

Competency-Based Education via the DACUM and SCID Process: An Overview

by Robert E. Norton

The Center on Education and Training for Employment (CETE) uses a curriculum development process involving DACUM (Developing A Curriculum) and SCID (Systematic Curriculum and Instructional Development) that has worked extremely well with many colleges, companies, and national as well as international organizations. See figure 1 for the nine components that make up the DACUM and SCID process flow.

The curriculum development process begins with a **Needs Analysis**, also called a needs assessment, which can be conducted in different ways. In a college setting, the goal of needs analysis is to identify which occupational areas have enough employment opportunities and will attract enough students to justify an instructional program. Several factors enter into this analysis, such as salary levels and required skill levels in the occupation and whether the instructional program should be offered at the secondary or postsecondary level.

In an industry or business setting, the focus is more likely to be on identifying training that can be done and that will be most beneficial to employees and to the company. This will likely involve consulting with supervisors and managers as well as looking for training implications in data on the quantity and quality of products or services, worker safety records, new equipment, new work processes, or other factors.

In most cases, the next component of the curriculum development process is **Job/Occupational Analysis**. The difference between job and occupational analysis is that in a company setting, the focus of analysis is a single job, whereas in most community college situations the focus is on an occupational area consisting of several closely related jobs. Job/occupational analysis involves finding out what should be taught to students or worker trainees. CETE has consistently found that the DACUM job analysis process is an excellent option. In the DACUM process, expert workers in the occupation are guided by a trained facilitator in a 2-day workshop to identify the duties and tasks (competencies) of the occupation, along with the supportive enablers such as knowledge and skills, tools and equipment, and worker behaviors.

The duties, tasks, and supportive enablers identified in the DACUM process provide a solid foundation for any college course or company training program. In addition, involving expert workers from the company or from the larger community generates strong support and buy-in from those

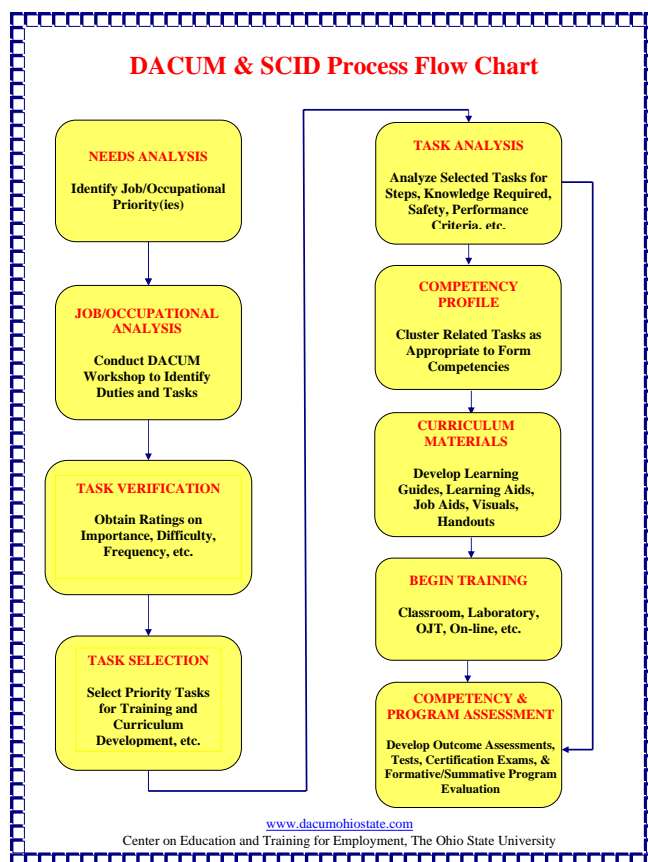


Figure 1

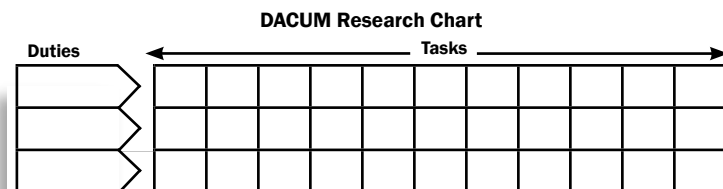


Figure 2

stakeholders. The DACUM process can be used to analyze jobs or occupations at all levels, from semiskilled workers to skilled technicians to managers and professionals. For an illustration of the format of a partial DACUM chart, see figure 2.

In addition to the 2-day DACUM job/occupational analysis workshops, CETE has extensive experience training individuals to serve as DACUM facilitators within their own college or company. CETE has conducted DACUM facilitator training institutes for schools, colleges, companies, and a variety of other organizations both in the U.S. and internationally. To date, 26 other countries have hosted DACUM facilitator training institutes. In

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Project KNOTtT (Kansas, Nevada, Ohio, & Texas Transition to Teaching) Activities

Brad Henry, Project KNOTtT Graduate Research Associate, College of Education and Human Ecology, co-presented at the Digital Media in a Social World Conference, which was held February 18, 2009 at The Ohio State University. Henry and Laura Fathauer, also from the College of Education and Human Ecology, provided a brief introduction to the concepts of SCORM and a demonstration of SCORM development tools.

At the Association of Teacher Educators (ATE) conference held February 2009 in Dallas, **Rebecca Parker** led the Classroom Improvements Workshop, which focused on how to manage a classroom effectively, build relationships with students, engage all students, and help students to grasp concepts. The workshop was co-sponsored by ATE, NAAC (National Association for Alternative Certification), and Project KNOTtT.

Also at the ATE conference, **Belinda Gimbert**, Project KNOTtT director, and **David Fultz**, Project KNOTtT Graduate Research Associate, College of Education and Human Ecology, presented *Quality Leaders and Effective Leadership for Beginning Teachers' Development*. The presentation focused on the ways in which principals influence novice teachers' successful enculturation and retention in the teaching profession.

Belinda Gimbert, along with KNOTtT partners Becky Washington, Education Service Center, Region 13, Texas; Judie Hayes, Wichita State University; Martha Young, University of Nevada, Las Vegas; Nell Ingram, Dallas Independent School District; and Judy Corcillo, National Association for Alternative Certification (NAAC); presented on the status of NAAC quality indicators for nontraditional teacher preparation programs. The quality indicators are being developed to bring rigor to the concept of alternative teacher preparation to enable it to fulfill its potential. The presentation was made at the ATE conference in February.

Improving the Quality of School-University Partnership and School-Based Teacher Preparation Programs in Kansas, Nevada, Ohio, and Texas was presented at the National Association for Alternative Certification (NAAC) 2009 Conference held January 29-31 in San Antonio, Texas. Presenters included Judith Hayes, Wichita State University; Martha Young, University of Nevada, Las Vegas; Deborah Bingham Catri, Ohio University; Michelle Reed, Wright State University; **Belinda Gimbert**, The Ohio State University; Nell Williams Ingram, Dallas Independent School District; Judy Corcillo, NAAC, Washington,

DC; and Becky Washington, Education Service Center, Region 13, Texas. The presentation focused on Project KNOTtT's multistate collaborative effort to create and sustain a network by building capacity among universities, schools, state department of education, corporations and businesses, and nonprofit organizations to support the preparation of teachers in both school-university partnership and school-based programs.

Another presentation at the NAAC 2009 Conference was *REAL e-Test Preparation Tutorials and e-Coaching to Equip Educators for Success on High Stakes Tests*. The presenters included **Maria Hruby Moore**, **Belinda Gimbert**, and **Rebecca Parker**, Project KNOTtT, The Ohio State University; Jean Stevens, Project KNOTtT Subject-Matter Praxis Expert and e-Coach for e-Math; Casaundra Ensley (Lisa Ontiveros), Subject Matter TExES Experts and e-Coach for e-Math, Dallas Independent School District; and Michelle Reed, KNOTtT Partner/Principal Investigator, Wright State University.

Belinda Gimbert, Project KNOTtT, College of Education and Human Ecology, The Ohio State University, and Becky Washington, Education Service Center, Region 13, Texas, reported on the status of the NAAC task force to develop quality indicators for nontraditional teacher preparation programs. The quality indicators are descriptive, qualitative measures of quality that are intended to be used to describe individual program components that are unique to the process of nontraditional teacher preparation. These indicators are being developed in response to a need to demonstrate NAAC's efforts to assure the public that nontraditional teacher preparation programs can produce quality teachers for the classroom. The presentation was made at the NAAC 2009 Conference, held January 29-31, in San Antonio, Texas.

Project KNOTtT was mentioned in *Campus Technology* (<http://campustechnology.com>) as one of two educational organizations piloting application integration between Moodlerooms and Google Apps Education Edition. Project KNOTtT is using Moodle for the LMS learning environment and Google Apps to integrate the Moodle environment as well as collaborations between schools and universities in four states. The Google application environment is being used in a "cloud computing" cross-collaborative environment allowing the ease of scheduling, document creation, tracking and assisting to streamline daily operations among the organizations. *Campus Technology* is a higher education technology magazine that provides updated information about advanced networking for the campus enterprise.

Update: Stackable Certificates and ABLÉ Programs

The fall Centergram (<http://cete.org/centergram/centergramFall2008.mht>) included information about Ohio's efforts to create a system of Stackable Certificates for adult students as they continue along a path of lifelong learning. This Ohio Board of Regents initiative fosters student transitions within Adult Basic and Literacy Education (ABLE) and between ABLE and postsecondary education. Because of its expertise in standards development and validation, the ABLE Evaluation and Design Project at the Center on Education and Training for Employment (CETE) has been closely involved in competency alignment activities for the Stackable Certificates.

So where is Ohio now in the development, verification, and piloting of the Stackable Certificates?

Basic and Advanced Pre-College Certificates: CETE, along with the Ohio Resource Center, facilitated the development, verification, and finalization of the academic content establishing math, reading, and writing competencies necessary for achievement of the Basic and Advanced Certificates. In addition, ABLE programs and postsecondary partners are identifying and designing curriculum, materials, assessments, and procedures to support the implementation of the Stackable Certificates. ABLE and postsecondary education programs are jointly field testing the Stackable Certificates in Ohio's 12 Economic Development Regions.

Oral Communication Pre-College Certificate: In conjunction with the Northeast ABLE Resource Center, CETE managed the development of competencies for English for Speakers of Other Languages (ESOL). Inputs to this work included Ohio's ESOL standards and College Readiness Expectations for Oral Communication, as well as, state and national standards and assessment competencies. Currently, ESOL practitioners are taking part in a verification survey to determine the leveling, measurability, and importance of the competencies. Using the survey results, an expert panel will finalize the Oral Communication Certificate content descriptors.

As Ohio moves forward with the Stackable Certificates, this transitions initiative will continue to evolve. An important next step will be the development of the College- and Work-Ready Certificate academic content. Work in this area will include identifying and validating competencies for study and critical thinking skills, math, English, and information technology foundations. In line with the state agenda, ABLE and its postsecondary partners will strengthen the University System of Ohio, making education more accessible and achievements more viable for Ohio's adult learners.

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total, persons from 45 countries have participated in CETE's DACUM facilitator training.

In the third component of the curriculum development process, **Task Verification**, CETE verifies selected aspects of each task identified in the DACUM process. Is the task actually performed in the job or occupation? How important is the task? How difficult is it to learn to perform the task? How frequently is the task performed? Task verification data are collected through paper or web-based surveys of other expert workers and, sometimes, the immediate supervisors of those workers. Data are statistically analyzed and become a basis for decisions about which tasks should be taught and which should not. The data are also valuable for creating test blueprints.

Task verification can involve as few as 25 expert workers or supervisors responding to a survey—or as many as thousands. Seeking input and involvement from expert workers and supervisors builds further support and buy-in from the local occupational community. Through task verification, many more workers and companies become aware that the college is updating an existing instructional program or creating a new one. All in all, task verification not only provides critical decision-making data; it's also good public relations.

In the next component of the curriculum development process, **Task Selection**, data gathered during task verification are used to select tasks for instruction. Instruction would typically not be provided for a task that is of low importance or of low difficulty or that is performed by very few workers *unless there is a compelling reason to provide instruction*—for example, the task is a new one that workers have not yet been trained to perform. CETE's experience has been that if a task is performed by fewer than 25 percent of workers, it should be set aside, as the return on investment for training on such a task will be quite low. Usually, task selection decisions should be made by a team of qualified persons; in a college, for example, a team could include the department chair, an instructor, a curriculum specialist, and a member of the DACUM panel.

The next component of the curriculum development process is to conduct **Task Analysis**. Whether in a college or a company, instructors need more information (unless they have had recent personal experience) on the tasks selected for instruction: the steps of the task, the tools and equipment needed, the knowledge and skills required, safety concerns, relevant worker behaviors, decisions the worker must make, and the criteria used by industry to judge the adequacy of performance.

CETE recommends that ideally, all tasks should be analyzed. However, there may be limitations to task analysis in prac-

tice. Companies usually want every important task analyzed. Company managers often say that they want to capture the intellectual capital of current workers before they leave or retire. Colleges, on the other hand, often feel that instructors are responsible for personally conducting task analysis or for bringing in guest speakers on tasks they are not familiar with. A thorough analysis of a single task with many steps can take an hour or more, so limited availability of expert workers from industry and limited time available to instructors can make task analysis difficult.

Next, an instructional **Competency Profile** is established using good professional judgment. CETE recommends examining the results of task analysis carefully to see which tasks require similar knowledge and worker behaviors. Often, there are multiple tasks in the occupation that require basically the same knowledge, although the knowledge may be applied differently. For instruction, it often makes a lot of sense to cluster such tasks together and write a new competency statement that encompasses all of the clustered tasks.

CETE likes to point out that not all tasks are of the same size or importance; some tasks are so significant that they deserve to be an instructional competency all by themselves. In many cases, however, if like tasks are clustered into a single competency, students or employees do not have to read the same information two or three times—or more. The necessary information can be supplied once in a single learning guide or module, and learners can spend time practicing and demonstrating the skills involved.

With task analysis completed and detailed, step-by-step information gathered, competency-based **Curriculum Materials** can now be developed. Many types of competency-based materials can be developed, including learner-centered learning guides, learning aids, handbooks, handouts, and job aids or instructor lesson plans—to mention just a few. Time, resources, instructor preferences, and institutional preferences are some of the factors that determine which materials are developed. Most of the trainees CETE has worked with prefer to develop learning guides designed for learners to use at their own pace. CETE feels that although learning guides take skill and time to develop, they have many advantages.

Learning guides consist of a performance objective and two or more enabling objectives. For each enabling objective, a learning experience with multiple, carefully selected activities is developed. Each learning experience contains a Self-Check and Model Answers and/or a Practice Exercise. Upon completion of all learning experiences, the learner must demonstrate his or her skill; the instructor uses the performance criteria in the learning guide's Performance Test to evaluate the learner's performance. If the learner does not demonstrate competency in the Performance Test, the instructor guides

him or her to more practice or other activities until competency is achieved. A knowledge test may also be administered, if desired.

Once competency-based curriculum materials have been developed, it's time to **Begin Training**—assuming you've recruited students, provided the necessary facilities, hired a qualified instructor, and so on. The instructor has three very important roles: advise students, assist students, and assess student progress. Instruction may be delivered in a classroom, in a laboratory, online, or through on-the-job training. Often, instruction is delivered in a blended approach using two or three different methods.

Administrators, other stakeholders, and learners may need to be oriented to learning guides or modules if they are being used for the first time. It may be a challenge for instructors to develop high-quality, learner-centered, competency-based materials, but CETE has identified many advantages of learning guides:

- They allow learners to work at their own pace.
- They free the instructor from lesson planning and lecturing.
- The instructor or trainer becomes a facilitator of learning.
- Instructional content is standardized for all students.
- The instructor has more time to work with individuals and small groups of students.
- The learner always has an opportunity to practice the skill before demonstrating that he or she has achieved the competency.

The last component of the curriculum development process, **Competency and Program Assessment**, is often given only minimal attention but is essential to the assessment of program outcomes and to program improvement. A Performance Test at the end of each learning guide assesses the learner's skill in the tasks covered by that learning guide. In overall competency assessment, however, the learner's skill is assessed across many competencies for many purposes such as course grading, worker promotion, worker performance, certification, and credentialing. It is important to note here that the DACUM analysis coupled with task analysis and task verification can provide a legally defensible basis for higher stakes competency assessments used in certification or employment situations.

During the course of instruction, program formative evaluation data should also be collected on how well the instructional program is working. If some elements of the program are not working well, in-course corrections should be made as soon as possible. At the end of each cycle of the instructional program, summative evaluation should also determine learner completion rates, learner satisfaction, instructor reactions, cost per student, and other data that can indicate needed

DACUM Research Chart Bank

For a complete listing of over 350 DACUM charts go to our website at www.dacumohiostate.com. The following partial list includes DACUM Charts that were completed during the 2008 calendar year. Individual charts can be purchased for \$30 per copy (U.S. funds). Charts are sent electronically. For more information on ordering, contact Debbie Weaver at weaver.22@osu.edu or 614/292-9934.

- √ Business Management (Central Ohio Technical College), 2008
- √ Church Administrator, 2008
- √ Church Facility Manager, 2008
- √ Clinical Research Coordinator, 2008
- √ College Secretary, (Community College of Beaver County), 2008
- √ Electrical/Instrumentation Technician (Glatfelter), 2008
- √ Firefighter, 2008
- √ HR Generalist, (Community College of Beaver County), 2008
- √ House Painter (INBAS, Moldova), 2008
- √ IT Business Analyst, 2008
- √ Medical Biller (Community College of Beaver County), 2008
- √ Mid-Level Manager, 2008
- √ Network Administrator (Columbus State Community College), 2008
- √ Office Associate, 2001, 2008
- √ Technical Training Instructor, 2008
- √ Tractor Operator (INBAS, Moldova), 2008
- √ Training Group Manager, 2008
- √ Warehouseman, 2008
- √ Wastewater Collection Class 1, 2008
- √ Water Distribution System Operator (Ohio EPA), 2008
- √ Water Operator, Class A (Ohio EPA), 2008
- √ Water Operator, Class I & II (Ohio EPA), 2008
- √ Web Developer (Columbus State Community College), 2008

program improvements and provide for program accountability. For questions about DACUM or SCID, contact Bob Norton at norton.1@osu.edu or 614/292-8481; or John Moser at moser.120@osu.edu or 614/247-7989.

References

- Norton, R. E., & Moser, J. (2008). *DACUM handbook* (3rd ed.). Columbus, OH: Center on Education and Training for Employment, The Ohio State University.
- Norton, R. E., & Moser, J. (2007). *SCID handbook* (7th ed.). Columbus, OH: Center on Education and Training for Employment, The Ohio State University.

Ron Jacobs Conducts S-OJT Project with a Honda Supplier

Ronald L. Jacobs, professor of Workforce Development and Education, received a contract to implement a structured on-the-job training (S-OJT) system for warehouse associates at Midwest Express Incorporated, Marysville, Ohio. The project represents a partnership with Clark State Community College and the Ohio Department of Development. Midwest Express provides dedicated warehouse services to the assembly areas of Honda Manufacturing.

Ron has partnered with Clark State Community College on several projects through CETE to support the implementation of S-OJT in Ohio manufacturing and production companies. S-OJT is the planned process of having experienced employees train novice employees in the actual work setting, and has emerged as one of the most frequently used training approaches used in organizations. Several WDE Ph.D. students have been supported by these projects. For more information on structured on-the-job training, contact Ronald Jacobs at jacobs.3@osu.edu or at 614/292-9943.

Events

Test Development Workshop

July 15-17, 2009 or October 14-16, 2009, 8:30am-4:30pm, hosted by CETE, Columbus, OH; \$1,100

Constructing valid, reliable assessments of job-specific knowledge and skills is critical to effective human resource practice. This workshop provides participants with practical knowledge and skills to understand the creation of valid, reliable, and legally defensible assessments. For information, contact Kathy Summerfield, summerfield.1@osu.edu or 614/688-4000, or Jim Austin, austin.38@osu.edu or 614/292-9897.

DACUM/SCID

DACUM (Developing a Curriculum) Institute, June 8-12, 2009, August 3-7, 2009, September 21-25, 2009, or November 2-6, 2009, 8am-5pm, hosted by CETE, Columbus, OH; \$1,395

SCID (Systematic Curriculum and Instructional Development), June 15-19, 2009, August 10-14, 2009, September 28-October 2, 2009, or December 14-18, 2009, 8am-5pm, hosted by CETE, Columbus, OH; \$1,195

For information, contact Robert Norton, norton.1@osu.edu; John Moser, moser.120@osu.edu; Debbie Weaver, weaver.22@osu.edu; www.dacumohiostate.com.

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