Chapter IX
APEC Cyber Academy: Integration of Pedagogical and HCI Principles in an International Networked Learning Environment

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ABSTRACT

This chapter introduces how APEC Cyber Academy, an international networked learning environment designed for K-12 students, can foster global collaboration through the integration of sound pedagogy and human computer interaction (HCI). Pedagogical principles that encourage project-based learning, knowledge construction, collaborative learning, community building, and critical thinking are incorporated into the design of this human computer interface. Furthermore, HCI is enriched by 3D virtual reality, multi-player games, an intelligent agent, video/voice conferencing, text-to-speech technologies, and instructional modules that are rooted in constructivist and self-regulated learning. APEC Cyber Academy provides a platform for engaging students in global collaboration and increasing information and communications technology (ICT) skills.

INTRODUCTION

Web-based learning environments have become an integral part of both traditional face-to-face and online education. Most Web-based learning environments have such basic tools as content management, course delivery, discussion board, and assessment. The functionalities of a Web-based learning environment can either dictate or extend the instructional activities that a teacher can apply to the classroom. Over the past five years, the boom of e-learning has contributed to the creation of more course management systems that are designed to provide better accessibility to students. Although many of the systems claim to support pedagogical visions with good human computer interface that encourages peer collaboration, knowledge construction, mentoring, and community building, most systems are designed largely for college or adult learners and only manage syllabi and instructional content. Bonk and Dennen (2003) found most online courseware to be pedagogically and interaction negligent. Several sources have reported international standards for HCI and usability. Among others, these standards include guidelines on functionality, interface, interaction, and use of graphics and multimedia (Bevan, 1995; Nielsen, 2004; Shneiderman, 1998; UsabilityNet, 2006). Functionalities that assist the development of rich interaction, reflection, problem-based, or project-based learning are largely missing. Very few Web-based learning environments provide pedagogical tools and quality HCI to support good human computer interaction and collaboration among international K-12 learners.

APEC Cyber Academy, a networked learning environment, was originally designed for K-12 students of APEC (Asia Pacific Economic Cooperation) member economies and was developed to address the specific vogues in pedagogy and HCI that are essential for supporting international collaboration among K-12 learners (primary and secondary school learners). *APEC Cyber Academy* (http://linc.hinet.net/apec/) is built on a learner-centered paradigm that provides project-based learning programs and a rich international learning community. The original intent was to provide a place for students and teachers to communicate and engage in virtual learning experiences in international context. Launched in 2002, the project is hosted by APEC Digital Content Production Center currently under the auspices of APEC/EDNET and Ministry of Education of Taiwan. With its emphasis on active learning and creative digital content, *APEC Cyber Academy* has attracted a growing number of international users, including K-12 students and teachers. As of December 2005, there are more than 10,000 registered learners from countries around the world (see Table 5). This chapter will provide a framework for applying pedagogical and HCI principles in virtual learning environments appropriate for young learners.

THEORETICAL FRAMEWORK

Constructivism

Some constructivist schools of thought focus primarily on the individual learner, while others focus primarily on the social nature of knowledge construction. The consensus is that education is not the mere *transmission* of knowledge from the teacher to the student but requires that students be *active*. At one end is *radical constructivism*, which attributes its origins to Von Glasersfeld (1978, 1985), who proposed that knowledge is constructed from individual experience. On the other end is *cognitive constructivism* as suggested by Jean Piaget (1969, 1970), who proposed that knowledge is constructed through assimilation, accommodation, and equilibrium. In between these two extremes is the notion of *social constructivism*, which has its origins in the theories proposed by Lev Vygotsky. Social constructivism gives importance to cultural and social contexts