

## Chapter XVI

# An Interactive Tool for Teaching and Learning LAN Design

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### Abstract

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*It is often difficult to motivate students to learn local area network (LAN) design, because many students appear to find the subject rather dry, technical and boring. To overcome this problem, the author has developed a software tool (named LAN-Designer) that gives students an interactive learning experience in LAN design concepts. The LAN-Designer is suitable for classroom use in introductory computer networking courses. This chapter describes LAN-Designer and its effectiveness in teaching and learning LAN design. The effectiveness of LAN-Designer has been evaluated both formally by students and informally in discussion within the teaching team. The feedback from students indicates that the development and implementation of LAN-Designer were successful. It also discusses the impact of LAN-Designer on student learning and comprehension.*

## Introduction

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LANs are often included as a topic in computer science, information technology (IT), engineering and business courses, as LANs are a fundamental component of IT systems today. Unfortunately, motivating students to learn about LAN design is often difficult, because they find the subject rather technical, dry and boring. However, the view is frequently supported in educational literature (Anderson, Reder, & Simon, 1996; Young, 1993) that incorporating practical demonstrations into these courses, thereby illustrating theoretical concepts and providing opportunities for interactive learning experiences, significantly enhances student learning about LAN design. Yet, despite the Chinese adage attributed to Confucius (551–479 BC), ‘I hear, I know. I see, I remember. I do, I understand,’ only a limited amount of material designed to supplement the teaching of LAN design is publicly available, as searches of the Computer Science Teaching Center (Grissom, Knox, Fox, & Heller, 2005) and SIGCSE Education Links (Anonymous, 2005) sites reveal.

The author strongly believes, as do many others (Belding-Royer, 2004; Casado & McKeown, 2005; Hacker & Sitte, 2004; Lopez-Martin, 2004; Midkiff, 2005; Moallem, 2004), that students learn more effectively from courses that provide for active involvement in interactive learning experiences. To that end, the author has developed LAN-Designer (using Authorware 6 under MS Windows), which facilitates an interactive teaching and learning of LAN design concepts.

LAN-Designer can be used either in the classroom or at home. Both teacher and students can benefit from the use of LAN-Designer in different teaching and learning contexts. For example, a teacher is able to use LAN-Designer in the classroom as a demonstration, to liven up the traditional lecture environment; students, on the other hand, can use server-based networking tutorials and verify the results of in-class tasks and exercises on LAN design.

LAN design concepts are described in many textbooks (Forouzan, 2003, 2004; Kurose & Ross, 2005; Palmer & Sinclair, 2003; Stamper, 2001), and commercial LAN design is described extensively in the literature (Fitzgerald & Dennis, 2002).

The main contribution and strength of this chapter is the emphasis that an interactive learning experience using a software tool is crucial in motivating students to learn LAN design concepts. Perhaps the innovative aspect of this work is the development and evaluation of such a tool so as to be effective in complementing the lecture content of LAN design. The chapter is organized as follows. First is a review of some existing network simulation and modeling tools, followed by a description of LAN-Designer and highlights of its educational benefits. Test results are presented to verify the successful implementation of LAN-Designer. The effectiveness of LAN-Designer is evaluated, and a brief conclusion ends the chapter.

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