

Education, the Internet, and the World Wide Web

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INTRODUCTION

What is the Internet?

The development of the Internet has a relatively brief and well-documented history (Cerf, 2001; Griffiths, 2001; Leiner et al., 2000; Tyson, 2002). The initial concept was first mooted in the early 1960s. American computer specialists visualized the creation of a globally interconnected set of computers through which everyone quickly could access data and programs from any node, or place, in the world. In the early 1970s, a research project initiated by the United States Department of Defense investigated techniques and technologies to interlink packet networks of various kinds. This was called the Internetting project, and the system of connected networks that emerged from the project was known as the Internet. The initial networks created were purpose-built (i.e., they were intended for and largely restricted to closed specialist communities of research scholars). However, other scholars, other government departments, and the commercial sector realized the system of protocols developed during this research (Transmission Control Protocol [TCP] and Internet Protocol [IP], collectively known as the TCP/IP Protocol Suite) had the potential to revolutionize data and program sharing in all parts of the community. A flurry of activity, beginning with the National Science Foundation (NSF) network NSFNET in 1986, over the last two decades of the 20th century created the Internet as we know it today. In essence, the Internet is a collection of computers joined together with cables and connectors following standard communication protocols.

What is the World Wide Web?

For many involved in education, there appears to be an interchangeability of the terms *Internet* and *World Wide Web* (WWW). For example, teachers

often will instruct students to “surf the Web,” to use the “dub.dub.dub,” or alternatively, to find information “on the net” with the assumption that there is little, if any, difference among them. However, there are significant differences. As mentioned in the previous section, the Internet is a collection of computers networked together using cables, connectors, and protocols. The connection established could be regarded as physical. Without prior knowledge or detailed instructions, the operators of the connected computers are unaware of the value, nature, or appropriateness of the material stored at the node with which they have connected. The concepts underlying the WWW can be seen to address this problem. As with the Internet, the WWW has a brief but well-documented history (Boutell, 2002; Cailliau, 1995; Griffiths, 2001). Tim Beners-Lee is recognized as the driving force behind the development of the protocols, simplifying the process locating the addresses of networked computers and retrieving specific documents for viewing. It is best to imagine the WWW as a virtual space of electronic information storage. Information contained within the network of sites making up the Internet can be searched for and retrieved by a special protocol known as a Hypertext Transfer Protocol (HTTP). While the WWW has no single, recognizable, central, or physical location, the specific information requested could be located and displayed on users’ connected devices quickly by using HTTP. The development and refinement of HTTP were followed by the design of a system allowing the links (the HTTP code) to be hidden behind plain text, activated by a click with the mouse, and thus, we have the creation and use of Hypertext Markup Language (HTML). In short, HTTP and HTML made the Internet useful to people who were interested solely in the information and data contained on the nodes of the network and were uninterested in computers, connectors, and cables.

BACKGROUND

Educational Involvement

The use and development of the Internet in the 1970s was almost entirely science-led and restricted to a small number of United States government departments and research institutions accessing online documentation. The broader academic community was not introduced to the communicative power of networking until the start of the 1980s with the creation of BITNET, (Because It's Time Network) and EARN (European Academic and Research Network) (Griffiths, 2001). BITNET and EARN were electronic communication networks among higher education institutes and was based on the power of electronic mail (e-mail). The development of these early networks was boosted by policy decisions of national governments; for example, the British JANET (Joint Academic Network) and the United States NSFNET (National Science Foundation Network) programs that explicitly encouraged the use of the Internet throughout the higher educational system, regardless of discipline (Leiner et al., 2000). By 1987, the number of computer hosts connected to networks had climbed to 28,000, and by 1990, 300,000 computers were attached (Griffiths, 2001). However, the development of the World Wide Web and Hypertext Markup Language, combined with parallel development of browser software applications such as Netscape and Internet Explorer, led to the eventual decline of these e-mail-based communication networks (CREN, 2002). Educational institutions at all levels joined the knowledge age.

FUTURE TRENDS

The advances in and decreasing costs of computer software and hardware in the 1980s resulted in increased use of and confidence in computer technologies by teachers and learners. By the mid-1990s, a number of educational institutions were fully exploiting the power of the Internet and the World Wide Web. Search engines to locate and retrieve information had been developed, and a mini-publication boom of Web sites occurred (Griffiths, 2001). In the early stages, educational institutions established simple Websites providing potential stu-

dents with information on staff roles and responsibilities; physical resources and layout of the institution; past, present, and upcoming events; and a range of policy documents. As confidence grew, institutions began to use a range of Web-based applications such as e-mail, file storage, and exams, to make available separate course units or entire and programs to a global market (Bonk et al., 1999). Currently, educational institutions from elementary levels to universities are using the WWW and the Internet to supplement classroom instruction, to give learners the ability to connect to information (instructional and other resources), and to deliver learning experiences (Clayton, 2002; Haynes, 2002; Rata Skudder et al., 2003). In short, the Internet and the WWW altered some approaches to education and changed the way some teachers communicated with students (McGovern & Norton, 2001; Newhouse, 2001). There was and continues to be an explosion of instructional ideas, resources, and courses on the WWW during the past decades as well as new funding opportunities for creating courses with WWW components (Bonk, 2001; Bonk et al., 1999; van der Veen et al., 2000). While some educators regard online education with suspicion and are critical that online learning is based on imitating what happens in the classroom (Bork, 2001), advocates of online, Web-assisted, or Internet learning would argue that combining face-to-face teaching with online resources and communication provides a richer learning context and enables differences in learning styles and preferences to be better accommodated (Aldred & Reid, 2003; Bates, 2000; Dalziel, 2003; Mann, 2000). In the not-too-distant future, the use of compact, handheld, Internet-connected computers will launch the fourth wave of the evolution of educational use of the Internet and the WWW (Savill-Smith & Kent, 2003). It is envisaged that young people with literacy and numeracy problems will be motivated to use the compact power of these evolving technologies in learning (Mitchell & Doherty, 2003). These students will be truly mobile, choosing when, how, and what they will learn.

CONCLUSION

The initial computer-programming-led concept of the Internet first mooted in the early 1960s has

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