Game change: The theory, practice, and possibilities of competency-based education

October 12, 2016
WCET Annual Meeting
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Higher Education Research and Policy
Agenda

Theory

Practice

What will it take?

Questions and Discussions

Resources
In theory
In theory . . .

“Transitioning away from seat time, in favor of a structure that creates **flexibility**, allows students to progress as they **demonstrate mastery** of academic content, **regardless of time, place, or pace** of learning. Competency-based strategies provide flexibility in the way that credit can be earned or awarded, and provide students with **personalized learning** opportunities.”

U.S. Dept. of Education
## Theory that aligns with CBE

<table>
<thead>
<tr>
<th>The instruction paradigm</th>
<th>The learning paradigm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provide/deliver instruction</td>
<td>Produce learning</td>
</tr>
<tr>
<td>Transfer knowledge from faculty to students</td>
<td>Elicit learner discovery and construction of knowledge</td>
</tr>
<tr>
<td>Time held constant; learning varies</td>
<td>Learning held constant; time varies</td>
</tr>
<tr>
<td>Classes start/end at same time</td>
<td>Environment is ready when learner is</td>
</tr>
<tr>
<td>Covering material</td>
<td>Specified learning results</td>
</tr>
<tr>
<td>End of course assessment</td>
<td>Pre/during/post assessments</td>
</tr>
<tr>
<td>Degree equals accumulated credit hours</td>
<td>Degree equals demonstrated knowledge and skills</td>
</tr>
</tbody>
</table>

*Note: Adapted from “From Teaching to Learning – A New Paradigm for Undergraduate Education” by Robert B. Barr and John Tagg, 1995, Change*
Drive towards andragogy

The instruction paradigm
- Provide/deliver instruction
- Transfer knowledge from faculty to students
- Time held constant; learning varies
- Classes start/end at same time
- Covering material
- End of course assessment
- Degree equals accumulated credit hours

Pedagogy
- Teacher-dependent
- Purpose broad
- Externally motivated
- Relevance independent

The learning paradigm
- Produce learning
- Elicit learner discovery and construction of knowledge
- Learning held constant; time varies
- Environment is ready when learner is
- Specified learning results
- Pre/during/post assessments
- Degree equals demonstrated knowledge and skills

Andragogy
- Self-directed
- Purpose-oriented
- Internally motivated
- Relevance dependent
Learning content visibility

MAJOR COURSE LEARNING OBJECTIVES: Upon successful completion of this course the student will be expected to:

• Describe the differences between relational and hierarchical databases.

• Describe the general organization of a relational database and explain the functions of the basic relational operators.

• Given a list of data elements, code the data description specifications and create the physical files.

• Apply normalization techniques.

• Explain how choices made in defining and creating database files affect disk space requirements and computer performance.

• Plan, design, create and modify a database.

• Document a database.

• Create database objects using SQL commands.

• Retrieve and manipulate data using SQL commands.

• Identify data integrity and security requirements.

• Discuss the meaning and use of BIG Data, data warehousing, and data mining.

<table>
<thead>
<tr>
<th>Competency Name</th>
<th>Competency Definition</th>
<th>Subcompetency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge of database purpose and structure</td>
<td>Identifies, defines, of describes the types and nature of databases in a business setting</td>
<td>Relational database</td>
</tr>
<tr>
<td>Knowledge of database technology</td>
<td>Understands and applies technology of database usage</td>
<td>Hierarchical database</td>
</tr>
<tr>
<td>Analysis of database interference with technology</td>
<td>Analyzes the impact of database size and performance on technology</td>
<td>Relational operators</td>
</tr>
<tr>
<td>Application of database operations</td>
<td>Understands and applies the processes of creating and maintaining databases</td>
<td>Data elements</td>
</tr>
<tr>
<td>Application of database content</td>
<td>Evaluates data needed to inform decision-making in a business setting</td>
<td>Data specifications</td>
</tr>
<tr>
<td></td>
<td>Data creation</td>
<td>Database administration</td>
</tr>
<tr>
<td></td>
<td>Table query</td>
<td>Database design methodology</td>
</tr>
<tr>
<td></td>
<td>Forms and subforms</td>
<td>Database design normalization</td>
</tr>
<tr>
<td></td>
<td>Reporting</td>
<td>Database back-up</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Database recover</td>
</tr>
</tbody>
</table>
Learner progress visibility

Goal Performance: Olivia Hafez

This dashboard calculates your performance on all assessments as they relate to broader goals. Results are calculated for the highest goal, but you can select each smaller goal to learn more about it. You can also see which courses were included in the goal assessment.
Personalization through self-pacing and coaching

Challenge assessment demonstrates mastery

< X%

Engage with content

Formative assessments give feedback

X%

Summative assessment demonstrates mastery

Credit
In practice
Shift in delivery

Traditional

Blended
Course based
Self-paced
Modularized
Direct Assessment
Shift in curricular framework

Major Course Learning Objectives
Upon successful completion of this course the student will be expected to:

1. **Describe** the differences between relational and hierarchical databases
2. **Describe** the general organization of a relational database and explain the functions of the basic relational operators
3. **Given a list of data elements, code** the data description specifications and create the physical files
4. **Apply** normalization techniques
5. **Explain** how choices made in defining and creating database files affect disk space requirements and computer performance
6. **Plan, design, create and modify** a database
7. **Document** a database
8. **Create** database objects using SQL commands
9. **Retrieve** and manipulate data using SQL commands
10. **Identify** data integrity and security requirements
11. **Discuss** the meaning and use of BIG Data, data warehousing, and data mining

Course Content
Topical areas of study include:

- Creating and managing data
- Multiple table queries
- Developing forms and sub-forms
- Complex reports
- Introduction to Database Management
- Database Administration
- Database Design Methodology
- Database Design Normalization
- Database backup and recovery
- Database administration and security
- ANSI Standard Structured query language (SQL)

<table>
<thead>
<tr>
<th>Competency Name/Definition</th>
<th>Subcompetency</th>
</tr>
</thead>
</table>
| Knowledge of database purpose and structure | • Relational database  
  *Identifies, defines or describes the types and nature of databases in a business setting*  
  • Hierarchical database  
  • Relational operators  
  • Data elements  
  • Data specifications |
| Knowledge of database terminology | • Database Manipulation Language  
  *Understands and applies the terminology of database usage*  
  • Database Definition Language  
  • Database Control Language  
  • DBMS Functions  
  • ANSI Std. Str. query Language |
| Analysis of database interface with technology | • Disk space requirements  
  *Analyzes the impact of database size and performance on technology*  
  • Computer performance  
  • Database objects  
  • Data integrity  
  • Data security requirements |
| Application of database operations | • Database Administration  
  *Applies the processes of creating and maintaining databases*  
  • Database Design Methodology  
  • Database Design Normalization  
  • Database back-up  
  • Database recovery |
| Evaluation of database content | • Data creation  
  *Evaluates data needed to inform decision-making in a business setting*  
  • Table query  
  • Forms and subforms  
  • Reporting |
Shifts in assessment practice

<table>
<thead>
<tr>
<th>Competency Name/Description</th>
<th>Subcompetency Description</th>
<th>Assessed</th>
<th>Formative Assessment</th>
<th>Summative Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analysis and classification of disease factors</td>
<td>Analysis of proximal pro-inflammatory factors</td>
<td>A. ______ is a condition that results when a person ingests a substance.</td>
<td>Effectively analyzes patient behaviors and identifies proximal pro-inflammatory factors including: smoking, diet, inactivity, obesity, alcohol/drugs, pollution.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Analysis of medial pro-inflammatory factors</td>
<td>A. Which of the following is NOT true?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Analysis of distal pro-inflammatory factors</td>
<td>A. About ____ of the adult American population smokes tobacco.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>A. Which of the following statements is NOT true?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>A. True or False: Most of the people who have an alcohol addiction, seek...</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>A. Excessive alcohol use increases the risk of _____.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>A. If you are working with someone as a wellness coach, and they start to...</td>
<td>Effectively analyzes patient behaviors and identifies medial pro-inflammatory factors including: stress, anxiety, depression, social or peer pressure, psychological factors, occupation, boredom, technology, genetics.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>A. What are some lifestyle behaviors that often worsen anxiety?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>A. One of the best lifestyle behaviors to help mental health is _______.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>C. The local ______ is often a good source of information regarding...</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>C. ______ is a chemical often used in plastic water bottles, that appears to ...</td>
<td>Effectively analyzes patient behaviors and identifies distal pro-inflammatory factors including: industrialization, modernity, economic growth.</td>
<td></td>
</tr>
</tbody>
</table>
Shift in faculty roles and practice

Professor

Coach/mentor
Subject matter expert
Assessment developer
Grader
Shift in faculty roles

Faculty and coach needs
• Has the student logged into the course?
• How is the student performing on formative assessments?
• Is the student spending adequate time on task in the course?
• How is the student progressing through the summative assessments?
• How is the student progressing through the program?
• What additional help does the student need?
• How can I work with the student to improve their success?

Student needs
• How did I perform on the formative assessment?
• What areas do I need to brush up on in order to be ready for the summative assessment?
• How far along am I in the formative assessments?
• How far along am I in the summative assessments?
• How far along am I in the program? How many competencies have I completed, and how many do I have left?
• How many times have I taken the summative assessment?
• What tool do I use to engage with my coach or faculty?
Shift in technology

LMS

Goal Performance Dashboard
Retention Center and Analytics
Portfolio
Tests, Rubrics
Blackboard Collaborate
xPlor, Publisher Integrations
Blackboard Achievements
Goals Management Infrastructure
Shift in use of assessment technology

Learning Unit 1 (or course)

- Competency 1
  - Sub-competency A
  - Rubric rows
  - Test items

- Sub-competency B
  - Rubric rows
  - Test items

- Sub-competency C
  - Rubric rows
  - Test items

Learning Unit 2 (or course)

- Competency 1
  - Sub-competency D
  - Rubric rows
  - Test items

- Competency 2
  - Sub-competency E
  - Rubric rows
  - Test items
What will it take?
Beyond the course . . .

CBE impacts every section of an institution

Institutional Resources

Student-facing institutional services impacted by CBE

- Faculty
- Bursar’s Office
- Advising

Non-student-facing institutional services impacted by CBE

- Financial Aid
- Registrar’s Office
- Enrollment Management
- Instructional Design
- Academic Support
- Institutional Research
- Instructional Technology
- Student-facing institutional services
- Non-student-facing institutional services

institutional services
impacted by CBE

impacted by CBE
## Comprehensive approach to CBE

<table>
<thead>
<tr>
<th>Planning</th>
<th>Preparing</th>
<th>Orienting</th>
<th>Delivering</th>
<th>Supporting</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Academic program demand</td>
<td>• Regulatory authorization</td>
<td>• Faculty and staff ownership</td>
<td>• Learning module design</td>
<td>• Academic support services</td>
</tr>
<tr>
<td>• CBE financial model</td>
<td>• Administrative and academic policy</td>
<td>• Competency definition and development</td>
<td>• Quality and accessibility framework</td>
<td>• Student preparedness development</td>
</tr>
<tr>
<td>• Operational process and quality improvement</td>
<td>• Staffing model</td>
<td>• Assessment design and development</td>
<td>• Technology and platform systems</td>
<td>• Non-academic services</td>
</tr>
</tbody>
</table>
CBE readiness tool
blackboard.com/cbetool
Scenario 1: Starting to Stretch

Great! You're Starting to Stretch Your Legs

You are ready to begin - determine where you need help to start developing a strong CBE program.

This is a great first step! Now is the time to make sure that all of your major stakeholders are involved in these conversations. It's not too early to think about what key aspects of your CBE program will look like, such as the financial and staffing models, faculty and staff ownership, and learning module design.
Scenario 2: Starting to Walk

Great! It Looks Like You're Starting To Walk

You are making good ground - focus on areas where you have more challenges to come up to speed.

You've moved past those early exploratory conversations about the role of CBE at your institution and have made a commitment to move forward with program development. Congratulations! Now is the time to make sure that you have your CBE team assembled and everyone knows the game plan.
## Lessons learned

<table>
<thead>
<tr>
<th>The right leaders matter</th>
<th>Managed growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use external facilitators</td>
<td>Rolling implementation</td>
</tr>
<tr>
<td>Leave room for fear and questions</td>
<td>Automate processes from the start</td>
</tr>
<tr>
<td>Provide ongoing and just-in-time professional development</td>
<td>Leverage instructional designers</td>
</tr>
<tr>
<td>Faculty-driven with the right mix of junior and senior faculty</td>
<td>Clarity, consistency, granularity of competencies</td>
</tr>
</tbody>
</table>
Leadership matters

Having the right leaders at every level of the program is critical. It creates buy-in, it means there is an institutional champion, and it greases squeaky wheels.

- Lead by example
- Providing advocacy
- Creating safe spaces to fail
- Creating buy-in
- Greasing squeaky wheels
- Providing external cover
Hard work but big payoffs

“[This is] the most visible aspect of a revolution occurring in education at all levels: the shift to learning outcomes and learner-centered education.

Every institution of higher education will have to make this shift, and the time to plan for it is now.”

Arthur Levine
President of the Woodrow Wilson National Fellowship Foundation and past president of Teachers College of Columbia University
Resources
Competency-based education resource hub

blackboard.com/cbehub

Competency-based education resource hub

As a service to the educational community, our experts have collected the best resources on competency-based education in order to help faculty, staff, policymakers, and other interested groups better understand CBE. We will regularly update this resource hub with case studies, promising practices, research, regulatory information, and more as the field develops.

Meet our CBE experts

What is CBE?

What is competency-based education? It’s an alternative mode of delivery that focuses on learner mastery of knowledge, ability, and skills. Working at their own pace, students may access a variety of learning materials; activities are guided and supported by faculty and staff.
NCHEMS competency-based education cost modeling

### CBE Cost Modeling

<table>
<thead>
<tr>
<th>Set Students Level Variables</th>
<th>Tuition &amp; Revenue</th>
<th>Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enrollment (Year one only)</td>
<td>Check per Credit Hour</td>
<td>$22.00</td>
</tr>
<tr>
<td>Enrollment (Year two only)</td>
<td>Revenue per FTE</td>
<td>$2,482</td>
</tr>
<tr>
<td>Enrollment (Year three only)</td>
<td>Annualized Tuition Revenue</td>
<td>$3,791,000</td>
</tr>
<tr>
<td>Courses per Academic Year</td>
<td>State and Local Support (FTE)</td>
<td>$1,485</td>
</tr>
<tr>
<td></td>
<td>Total FTE Support</td>
<td>$1,179,650</td>
</tr>
<tr>
<td></td>
<td>Projected Tuition Revenues</td>
<td>$261,900</td>
</tr>
<tr>
<td></td>
<td>Projected Annual Revenue at Year One</td>
<td>$2,405,500</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Input CBE Model Definitions</th>
<th>Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set Staff and Unit Costs</td>
<td>The CBE Cost Modeling tool is designed as a high-level introductory planning tool to help identify costs associated with CBE-based programs, including staffing, facilities, and costs for course design and delivery. This planning tool helps to illustrate some of the underlying assumptions in CBE. The user will need to know any existing data in this tool, and then enter their own data throughout this model by selecting one of the buttons to left and fill in the blank cells. Definitions can be found within each section of the tool.</td>
</tr>
<tr>
<td>Set Staff and Unit Ratios</td>
<td></td>
</tr>
<tr>
<td>Set Course Design Costs</td>
<td></td>
</tr>
<tr>
<td>Set Course Delivery Costs</td>
<td></td>
</tr>
<tr>
<td>Set Enrollment Projection</td>
<td></td>
</tr>
</tbody>
</table>

nchems.org
CBE readiness tool

blackboard.com/cbetool
Questions and discussion
Karen Yoshino, PhD
Principal Strategist, Enterprise Consulting
karen.yoshino@blackboard.com

Van Davis, PhD
Associate Vice President, Higher Education Research and Policy
van.davis@blackboard.com
<table>
<thead>
<tr>
<th>CBE continuum</th>
<th>Learning outcomes focused</th>
<th>Competency course based</th>
<th>Competency credit based</th>
<th>Direct assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Credit hour and courses</td>
<td>• Fixed term</td>
<td>• Fixed term</td>
<td>• May be self-paced</td>
<td>• Self-paced</td>
</tr>
<tr>
<td>• Learning outcomes may be present</td>
<td>• Credit hour and courses</td>
<td>• Credit hour and courses</td>
<td>• Credit hour, no courses</td>
<td>• No credit hours</td>
</tr>
<tr>
<td>• Teacher-focused</td>
<td>• Learning outcomes present</td>
<td>• Competencies</td>
<td>• Competencies</td>
<td>• Competencies</td>
</tr>
<tr>
<td>• Assignment-based assessments</td>
<td>• Teacher-focused</td>
<td>• Teacher-focused</td>
<td>• Learner-focused</td>
<td>• Learner-focused</td>
</tr>
<tr>
<td>• Vertically integrated faculty role</td>
<td>• Assignment-based assessments</td>
<td>• Competency-based assessments</td>
<td>• Assessments aligned</td>
<td>• Direct assessment</td>
</tr>
<tr>
<td></td>
<td>• Vertically integrated faculty role</td>
<td>• Vertically integrated faculty role</td>
<td>• Faculty role may be unbundled</td>
<td>• Faculty role unbundled</td>
</tr>
</tbody>
</table>