Chapter XIII

Assistant Tool for Instructors Teaching Computer Hardware with the PBL Theory

Maiga Chang, National Science and Technology Program for e-Learning, Taiwan

Kun-Fa Cheng, Chih-Ping Senior High School, Taiwan

Alex Chang, Yuan-Ze University, Taiwan

Ming-Wei Chen, Chih-Ping Senior High School, Taiwan

Abstract

Students often get a good score in written exams but fail to apply their knowledge when trying to solve real-world problems. This is particularly true for computer hardware courses in which students are required to learn and memorize many key terms and definitions. Also, teachers often find it difficult to gauge students’ progress when teaching computer hardware fundamentals. These problems are related to the learning process, so it is necessary to find an appropriate instructional model to overcome these problems. This chapter describes a Web-based tool called the assistant tool, which is based on problem-based learning (PBL) theory and not only assists instructors in teaching computer hardware fundamentals but also overcomes the above-mentioned problems.
Learning Objectives

After completing this chapter, you will be able to:

• Discuss the usefulness of PBL theory in teaching and learning contexts.
• Discuss the effectiveness of the assistant tool in enhancing teaching and learning computer hardware concepts.
• Define the following key terms: problem-based learning, brainstorm map, concept map, and cooperative learning.
• Suggest further enhancements to the assistant tool proposed in the chapter.

Introduction

There are numerous key terms, definitions, and abstract concepts in computer hardware fundamentals courses that students are required to learn and memorize to pass the exam. Therefore, it is often difficult to motivate students to learn computer hardware because many students appear to find the subject rather abstract, technical, and boring. Teachers also find it a bit difficult to gauge students’ progress in their classes.

There are two primary issues a teacher must investigate to gauge student progress: (1) memorization, that is, how many terms or abbreviations students have learned; and (2) relations between concepts (e.g., whether students know that both Pentium and Athlon are processors or whether students know the difference between a printer and a scanner). Memorization can easily be measured by a simple quiz or test. However, determining whether a student understands the relationships between concepts is not an easy task. Furthermore, a teacher needs to be assured that students have acquired the knowledge required and understand the numerous abstract concepts.

Sometimes students make mistakes and incorrectly group together concepts on different levels. For example, a student may have memorized ViewSonic VE700, an output device, and incorrectly associated this with the CPU and motherboard instead of Intel Pentium IV and IWill P4SE2. The questions arise, how can a teacher teach students about the conceptual relations among computer components and what concepts should a teacher provide as supplemental instruction.

To overcome the above issues and problems, we have proposed an assistant tool based on problem-based learning (PBL) theory that can be used in assisting instructors teaching computer hardware courses.