COMMUNITY COLLEGE CORNER

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Curricular Guidance for IT Associate-Degree Programs

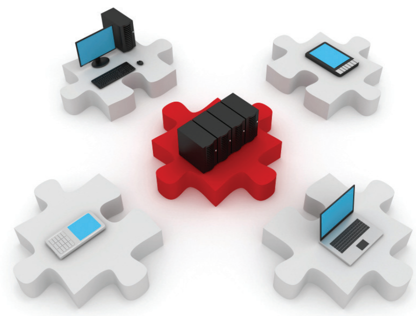
IT IS EXCITING TO REPORT that the curricular initiative described in the Community College Corner of March 2012 is close to fruition and targeted for completion in March 2013! Readers may recall that under the title "Associate-Degree Curricular Guidance for Information Technology" [4], the ACM Committee for Computing Education in Community Colleges (CCECC) outlined a multifaceted framework for curricular guidance defining the core student competencies underpinning two-year college IT-degree programs.

Now the CCECC is issuing a final call for feedback and providing different avenues to collect constructive input. Comments are continually accepted through our website [3], and committee representatives will be attending SIGCSE 2014 Technical Symposium in Atlanta. Please stop by our poster session or participate in our Birds-of-a-Feather (BoF) session to tell us what you think.

In brief, in fulfilling the charge given by the ACM Education Board, the CCECC embarked on producing IT curricular guidance, which is:

- built from the ground up on a framework of student learning outcomes;
- constituted by core IT competencies assembled into a framework of defined competency domains;
- influenced by the current and future needs of business and industry, by certifications and related curricula, by government and standards bodies, and by new and emerging technology;
- designed in a manner that provides for staying power, breadth and adaptability.
- international in application; and
- accompanied by well-designed assessment rubrics and meaningful evaluation metrics.

The result is a set of forty well-vetted, technically-oriented competencies, developed into student learning outcomes reflecting the *cognitive* domain of Bloom's Revised Taxonomy [2], together with a set of behavioral competencies developed into student learning outcomes reflecting the *affective* domain of Bloom's [2]. This IT curricular guidance is the result of a multiphase process of collaboration and debate among representatives from two-year colleges, businesses, professional organizations and certification/standards bodies; peer dissemination and public comment; oversight by a team of experts in student assessment; informed by the relevant related work of various other national and international organizations. The seminal product is the recommendation of ACM that any IT-related associate-degree program should include – somewhere in the curriculum – these 40 student learning outcomes constituting the foundational technical core competencies. Table 1 below provides a sample of these 40 competencies. To view all the core learning outcomes, visit our web site [3].



Still, curricular guidance today needs to go further, by way of the following two additional pursuits. First, in order to facilitate the integration of these student learning outcomes into contemporary assessment-based curricula – typical among associate-degree programs – each is accompanied by a structured assessment rubric. This pairing of learning outcome with associated assessment provides faculty with more context regarding the breadth and depth of the competency as well as the expected levels of student mastery. These are the building blocks for modern IT-related curricula in two-year colleges and the prototypical suite of considerations for faculty, program coordinators and department chairs. See Table 2 for example of core IT learning outcomes with assessment rubric. In Bloom's Revised Taxonomy [2], the lowest level of cognition is *Remembering* and scales up five more levels to *Creating* for a total of six levels each with a set of action verbs.

Second, in order to make the collection of student learning outcomes more accessible to various constituent groups, the CCECC has categorized them in accordance with a variety of existing ontologies. Perhaps the simplest and most evident of such categorization arises from an examination of the action verbs that lie at the heart of any collection of learning outcomes aligned with Bloom's Revised Taxonomy [2].

TABLE 1: SAMPLE OF CORE IT LEARNING OUTCOMES

	Learning Outcome (Core Competency)
1	Use a programming or a scripting language to solve a problem.
2	Demonstrate the techniques of defensive programming and secure coding.
3	Diagram a database design based on an identified scenario.
4	Produce simple database queries.
5	Summarize the implications of various cloud computing models.
6	Implement an application of virtualization.
7	Carry out basic network troubleshooting techniques.
8	Differentiate among various techniques for securing a network.
9	Identify a variety of assistive technologies and universal design considerations.
10	Discuss lifecycle strategies for replacement, reuse, recycling IT technology and resources.

For example, for the 40 technical outcomes noted above, 6 are at the Bloom's *Remembering* level, 20 are at the *Understanding* level and 14 are at the *Applying* level. Much can be noted about this distribution at the lower end of the six-level taxonomy, but in particular this simple analysis immediately resonates with individuals fluent in such considerations. In like fashion, those individuals familiar with the SIGITE 2008 "Curriculum Guidelines for Undergraduate Degree Programs in Information Technology" [5] will find the mapping to the knowledge unit headings in that report to be an effective entre to the associate-degree IT competencies. Many computing professionals are familiar with the recently revised ACM Computing Classification System [1] and will find the mapping to that taxonomy a handy tool for interpreting these newly-defined IT competencies. The natural working relationship between high schools and community colleges makes the categorization of these competencies by way of the CSTA Standards [6] an excellent framework for articulation discussions. Last but certainly not least, faculty participating in the work of the Mid-Pacific ICT Center will appreciate the mapping of these competencies to the U.S. Department of Labor IT Competency Model [7].

The ACM CCECC is on target to bring these important curriculum guidelines to a close in 2014. Until then, we will continue to disseminate and seek input on this ground-breaking associate-degree IT curricular guidance through different ways, but in particular by drawing attention to the suite of web-based associated tools and interactive resources available via the CCECC website - www.capspace.org. We urge you to visit us online and to share your feedback on this body of significant work. Additionally, we will be providing different avenues at the SIGCSE 2014 Technical Symposium to receive feedback. So be sure to stop by the CCECC booth or either of our poster or Birds-of-a-Feather sessions and chat with us in person. **Ir**

TABLE 2: EXAMPLE OF CORE IT LEARNING OUTCOMES WITH ASSESSMENT RUBRIC

		Assessment Rubric		
Core IT Learning Outcome	**Targeted Bloom's Level**	**Below Expectation**	**Meets Expectation**	**Exceeds Expectation**
Identifies the layers, protocols and components of the OSI model	*Remembering*	*Lists* the layers, protocols or components of the OSI model inaccurately or insufficiently.	*Identifies* the layers, names the major protocols and describes common components of the OSI model.	*Explains* the interaction of the OSI model layers in the encapsulation process.
Summarize the security implications and risks for distributed IT systems	*Understanding*	*Recognizes* some of the security issues and risks in a distributed IT system.	*Summarizes* the security issues and risks in a distributed IT system, and discuss their implications.	*Analyzes* the security issues and risks in a distributed IT system, and discusses their implications and mitigation strategies.
Use data analytics to support decision making for a given scenario	*Applying*	*Discusses* how data analytics could be used to support decision making for a given scenario.	*Uses* data analytics to identify meaningful options for decision making.	*Uses* data analytics efficiently and effectively to identify meaningful options for decision making.

References

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