European Union do. We may differ in many ways, yet we have important commonalities.

Aside from the amazing people I met at UMLW, I came away recognizing a huge opportunity for the computing education community. First: if you are looking for excellent examples of the application of computing to real and pressing social issues, there is a treasure trove of complex pedagogically ripe material within the development community. Second: the development community and the computing education community can benefit equally from developing a dialog. For example, the development community is wrestling with issues we have studied extensively concerning what works and doesn't work when mobile phones and tablets are put in the hands of students—especially when it comes to the realm of classroom management and content learning. Conversely, the development community has extensive knowledge and understanding about what works and what doesn't work with targeted empowerment efforts and workforce development.

I could go on about how my MOOC experience not only taught me something about the power of high quality, free, online learning but prepared me in completely unanticipated ways for new and exciting avenues within computing education. I could point out that for those of us who care deeply about using computing to make a positive difference in the world here are opportunities to do so and be on the cutting edge of technological development. However, the ball is now in your court—what can you do with it? **Ir**

References

[1] Interdisciplinary Computing Blog: http://computing4society.blogspot.com/. Accessed 2014 April 8

Lisa C. Kaczmarczyk
12710 Torrey Bluff Drive, Apt. 176
San Diego, California 92130 USA
lisakacz@gmail.com

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COMMUNITY COLLEGE CORNER

Elizabeth K. Hawthorne

Associate-Degree IT2014: A Call for Course Examples and Curriculum Champions

READERS MAY RECALL my two previous columns, March 2012 and December 2013 [14,16], regarding a three-year journey to produce the *Associate-Degree Curricular Guidance for Information Technology: A Competency Model of Core Learning Outcomes and Assessment*. Readers may also recall my December 2012 column, "CS2013: A Call for Community College Exemplars" [15] and my March 2014 column, "CS2013 Exemplar Spotlight on Two-Year Colleges" [17]. This issue's column combines the best of curricular development ideas from computer science (CS) and information technology (IT) guidelines with another call for community participation not only to two-year colleges, but also to businesses and four-year colleges. Two- and four-year colleges may choose to correlate their existing courses to the ACM core IT learning outcomes and contribute to the growing online collection at CAP Space [5]. Colleges and businesses alike may also choose to become curriculum champions along with Google, Oracle, Intel and others.

Core IT Competencies

The core information technology competencies are expressed in fifty student learning outcomes listed in Table 1. Each learning outcome has an associated three-tiered assessment rubric (not shown), providing further clarity and meaningful evaluation of the core competencies. This entire list of learning outcomes and related measurable evaluation metrics is available online in an interactive format at [6].

Course Examples

Examples of college courses that align with the core IT learning outcomes are part of an online collection shareable among institutions. The use of mapped or correlated courses as instructional models is similar to the ACM/IEEE-CS course exemplars compiled in Computer Science Curricula 2013 [2]. If you would like to have your college's IT course(s) be part of this growing repository, visit [8] for detailed instructions and the downloadable correlation template. See Figure 1. The members of the ACM Committee for Computing Education in Community Colleges (CCECC) will be glad to assist you in the easy-to-do correlation process. The collection currently includes

Figure 1. Correlating courses to core IT learning outcomes.

Associate-Degree IT2014: A Call for Course Examples and Curriculum Champions

Table 1. Core IT Student Learning Outcomes

An ability to demonstrate core IT competency in client computing and user support	
1	Carry out trouble-shooting strategies for resolving an identified end-user IT problem.
2	Diagram a hardware and software configuration responsive to an identified scenario.
3	Differentiate among various operating systems.
4	Explain the process of authentication and authorization between end-user devices and network resources.
5	Identify a variety of assistive or adaptive technologies and universal design considerations.
6	Identify basic components of an end-user IT system.
7	Summarize life-cycle strategies for replacement, reuse, recycling IT technology and resources.
8	Summarize strategies to support or train users with their IT resources.
9	Use a variety of practices for securing end-user systems.
An ability to demonstrate core IT competency in database and information management	
10	Describe the data management activities associated with the data lifecycle.
11	Diagram a database design based on an identified scenario.
12	Differentiate between public and private data.
13	Discuss applications of data analytics.
14	Discuss issues relevant to dealing with very large data sets, both structured and unstructured.
15	Identify database administration tasks.
16	Produce simple database queries.
17	Use data analytics to support decision making for a given scenario.
An ability to demonstrate core IT competency in digital media and immersive technology	
18	Differentiate among a variety of technology-based sensory interactions.
19	Differentiate among data types, data transfer protocols and file characteristics specific to targeted use.
20	Illustrate the activities of a digital media design process.
21	Implement communication principles into digital media design.
An ability to demonstrate core IT competency in networking and convergence	
22	Carry out basic network troubleshooting techniques.
23	Describe the layers, protocols and components of the OSI model.
24	Diagram the components of an integrated system.
25	Differentiate among various networking models.
26	Differentiate among various techniques for securing a network.
27	Summarize the flow of data through a network scenario.
An ability to demonstrate core IT competency in programming and application development	
28	Demonstrate best practices for designing end-user interfaces.
29	Demonstrate the techniques of defensive programming and secure coding.
30	Diagram the phases of the Secure Software Development Lifecycle.
31	Discuss software development methodologies.
32	Summarize the differences among various programming languages.
33	Use a programming or a scripting language to share data across an integrated IT system.
34	Use a programming or a scripting language to solve a problem.
An ability to demonstrate core IT competency in servers, storage and virtualization	
35	Differentiate among strategies for business continuity provisioning at the enterprise level.
36	Discuss data governance and its implications for users as well as IT professionals.
37	Identify a variety of enterprise-level storage technologies.
38	Implement an application of virtualization.
39	Modify a system to improve data confidentiality or regulatory compliance.
40	Summarize the implications of various cloud computing models.
41	Summarize the security implications and risks for distributed IT systems.
An ability to function effectively as a member of a diverse team to accomplish common goals	
42	Use communication, negotiation, and collaboration skills as a member of a diverse team.
An ability to read and interpret technical information, as well as listen effectively to, communicate orally with, and write clearly for a wide range of audiences	
43	Describe the attitudes, knowledge and abilities associated with quality customer service.
44	Produce documentation appropriate to an Information Technology task that conforms to the requisite format and syntax.
45	Use documentation or a knowledge base appropriate to an Information Technology task.
An ability to engage in continuous learning as well as research and assess new ideas and information to provide the capabilities for lifelong learning	
46	Discuss significant trends and emerging technologies and their impact on global society.
An ability to exhibit professional, legal, and ethical behavior	
47	Demonstrate professional behavior in response to an ethically-challenging scenario in computing.
48	Summarize the tenets of ethics and professional behavior promoted by international computing societies.
An ability to demonstrate business awareness and workplace effectiveness	
49	Describe IT procurement processes for goods and services.
50	Summarize the role of IT in supporting the mission and goals of an organization.

Table 2. Curriculum Champions to Date and Growing

Two-Year Colleges	NSF ATE Centers	Businesses	Other
Bluegrass Community and Technical College (Lexington, KY)	BATEC - Broadening Advanced Technological Education Connections	Citrix	C-ID Information Systems Faculty Discipline Review Group (California)
Estrella Mountain Community College of the Maricopa Community College District (Phoenix, AZ)	MPICT - Mid-Pacific Information and Communication Technologies Center	Cisco	Computer Science Teachers Association (CSTA)
Portland Community College (Portland, OR)		Dell	
Union County College (Cranford, NJ)		EMC2	
		Google	
		Intel	
		Juniper Networks	
		NetApp	
		Oracle	

IT courses from Bluegrass Community and Technical College, Estrella Mountain Community College and Portland Community College.

Existing Mappings

Additionally, the core IT student learning outcomes above have been mapped to other curricula, classifications, and frameworks. Existing mappings include the U.S. Department of Labor IT Competency Model [19], the knowledge units of the 2008 ACM IT Baccalaureate Guidelines [3], the ACM Computing Classification System (CCS) [4], the CSTA Computer Science and Information Technology Standards [12], the ABET criteria for Information Technology [1], and the European e-Competence Framework [13]. Future mappings will include the National Cybersecurity Workforce Framework [18], the Common Criteria for Information Technology Security Evaluation (ISO/IEC 15408) [11], and others. To view the current mappings, visit [10] and select the desired classification from the drop down list. See Figure 2.

Figure 2. Core IT Learning Outcomes Mapped to Other Ontologies

Curriculum Champions

Champions are organizations that appreciate the importance of robust associate-degree IT programs, make a commitment to the academic foundation of IT students, and promote education that meaningfully prepares graduates as future employees and practitioners. Representatives from business and industry as well as two-year college faculty collaborated with the ACM CCECC to formulate, review, and support this ACM curricular guidance that expresses core IT competencies across IT associate-degree programs. Champions including two-year colleges, National Science Foundation Advanced Technology Education (NSF ATE) centers and other organizations reviewed the curricular guidance. Table 2 provides a list of current champions. If your college, corporation or organization is interested in becoming a curriculum champion, please contact me at ehawthorne@acm.org or through the ACM CCECC's website at [7].

The members of the CCECC look forward to hearing from you about correlating existing IT courses to our core IT learning outcomes as well as becoming a curriculum champion. Our collection of courses and list of champions are growing every day. Why not be included? And once endorsed by the ACM Education Board, the final version of the Associate-Degree *Curricular Guidance for Information Technology: A Competency Model of Core Learning Outcomes and Assessment* will be available online in an interactive format at [9] and as a static PDF document. **Ir**

References

[1] BET. (2014). 2014-2015 *Criteria for Accrediting Computing Programs*. http://www.abet.org/cac-criteria-2014-2015/. Accessed 2014 March 1.

[2] ACM & IEEE. (December 2013). *Computer Science Curricula 2013: Curriculum Guidelines for Undergraduate Degree Programs in Computer Science*. DOI: 10.1145/2534860.

[3] ACM & IEEE. (2008). *Information Technology: Curriculum Guidelines for Undergraduate Degree Programs in Information Technology*. http://www.acm.org/education/curricula/IT2008 Curriculum.pdf. Accessed 2014 March 1.

[4] ACM. (2012). *ACM Computing Classification System*. https://www.acm.org/about/class/2012/. Accessed 2014 March 1.

[5] CAP Space. http:/www.capspace.org. Accessed 2014 April 15.

[6] CAP Space Assessment. http:/www.capspace.org/assessment/ITcore/. Accessed 2014 April 15.

[7] CAP Space Contact. http:/www.capspace.org/contactus/. Accessed 2014 April 15.

[8] CAP Space Correlation. http:/www.capspace.org/correlation/. Accessed 3014 April 15.

[9] CAP Space IT Core. http:/www.capspace.org/ITcore/. Accessed 2014 April 15.

[10] CAP Space Mappings. http:/www.capspace.org/mappings/ITcore/. Accessed 2014 April 15.

[11] Common Criteria for Information Technology Security Evaluation. http://www.commoncriteriaportal.org/. Accessed 2014 March 1.

[12] Computer Science Teachers Association. http://csta.acm.org/. Accessed 2014 March 1.

[13] European e-Competence Framework. http://www.ecompetences.eu/. Accessed 2014 March 1.

[14] Hawthorne, E.K. (March 2012). "Associate-degree curricular guidance for information technology." *ACM Inroads*, 3(1), 28-29. DOI: 10.1145/2077808.2077817.

[15] Hawthorne, E.K. (December 2012). "CS2013: a call for community college exemplars." *ACM Inroads*, 3(4), 24-25. DOI: 10.1145/2381083.2381094.

[16] Hawthorne, E.K. (December 2013). "Curricular guidance for IT associate-degree programs." *ACM Inroads*, 4(4), 26-27. DOI: 10.1145/2537753.2537764.

[17] Hawthorne, E.K. (March 2014). "CS2013 exemplar spotlight on two-year colleges." *ACM Inroads*, 5(1), 31-34. DOI: 10.1145/2568195.2568206.

[18] National Initiative for Cybersecurity Education. (2013). *National Cybersecurity Workforce Framework*. http://csrc.nist.gov/nice/framework/. Accessed 2014 March 1.

[19] U.S. Department of Labor. (2012). *Information Technology Competency Model*. http://www.careeronestop.org/COMPETENCYMODEL/competency-models/information-technology.aspx. Accessed 2014 March 1.

Elizabeth K. Hawthorne
Union County College
1033 Springfield Avenue
Cranford, New Jersey 07016 USA
ehawthorne@acm.org

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