Chapter 5.20
The Seven C's of Comprehensive Online Assessment:
Lessons Learned from 36 Million Classroom Assessments in the Cisco Networking Academy Program

John T. Behrens
Cisco Systems, USA

Tara A. Collison
Cisco Systems, USA

Sarah DeMark
Cisco Systems, USA

ABSTRACT

During the last 6 years, the Cisco Networking Academy™Program has delivered online curricula and over 36 million online assessments to support instructors and schools teaching computer networking skills to students. This chapter describes the context of this work and lessons learned from this endeavor. Through discussions with stakeholders concerning the central aspects of the Cisco Networking Academy Program assessment activities, seven themes have evolved, each starting with the letter C: claims, collaboration, complexity, contextualization, computation, communication, and coordination. These themes address many aspects of assessment, including design, development, delivery, and the management of assessment resources, which are all necessary to ensure a quality assessment program.

BACKGROUND

The Cisco Networking Academy Program was funded as a collaborative effort by Cisco Systems, Inc., and the Cisco Learning Institute and partnered with educational institutions to support schools and instructors teaching networking technology skills. The program contains many notable aspects, including (a) online curriculum materials designed for high interactivity, (b) comprehensive instructor training through partnering educational institutions, (c) a Quality Assurance Plan that helps schools monitor and improve program implementation, and (d) online assessments for in-class delivery by instructors. This program provides online curriculum and online assessment access along with support tools and staff at no cost to participating not-for-profit educational institutions.

Teacher training is provided in a tiered structure in which instructors at local academies (lowest in the structure) obtain training and mentoring from instructors at regional academies, which, in turn, obtain their instruction from Cisco area training centers. School personnel in this system provide instruction and guidance to other schools on a cost-recovery basis. Schools desiring to participate in the Cisco Networking Academy Program agree to a number of quality assurance practices, including sending instructors to instructor training, monitoring course feedback, and including a high degree of hands-on activity in the class.

In essence, the academy program offers teaching aids to the instructors. The instructors receive suggestions and some guidance from the Networking Academy Instructor material, but they are directed to implement their instruction following their own local conditions, constraints, and resources. For example, schools participating in the program are required to purchase a small amount of networking hardware so that students can have hands-on in-class experience with real networks, but the actual amount of this activity varies by teacher and school.

The prototypical instructional format is for instructors to assign students Web-based reading and activity lessons in the online curriculum. Students have unique login names and passwords to a curriculum and assessment portal. Interaction with the curriculum is followed by class discussion and hands-on activities and exercises. A key component of the academy program has been the notion that the instructor is present and facilitating the learning. Students are not simply dumped into online curricula. Courses are composed of modules that segment the curriculum as chapters in a book do. At the end of each module is a quiz designed to give detailed performance feedback and a module exam intended to give feedback regarding student strengths and weaknesses as well as to help prepare the student for the final exam. Module and final exams are often embellished with a feature called a *personalized feedback report.* This report creates a customized listing of curricular content based on tasks on which the student did not perform well. Assessment tasks can be tagged to correspond to a single page in the curriculum, section, module, or course, or multiple instances of these objects in the course. This gives the student a personalized subset of curricular content to review. This subset is created dynamically by the delivery system.

The Networking Academy Program has two delivery mechanisms for assessment activity. Quizzes are embedded inside the curricular materials and are developed in the FLASH interactive media system, which is a common application on the Internet. These activities give feedback on question correctness and, in some cases, employ personalized feedback reports as well. Quizzes generally consist of 10 to 20 tasks including multiple choice questions, drag-and-drop tasks, and point-and-click activities. Figure 1 is an illustration of a drag-and-drop task from a quiz in one of the academy program's courses. No data