

Preface

This book is about the future of online learning. It argues that online courses that include significant amounts of video and audio should replace many of the current text-rich courses. Video and audio will not be used only as elements of content but also as replacements for many of the interactions that are currently hosted by text-based technologies. The history of e-learning is relatively short and perhaps the examples that we see today reflect the tradition that came before e-learning. The traditions of face-to-face and correspondence courses are both traditions in which printed text plays a large role. In face-to-face learning presenters have for years used written notes to guide what they say. They have, on occasion, handed out printed materials to students. They have asked students to read books, articles, and papers. They have written book articles, papers, and theses. In correspondence courses students received printed materials from their instructors they would then read these and create further written materials, which were in turn sent back to the instructor for assessment. Clearly the printed word is central to traditional learning.

The history of the World Wide Web is also short. However, it has evolved from a collection of text-rich pages into a place where pages employ a suite of media-rich resources to provide users with sound, color, and movement. The Web is also now highly interactive with users writing to the Web almost as often as they read from it. Many users use the Web as their primary networking device. Portfolios are created online, which users can present to prospective employers. Online social spaces

abound with places to meet possible friends and future partners. With video sharing sites like YouTube, simulations like Second Life, and video communications services like Skype—enjoying huge usage levels—it can reasonably be assumed that rich online media are here to stay. Further, if the trend of increasing levels of bandwidth continues, bigger and clearer video images and higher fidelity audio will be available in the near future.

Students' expectations of their online learning experience will no doubt be flavored by their experiences of their other uses of the Web. Clearly their expectations will not be ones of text-rich resources but rather ones of media and interaction. The challenge then for designers of e-learning is to develop courses that make use of media and interactions in pedagogically sound ways. It is to these people that this book is primarily directed, whether they work for a college, university, government department, private organization, or other. Of course there is a place for text in e-learning and it is suggested that part of the challenge is to find the right mix of text and rich media.

Much has been written about the use of computers and the Internet in learning. Articles, chapters, and monographs of case studies of online learning are available online and in hard copy. While these abound, little has been written that takes the case studies and builds theoretical underpinnings. Such theories are needed to guide the design of e-learning.

This book draws on the literature from several fields to provide an appropriate context. Of course the field of distance education strongly features the development of online learning, flexible learning, and e-learning. Many of the techniques and technologies used in e-learning are adaptations of distance education practices. However, literature from other areas also has contextual value for the appropriate use of rich media in e-learning. Many attempts to guide educational designers in the appropriate use of technology and media are reported in the literature of instructional design. Also, technology has been used in training and the literature of human resource development and organizational communications provides interesting insights and comparisons to the literature from the other fields and additionally provides a theoretical basis on which one of the theoretical models in this book is based.

The aim of this book is to meet the challenge of selecting technologies, both media rich and text rich, for e-learning events and to ensure that they are used in ways that are appropriate for the students, the learning objectives, the context, and the budget. In this way e-learning events will be created that effectively and efficiently meet the learning objectives. New theoretical tools are presented that will assist in the selection of learning technologies. Two theoretical models and a practical method are described and exemplified—they are, The learning activities model, the learning technologies model, and the technology selection method.

Who This Book is For

The research behind this book has been drawn from a number of disciplines. The tools that are put forward later in the book bring together elements of:

- Distance education theory and practice.
- Educational theory and practice.
- The concept of media richness and trait theories from the area of organizational communications.
- Information and communications technology studies.

Just as the approach taken has been interdisciplinary so too is the intended audience. Many teachers in many different fields are asked to design online learning as part of their academic duties. This book is for:

- Teachers at universities and colleges who are designers.
- Trainers in business, industry, and government who are designers.
- Instructional designers.
- Researchers in the area of instructional design or training design.
- Students of instructional design or human resource development.

Organization of the Book

This book is in three sections. The first section, including this introduction, sets the scene for the future of online learning and argues that media-rich content and interactions will have a greatly increased role. It sets out reasons for the argument that video and audio will play significant roles in online learning of the future or e-learning 2.0. The first section also poses a challenge to all designers of online learning, that to be effective and efficient online learning of the future must not just include, but incorporate appropriately, the rich media of video and audio.

Chapter I introduces the future of online learning by considering some possible future approaches to the Web. In particular Web 2.0 and the Semantic Web are discussed regarding the impact they might have on e-learning and the concept of e-learning 2.0 is described. The changes in learning technology that have resulted in e-learning (both 1.0 and 2.0) have been sufficiently far reaching to be considered paradigm shifts. As with many paradigm shifts new terms are introduced to assist in the description of its new elements. In the early 1990s the term *flexible delivery*

was coined to describe some of the aspects of e-learning. Since then other terms have been used to describe many of the variations of online, flexible, or e-learning. Chapter I concludes with a word of warning. The concern is one of equity between students with different levels of access to the Internet. If some students have cheap, high-speed connections and other have slow or no connections, a further challenge is presented to the designers of e-learning—that is, the challenge to avoid creating a second digital divide between the bandwidth rich and the bandwidth poor.

The first section of the book goes on to consider the literature from several disciplines to provide a historical perspective and thus provide a better understanding of the future of rich media in e-learning. The reviews of the literature also provide the basis of the theoretical frameworks that are developed in later chapters.

Chapter II investigates the literature of open and distance education to provide a historical background of learning technologies. The chapter includes a discussion of the context and background to generational changes in learning technologies, their role in learning, and the ways in which they have been conceptualized. Understanding the changes in learning technologies in the past and the forces that shaped these changes helps not only in the understanding of their contemporary role in learning but provides direction to their future. Two key, early commentators in the literature of distance education suggest generations of distance education that reflect the paradigm shifts in teacher and student experiences as different families of technology were added. The first generation is based on the technology of print called the correspondence model. The names of subsequent generations reflect the predominant technology and are called: the multimedia model, the telelearning model, the flexible learning model, and the intelligent flexible learning model. The chapter compares the latest generation of distance education as described in the literature with the move to Web 2.0 and the Semantic Web. The chapter concludes by reporting on the changing role of technology in teaching and learning—changing from adjuncts to a face-to-face process to a role of centrality in the provision of e-learning.

Chapter III discusses key attempts that have been made to develop theoretical frameworks of learning technologies in the fields of higher education, human resource development, and instructional design. In many cases the theoretical frameworks are intended to guide the selection of learning technologies but often the conceptualizations have not kept pace with technological changes. A review of the literature of these fields helps to evaluate the suitability of conceptualizations of learning technologies to their selection in the process of designing learning events. The chapter provides a perspective on the sometimes difficult transition from an educational model centered on face-to-face experiences to one centered on face-to-technology. The chapter also considers the difference between classification and categorization and the value of these organizational systems to those who design e-learning experiences. The chapter concludes that the attempts in the literature to organize technologies in ways to help designers use them appropriately are not as helpful as they could be. Many have just not kept pace with changing technologies and others, while valuable in large institutions where e-learning is designed by teams, are far too complex for individual designers.

In **Chapter IV**, existing approaches to the selection of learning technologies are reviewed. As the methods suggested in the literature of instructional design are limited and are generally applied to human resource development and higher education, the reviews of them have been combined. Another area in which methods of technology selection are investigated is *organizational communications*. As the efficiency of communications between managers and other members of an organization has clear links to profits, a sturdy body of literature that conceptualizes and theorizes the selection of technologies for communications has developed. The chapter draws some basic conclusions as generalities from the literature. In particular there is some commonality of the criteria used in the selection of technologies for e-learning. These are the costs, the nature of the subject, and the implications for learners. The chapter concludes with the finding that the technology selection methods reviewed are not completely appropriate for designers who work individually and are seeking simple yet robust tools to guide the selection of appropriate technologies for e-learning.

Chapter V sums up the previous four chapters by arguing that generic tools are needed to assist designers of online learning. Shortcomings in existing models of learning activities, learning technologies, and methods of technology selection are discussed and the conceptions or key elements of the literature are described. The chapter concludes by foreshadowing the next section of the book in which the new theoretical frameworks are introduced.

The central section of the book introduces two theoretical frameworks and a practical method. These tools have been developed to assist in the development of online or e-learning programs that make appropriate use of the technology and in particular use media-rich content and interactions.

Chapter VI introduces the first theoretical model, the learning activities model (LAM). This model is the first of two theoretical frameworks described in this book. The model is intended to assist designers of learning events and is based on the thesis that categories of activities, which are subdivisions of the learning process, can be matched to techniques, technologies, and methods as part of the design process. The LAM categorizes the activities of students and teachers in the process of learning into the five categories: (1) provision of materials, (2) interactions with materials, (3) interactions with the facilitator of learning, (4) interactions between learners, and (5) intra-action. The last category is included in the model for the sake of completion and contains activities that probably form the heart and soul of learning, things that learners generally undertake and control themselves; these include, but are not limited to, structured and unstructured reflection, refinement of opinion, critical thinking, and the comparison of new experiences and information with older ones.

Chapter VII introduces the second theoretical model, the learning technologies model (LTM). Learning technologies have increased in number and diversity to such an extent that a theoretical framework is needed to help teachers and designers understand the nature of different technologies and hence apply them appropriately.

The LTM is made up of two primary components. The first consists of the categories of the LAM to which the technology is suited. The second component further describes the technology by the criteria; synchronous or asynchronous; one-way or two-way; and the type of communication channels available. The communications channels are divided into three levels where the most basic level is text alone. The next level is voice/audio which is considered as text plus the non-verbal attributes and the final level combines pictures and sounds which is considered as text plus non-verbal attributes plus non-vocal attributes such as body language. The chapter contains examples of 10 different technologies as interpreted by the LTM.

Chapter VIII brings together the theoretical models from the previous two chapters and combines them to form the technology selection method (TSM). The TSM is a robust tool for the selection of appropriate learning technologies. It assumes no specialist knowledge in the field of instructional design and provides users with an understanding of the technologies as well as the selection process. The TSM considers a number of criteria in three areas. They are:

- Mechanics of the subject, or institutional factors
- Implications for learners and facilitators
- Costs.

The mechanics of the subject refer to any technology requirements that are essential for the efficient and effective attainment of the learning objectives. These can include answers to questions like:

- Is text necessary or desirable?
- Are black and white graphics necessary or desirable?
- Are color graphics necessary or desirable?
- Is audio necessary or desirable?
- Is animation necessary or desirable?
- Are moving pictures (movie/video) necessary or desirable?

The LAM is then revisited and categories of it are matched to broad categories of the LTM and a step by step method for selecting technologies is presented. The chapter concludes with a number of examples of the TSM and with placing the method into the course design context.

The third section of the book applies the theoretical models and the method by describing a number of learning technologies and describing their appropriate use in teaching and learning. The learning technologies covered are:

- Video
- Recording lectures
- Streaming
- Downloading, podcasting, vodcasting, and Webcasting
- Real time communications technologies such as videoconference, video chat, and the Access Grid

In **Chapter IX**, the traditional role of video in education is revisited briefly as a basis for the exploration of new and different uses of this technology in e-learning. The chapter provides some basic technical background information and introduces a production method that is appropriate for those new to the technology. Film theory is touched on briefly as it forms the basis of the *language* of the technology. The educational use of video is explored and examples of new and different uses of video are provided. The chapter concludes with a review of how video camera and editing costs have changed in recent years and that these are now accessible to many. This, and changes to the ways in which video can be shared, have driven the production of domestic video to higher levels. This has increased the ways in which video can be used in e-learning.

Chapter X covers the related technologies of streaming, downloading, podcasting, vodcasting, and Webcasting, which can be used to record and distribute lectures or presentations. As many of these technologies are new they need to be clearly defined before they can be applied to the process of teaching and learning. A short historical case study of an Australian university's implementation of these technologies provides insights into the way in which lectures can be recorded and distributed as well as the ways in which they are used in teaching and learning. Details are provided on what can be recorded other than lectures and on the layout, installation, and equipment required to facilitate institution-wide recording. The LTM is used to describe the technologies and the chapter concludes by hinting at the articulation of these technologies into m-learning or mobile learning.

Chapter XI provides an introduction to the three chapters that follow it. The chapter provides a theoretical approach to the design of teaching and learning with real time communications technologies (RTCs). The LTM and the LAM are revisited in the context of RTCs in teaching and learning. From these a continuum of learning activities is proposed. The continuum has poles of completely one-way activities and completely two-way activities and between the poles varying degrees of one- and two-way activities. The chapter argues that somewhere on the continuum there exists a threshold of effective teaching and learning. A number of criteria are suggested as affecting the position of the threshold and model is suggested as a guide to designing appropriate learning events that use RTCs.

Chapter XII introduces three RTCs: videoconference, audioconference, and video chat. The technologies are defined and technical aspects of compression and quality, point-to-point and multipoint, continuous presence, and codecs are discussed.

The chapter also describes large and small videoconference installations, standards, and room layouts. A case study of an Australian university provides an insight into the advantages of Internet-hosted videoconferences over integrated services digital network (ISDN). The chapter concludes with a look to the future and the potential of video chat technology to displace appliance-based videoconference.

Chapter XIII takes the technological description of videoconference and video chat of the previous chapter, describes the use of these technologies, and recommends practices for teaching and learning. The technologies are analyzed in terms of the LTM and the relationship between technical quality, interactivity, and learning outcomes is presented. The chapter covers the elements of planning for teaching with videoconference and argues that successful educational videoconferences generally stem from sound planning. The chapter describes a number of teaching and learning activities and how they can work with videoconference.

Chapter XIV investigates a related RTC, Access Grid. The technology of the Access Grid is described and directions to the open source software are provided. Details of different levels of implementations are provided and the Access Grid experience is described and compared to that of videoconference and video chat. The technology and plans for equipping teaching and learning spaces for Access Grid are presented. The chapter also covers teaching and learning with Access Grid by analyzing the Access Grid in terms of the LTM and a case study of the use of Access Grid to host inter-institutional teaching and learning is presented. The chapter concludes with an analysis of the costs and benefits of this technology in e-learning.

In **Chapter XV** the future of RTCs in higher education is addressed and future directions for each of them are summarized. A comparison of the functionality, costs, and support requirements is also provided. The chapter concludes by arguing that in the medium term it is likely that institutions and organizations will use a mixture of RTCs and that they will need to be used in ways that facilitate easy interactions and thus render the technology transparent.

The book concludes with a look to the future of online learning and rich media. It argues the benefits for integrating rich media communication technologies with learning management systems and the benefits of sharing rich media resources through repositories such as content management systems.

Two appendices are included. The first is a glossary of terms used in the book and the second is a short introduction to the measurement of computer memory and bandwidth.

Conclusion

Unfortunately one of the problems with writing about technology is the rate of change of the technology. If the evolutionary trajectory is not considered when writ-

ing about a technology, there is a good chance that the written material will be out of date soon after it is published. For this reason care has been taken in this book to consider where rich media technologies are heading and to plan for their particular trajectories. From the title of this book, it can clearly be seen that the emphasis is on rich media. It is the belief of the author that those who offer e-learning opportunities that are rich in media stand to enjoy the creation of learning activities in which students achieve the objectives with greater efficiencies and effectiveness.