5 math and science teachers who hold a teaching certification and are interested in developing additional STEM teaching expertise. VSU began offering the pilot science program to a select number of teachers (10 total) from two nearby school districts—Valdosta City School District and Lowndes County School District—in spring of 2016. The math endorsement is expected to follow, with enrollments beginning in the spring 2017 semester.

Students are able to obtain each endorsement by completing 51 individual competencies that have been organized into 3 courses. Each competency consists of a number of self-paced,

PROGRAM SNAPSHOT

- Competency-based post-baccalaureate teaching endorsements in math and science
- Designed for currently employed, certified, K–5 math and science teachers interested in receiving additional training or expertise in math/science teaching
- Received a \$198,000 development grant from the Georgia Department of Education
- Partners are two local school districts: Valdosta City School District and Lowndes County School District
- 51 professional competencies organized into 3 courses, and grouped into a number of cross-course subject domains
- Each competency consists of a number of required and recommended project-based learning activities
- Competency mastery is determined through a final summative assessment; some competencies also require formative assessments
- Makes use of curated open educational resources (OER), which are available digitally through the university's learning management system, Desire2Learn (D2L)

JUMPSTART TRAINING AT VALDOSTA

VSU was an early participant in the Jumpstart program, offered through CAEL and funded by Lumina Foundation. The Jumpstart program offered a special one-day training for a broad group of faculty and staff at VSU in order to help develop a greater understanding of the various models and forms of CBE.

CAEL conducted the Jumpstart training at VSU in July 2014, at a point in the planning process when the development team was deciding whether they would continue to pursue developing a CBE program.

According to Scheffler, the training allowed the development team to receive feedback and validation about their planning process, instilling confidence that they were headed in the right direction. It also provided them with additional knowledge and resources to move development forward. According to Dr. Gerald Merwin, director of adult degree completion, without the training, they would not have gotten so far with the program, so fast. Finally, the recognition and validation brought by participating in Jumpstart aided the team in securing a vital development grant from the GaDOE.

project-based learning activities, which utilize open educational resources and are guided by both an instructional leader (who acts as subject matter expert) and an individualized student success coach. Students ultimately demonstrate their mastery of each competency through the completion of an actionable and authentic summative assessment. After successfully mastering all 51 competencies, students must submit a portfolio of their work across the entire program, which is reviewed for completion before receiving the endorsement.

BACKGROUND

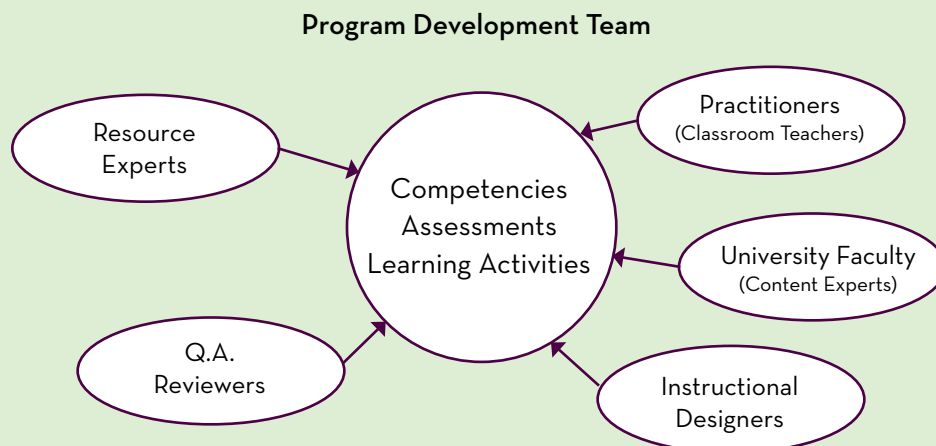
The development of the CBE program at VSU began when one of the Valdosta, Georgia, public school systems, the Valdosta City School District, approached the university about offering K-5 math and science teaching endorsement programs for their teachers. In addition to filling what was identified by the district as a high-need area of instruction, if a school's STEM teachers are "working toward" increased content knowledge in math or science—in addition to other programmatic criteria—that school can apply for the state's STEM School Certification, which then qualifies them to apply for additional

grant funding opportunities from the GaDOE (Georgia Department of Education, 2015). As a result, the district was heavily invested in the creation of quality endorsement programs at a local university.

At the same time, administrators and faculty within VSU, including Dr. Anthony Scheffler, interim vice president for academic affairs, had been discussing CBE and looking for opportunities to apply it in the development of a new program. The university had already garnered success in offering online education and saw CBE as a natural evolution in its ongoing search for new and innovative methods of educational delivery. In particular, the university was interested in programs that would address three primary considerations: accommodation of post-traditional students, particularly working adult learners; affordability; and the addition of educational value for students across the university. Scheffler and others saw CBE as an educational model that addresses all three.

University leaders soon determined that a math and science endorsements program would be a perfect place to begin implementing CBE at the institution for a number of reasons. First, initial enrollment could be relatively small and targeted towards a specific student profile. This

Figure 1. Valdosta State University CBE Program Development Team



(Courtesy of Dr. Sheryl Dasinger, Valdosta State University)

specificity would allow the university to develop an easily manageable pilot program in which the systems and processes necessary to implement CBE could be tested and worked out at a basic level before being scaled up to other programs. Second, the leaders believed that the curricular requirements for the credentials, as outlined by the Georgia Professional Standards Commission (GaPSC), would easily accommodate the project-based learning that faculty and administrators wanted at the core of instruction and assessment. Finally, because of the high demand and increased funding associated with employing STEM-certified teachers, the Valdosta City and Lowndes City schools offered to pay for their teachers to pursue the endorsements, removing many financial barriers to enrollment.

The GaDOE also provided an early grant of \$198,000 towards the development of the program. Because the program would not be degree-pursuing, would be offered only at the graduate level, and would largely be funded and paid for externally, there was less need for the program to be eligible for Title IV funding. This advantage allowed the team to bypass the additional process necessary to get the self-paced, competency-based program approved as a direct assessment program by the United States Department of Education's Office for Federal Student Aid.

DEVELOPING THE PROGRAM MODEL AND STRUCTURE

Planning for the program's development began with an intensive information gathering process in which Dr. Scheffler and other VSU administrators attended a number of CBE-focused conferences and workshops and spoke with colleagues at other universities that had already implemented CBE in some form. These other institutions included the University of Wisconsin's Flexible Option, Western Governors University, Southern New Hampshire University's College for America, and Northern Arizona University's Personalized Learning programs.

Following nearly half a year of planning, program development began in earnest in the fall semester of 2014. Spearheaded by Dr. Scheffler, a program development team convened and began major in-depth discussions about all aspects of the program. This team was also led by Dr. Sheryl Dasinger, an associate professor of education, who acted as the project manager throughout development. Team members included master teachers from the local school systems, faculty and administration from within the university's College of Education and Human Services, instructional designers, experts on open educational resources (OERs), and internal

experts on eLearning and technology solutions, such as the university's student information system (SIS), Banner, and its learning management system (LMS), Desire2Learn (D2L). In total, the development process lasted a full 12 months.

Utilizing a backwards design methodology, the team began program development by first outlining the program's structure and progression framework as well as identifying the specific competencies students would need to master (described below). Once the competencies for each endorsement had been identified, the team then worked to identify appropriate summative assessments that could be used to measure student mastery for each competency. Finally, the team worked to identify competency-specific learning activities, as well as open educational resources, that would address the required learning outcomes and assessment criteria identified for each. After developing the core content of the program, the team sought final approval of the program from the GaPSC, which accredits all teacher certification and endorsement programs.

Following this initial development phase, the team provided all aspects of the program design to internal and external independent quality assurance (QA) reviewers. The QA team, all of whom had extensive online teaching experience, reviewed each competency to ensure that its summative assessment would accurately and fully measure a student's mastery. Similarly, the QA team reviewed each competency's learning activities and resources to confirm that they were project based and that they would provide adequate instruction and learning opportunities. Members of the eLearning team also reviewed the competency and program designs to make sure they would mesh with the institution's LMS (D2L), which was itself redesigned (in a separate instance) to better accommodate the delivery and tracking of individual competencies.

Finally, the development team made any necessary final adjustments based on the feedback from this review process. Even in the current phase of implementation, however, this process of review, quality assurance, and re-development is ongoing; the team expects

to revisit and adjust the program competencies, activities, and assessments at the end of each semester. Scheffler, Dasinger, and the rest of the development team saw this continuous improvement process as a key feature of the university's CBE model.

BUILDING THE PROGRAM'S CONTENT

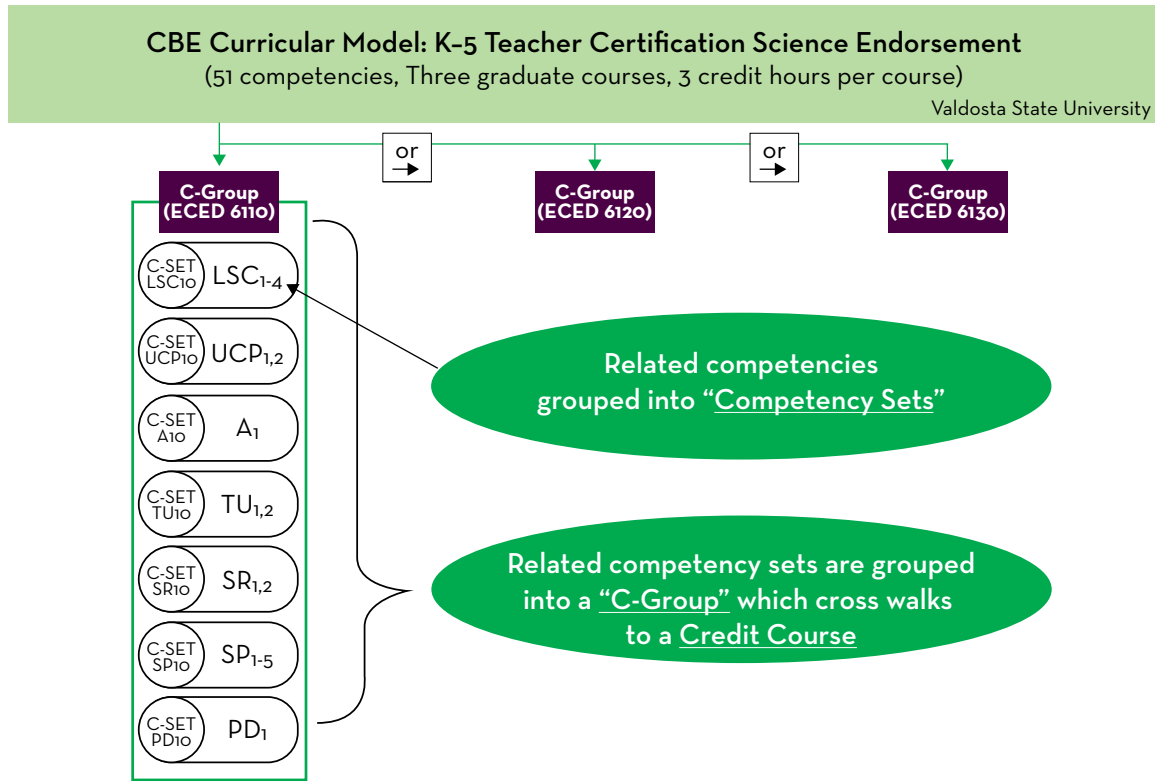
Competencies, Domains, and Groups

The fact that the guidelines and objectives for the math and science endorsements were already defined by the GaPSC aided the process of identifying competencies for the program. Drawing on these pre-identified objectives, as well as national standards outlined by the National Council of Teachers of Mathematics and the National Science Teachers Association, the faculty and master teachers eventually identified a total of 51 competencies that students are required to master in order to receive each endorsement.

The development team then grouped these competencies, based on their content, into 3 separate **Course Cross-walked Competency Groups (C3Gs)**, with between 14 and 17 competencies in each (see Figure 2). Each C3G is associated with an individual, credit-bearing course, and students progress through the program by working towards completion of one C3G at a time. While students may enroll in any of the C3Gs in any order, they must progress through the competencies within that C3G in a prescribed order. Although students may progress at their own pace, they are typically only allowed to complete work towards one competency at a time.

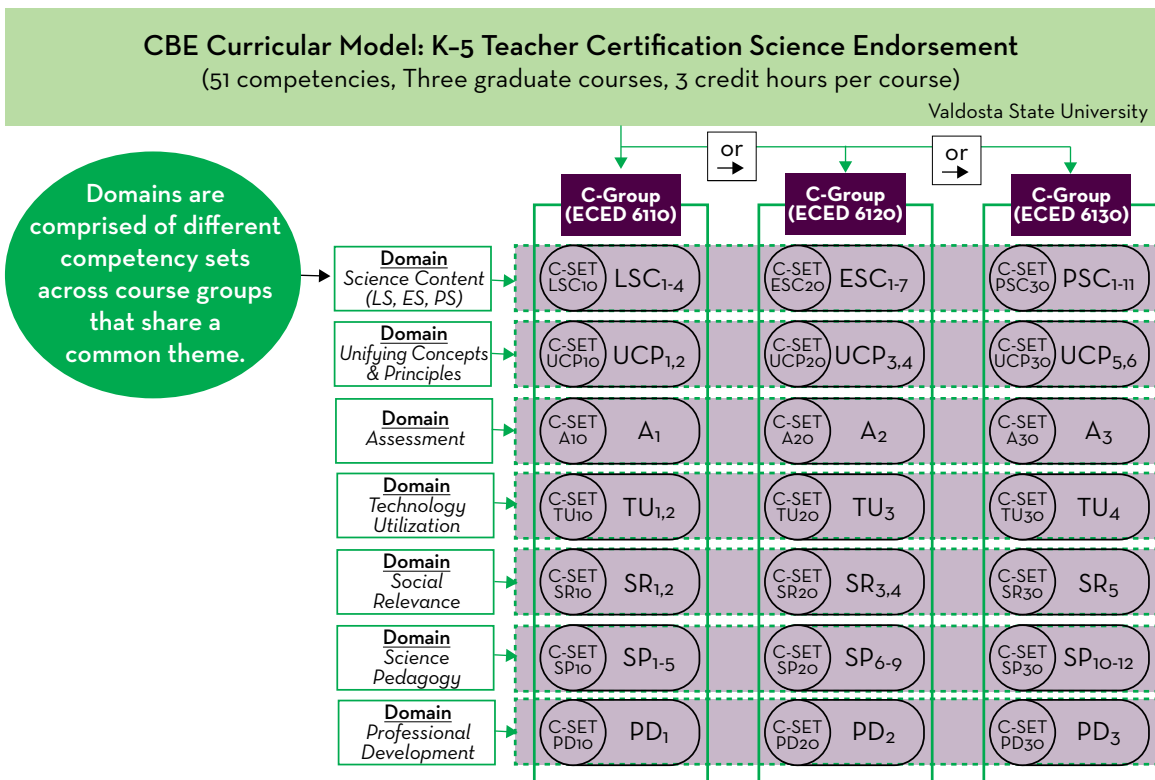
Multiple related competencies are grouped into **competency sets**, with several competency sets comprising each of the three courses. In addition, competency sets that share a common theme are grouped into seven **subject domains** that are represented across each of the three C3Gs (see Figure 3). According to Scheffler, grouping competencies according to domain will allow for the effective cross-disciplinary translation of competencies between programs

Figure 2. Valdosta State University CBE Curricular Model - Partial



(Courtesy of Dr. Anthony Scheffler, Valdosta State University)

Figure 3. Valdosta State University CBE Curricular Model - Full



(Courtesy of Dr. Anthony Scheffler, Valdosta State University)

when CBE is expanded within the university. Once the system is fully developed, if students complete a competency domain within one program, they will be able to receive credit for their mastery of the competency sets within that domain in another program with which the domain is shared.

Learning Activities and OER

Upon beginning a new competency, the student is provided with an introduction to the competency's learning content and, in some cases, an initial formative assessment to determine their level of existing knowledge and ability. Based on this introduction and initial assessment, the student is then presented with a series of learning activities that are either required or recommended in order for the student to master the learning content for that competency. These learning activities are self-paced and project based, requiring students to complete the activities in the context of actual classroom teaching (e.g., building and videotaping a lesson plan on classes of organisms). For this reason, "authentic residency," or current employment, as a math or science teacher is a required component of the program.

Due to their affordability and accessibility, the program also relies on open educational resources (OER) of various types (texts, video lectures, interactive quizzes, etc.) in order to provide additional learning content. The program development team carried out an extensive process of curation, ensuring that the resources chosen for the program were high quality. The team benefited in this process from a grant provided by the USG specifically for OER development. They also utilized local expertise around OER development; at the time, the university housed the state's leaders in OER. Along with experienced staff at the university library, these experts provided curation assistance as well as a number of valuable resources and tools, including a rubric for assessing OER quality. The team will be required to review and update the resources each semester to ensure their continued quality and access.

Assessments

Once students have completed all the various learning activities associated with a competency, they must demonstrate their mastery by completing a summative assessment. These assessments, like the learning activities, are project based, requiring the student to demonstrate his or her learning in the classroom teaching environment and in a variety of formats, such as the preparation and execution of lesson plans, presentations, or essays drawing on classroom experience.

TABLE 1.

Valdosta State University CBE Math and Science Endorsements: Assessment Levels

Mastery Level	Minimum Mastery	Letter Grade
Level IV - High Mastery	90%	A
Level III - Mastery	80%	B
Level II - Non-Mastery	-	-
Level I - Non-Mastery	-	-

Once a student completes an assessment, it is sent to an external assessor who scores the project according to a rubric of pre-defined criteria. Depending on the assessment's quality, it is scored at one of four levels (see Table 1). Because competency mastery is ultimately determined by a student's performance on the summative assessment, an assessment must meet the requirements for either level III or level IV mastery in order for the student to pass a particular competency; if students score lower (I or II), they must revise and re-submit their assessment to address the scorer's concerns.

This tiered system of scoring is intended to provide the student with as much feedback as possible regarding their level of knowledge and ability—if students score at a level I, they are aware that significantly more work is required to prove mastery than if the assessment had been scored at a level II. Identifying two separate levels of mastery—regular and high—also allows the university to assign letter grades to each

competency. However, only the average grade for all the competencies within a course, or C3G, is reflected on a student's transcript.

Once a student masters all the competencies in a particular C3G, the associated course's requirements are met, and the student is awarded credit for that course. After students complete all three C3Gs they must submit a final portfolio of their work. While the portfolio submission is not required to receive credit for individual courses, it is ultimately required in order to receive the endorsement.

FACULTY ROLES IN PROGRAM DEVELOPMENT AND IMPLEMENTATION

In addition to playing a key role in developing program content, faculty also fill two primary roles in the program's implementation: the **student success coach** and the **instructional leader**. The exact responsibilities of these roles are still being developed. In broad terms, however, student success coaches maintain an advisory relationship with individual students, guiding them through the process of completing competencies, while instructional leaders act as subject matter experts for specific sets of competencies. Because the scale of the program is still relatively small, one faculty member—Dr. Dasinger, who has been actively involved with the project since its early stages—is currently acting as the success coach while another qualified faculty member serves as the instructional leader. The full impact of these shifts in faculty roles has not yet been felt. According to Scheffler, Dasinger, and others on the development team, faculty have been enthusiastically engaged throughout the design and development process.

COST AND PRICING

As has been mentioned, the university was able to fund the cost of the program's development through grants from the GaDOE, and the Valdosta City and Lowndes County school districts cover their students' tuition and fees. As the program continues to grow and as CBE expands to other degree programs

across the university, the development team recognizes that another model will be required to cover these delivery costs. Scheffler and other university administrators are strongly considering a subscription period model for future CBE efforts while continuing to explore other fee and enrollment options.

STUDENT OUTREACH, ENROLLMENT, AND OUTCOMES

Due to the program's partnership with the Valdosta City and Lowndes County school systems, enrollment—at least in the pilot stage—is currently focused on specifically drawing K-5 math and science teachers employed at schools within these districts as the program's first cohorts of students. In fact, the university worked closely with the assistant superintendents in both systems to identify and handpick strong teachers who they thought would be the best fit for the type of learning CBE requires.

IS CBE AT VSU FOR YOU?

- Do you have adequate time to allocate to your educational goals?
- Can you devote time for uninterrupted study?
- Do you work well independently and are you self-motivated?
- Do you enjoy reading?
- Do you want a flexible schedule?
- Do you enjoy working on a computer?
- Are you organized?
- Do you communicate well through writing?
- Do you have a reliable computer and internet service?

Source: www.valdosta.edu/academics/yousucceed/about-cbe.php

Based on experience gained through the pilot program so far, the team has identified a few of the qualities they are looking for in potential CBE students: that they are self-motivated, self-directed, and highly independent learners; that they possess strong reading and writing skills, as so much of the program is conducted online; and that they have the time allowance and time management skills to study and complete activities amidst work and other full-time life commitments. As the program grows and begins seeking open enrollment, developers have begun designing a comprehensive onboarding process that will emphasize these qualities. The school's website for CBE programs also contains a brief self-assessment meant to encourage potential students to carefully analyze their own ability to self-motivate and learn independently (see the sidebar on the previous page for a sample of the types of questions VSU wants prospective CBE students to consider before enrolling).

Based on the experiences of the pilot students so far, the university expects that a majority of students will be able to complete all three courses in around two semesters, which is seen as typical for the working adults they serve.

RESEARCH, EVALUATION, AND FEEDBACK

The program has already received strong positive feedback from members of its initial cohort. While there have been a few students who have struggled to adapt to the format of CBE, most have reported benefitting a great deal from the program. Based on focus group conversations, students have been satisfied with the overall quality of the learning experience, particularly when compared with that of a typical lecture or class-based program.

The team sees these focus groups as an important component of the program's continuous improvement process and plans on using the feedback as one part of their reiterative process of evaluating and improving the program on a regular basis. They are also examining data from the program

to see if meaningful trends arise around student success and completion rates as well as how these trends may be related to the profiles and qualities of students prior to enrollment.

LESSONS FOR THE FIELD

In spite of this early positive feedback about the program, the team faced a number of challenges in successfully developing and implementing the program. In building solutions to these challenges, the team has gleaned a number of lessons that have been useful as they work to refine and improve the program and that may benefit other institutions seeking to develop CBE programs. Among these lessons are the following:

1. **Engage key stakeholders and secure their buy-in early on.** Engaging key stakeholders from across the university—particularly faculty—and securing their support for the initiative took more time and resources than initially anticipated. This challenge highlighted the importance of getting all the right people at the table as early in the development process as possible. The development team also recognized that it is critical to use this outreach and engagement process in order to gain a full understanding of what the institution wants to get out of CBE, so as to build the most effective program possible.
2. **Identify alternative ways to grow staffing capacity during development.** The team benefitted from receiving outside grants, which helped fund alternative means of program development. While the faculty and staff on the development team managed to carve out the necessary time from their own workloads to meet and collaborate around the project, they were also able to utilize contract workers, outside consultants, and graduate assistants in order to complete some of the necessary work. This expanded

collaboration also allowed them to benefit from the perspectives of people outside the institution when building the program.

3. **Outline a strategy for effective project and team management.** With the development team including not just faculty and staff from across the university but outside contractors, vendors, and consultants, the team also thought regularly about how to function most effectively as a group. Because the development process was designed to be as collaborative as possible, a number of individuals would be working on designing and refining a single competency or assessment at any one time; as a result, the team took longer to make some decisions than desired. In the future, the university plans on building a process whereby one subject matter expert (SME) or faculty designer will be assigned to each instructional designer in order to focus on developing a specific program component, which will then be later reviewed by the larger group.
4. **Create a flexible system for tracking and managing student progress.** The development team also found that managing and tracking the progress of students who are all working through the program at different paces requires paying greater attention to how students move through the program as well as some flexibility in how this mobility is structured. In an attempt to manage student progression, and prevent students from outpacing their readiness and learning, the program was initially designed to only allow students to complete competencies in a prescribed order—one at a time. While this structured progression has been beneficial in allowing the student success coach and instructional leader to more easily track

student advancement, current students have indicated a desire to progress more rapidly than is currently allowed. As a result, the program was changed so that if the success coach and instructional leaders see that the student is doing well and progressing rapidly, more than one competency will be open to the student at one time.

NEXT STEPS

Once VSU has assessed the success of the pilot program, the university's next step for CBE includes integrating it into a full degree program. Eventually, the university would like to see CBE expand into a number of undergraduate and graduate programs across the university. In the meantime, Scheffler and the rest of the development team have been working to regularly inform faculty and staff outside of the College of Education and Human Services about their efforts through presentations and workshops. Administrators from at least two other programs—foreign languages and nursing—have already approached Scheffler expressing interest in implementing their own CBE programs. The university has also begun working with a local employer who is interested in developing an industry-focused post-baccalaureate certification in a CBE format.

As noted previously, the development team planned from the start for this kind of expansion throughout the university. For example, the team structured the grouping of competencies into cross-disciplinary domains so that there might be greater seamlessness and transferability between programs. This planning for a larger scale CBE roll-out is something that distinguishes the Valdosta CBE approach, and it may serve as an important model for other institutions to consider as they plan their own CBE initiatives.

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- **Lynn Minor, Ed.D.**—Interim Dean of the College of Education & Human Services
- **Sheryl Dasinger, Ph.D.**—Former Project Manager and Current Success Coach, Science and Mathematics Endorsement Program for K-5 Teachers; Associate Professor, College of Education & Human Services
- **Kathy Sundin**—Online Communications Coordinator, Center for eLearning
- **Vincent Spezzo**—Senior Online Instructional Designer, Center for eLearning
- **Mimi Wetherington, Ed.D.**—Instructional Leader, Science and Mathematics Endorsement Program for K-5 Teachers

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