Chapter 4
Navigation and Visualisation Techniques in eLearning and Internet Research

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ABSTRACT

Research into investigating how users navigate through internet and multimedia resources in an educational context has revealed distinct preferences in how they approach the resource, their methods of interrogating it and both the quantity and quality of the information they obtain. Using highly sophisticated software even for digital natives involves learning a series of methods or techniques for easily manoeuvring through the vast quantities of data and developing schemas to do this efficiently and accurately. This chapter analyses methods that have been used for navigating through multimedia packages, explores users' preferences for navigation and visualisation, investigates design errors in multimedia that prevent good navigation and details newer visualisation methods and navigational tools. The chapter should give educational users a fresh perspective of issues of navigation and visualisation and allow them to develop these techniques in order to improve their use of internet and web resources and teaching materials.

INTRODUCTION

This chapter reports on the observational sessions of users individual preferences using multimedia and online resources. It investigates how they chose to move through the software, their choices and options and how these are related to their methods of working and ways of learning. Allowing the students

access to the methods that have been used, and compiling this into a predictable tool, is valuable and may allow students to use their preferred method(s) through a number of similar resources without having to relearn new tools or methods. Linking these methods to an intelligent tutor or agent will permit this knowledge to be used both by other students but also by academic staff to deliver courses, and to view students' progress. This would also help the course developer as knowing which sections of

the resource are most used, gives an indication of which should be updated first and which can be discarded or updated less frequently.

The chapter analyses a series of tools for navigation and visualisation and supports the provision of a toolkit of specified navigational components for use both by educationalists and by designers for internet and multimedia resources.

The aim of the chapter is to investigate navigational patterns employed by users while exploring multimedia and internet resources. The objectives of the chapter are:

- to see how these navigation patterns affect the learning potential of the resources,
- to investigate which navigational patterns digital natives use,
- to find the most beneficial methods of utilising the resource,
- to encourage the use of newer or more efficient methods of navigating within resources,
- to promote a toolkit of specified navigational tools as a transferable toolkit or palette for users,
- To demonstrate how visualisation techniques can inform users, tutors and software designers of the methods that have been used to interrogate resources.

The chapter commences with a short background section on previous research in this area. Then the five key issues of audit trails, navigational patterns, navigational tools, newer tools and design issues are discussed in detail. This last issue here briefly details some of the problems encountered in multimedia in order to give readers an understanding of the type of issues that occur in digital resources. The next solutions and recommendations section looks at intelligent tutors and network maps/charts before exploring visualisation techniques that can both demonstrate and compare different methods of navigation. This

is followed by an investigation of future research directions and a short conclusions section.

BACKGROUND

Digital Natives Research

The Digital natives debate was started by Prensky in 2001 when he stated that the Digital Natives had "spent their entire lives surrounded by and using computers, videogames, digital music players, video cams, cell phones, and all the other toys and tools of the digital age" (Prensky, 2001, p.1). Prensky proposed that the Natives exposure to digital culture and environment had changed the way they think: "It is now clear that as a result of this ubiquitous environment and the sheer volume of their interaction with it, today's students think and process information fundamentally differently from their predecessors." (p.1). Prensky's digital natives are meant to: prefer receiving information quickly; be adept at processing information rapidly; prefer multi-tasking and non-linear access to information; have a low tolerance for lectures; prefer active rather than passive learning, and rely heavily on communications technologies to access information and to carry out social and professional interactions.

Prensky also had a view on these student's educators, terming them Digital Immigrants – foreigners in the land of the Net Generation. Prensky's view, which has been supported by other researchers such as Oblinger (2003) and earlier work by Frand (2000) along the same lines, that educators need to adjust their pedagogical models to suit these new kinds of learners. Students according to Prensky are already "adopting new systems for communicating (instant messaging), sharing (blogs), buying and selling (eBay), exchanging (peer-to-peer technology), creating (Flash), meeting (3D worlds), collecting (downloads), coordinating (wikis), evaluating (reputation

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