Keeping the User in Mind

CHANDOS
INFORMATION PROFESSIONAL SERIES

Series Editor: Ruth Rikowski
(email: Rikowskigr@aol.com)

Chandos' new series of books are aimed at the busy information professional. They have been specially commissioned to provide the reader with an authoritative view of current thinking. They are designed to provide easy-to-read and (most importantly) practical coverage of topics that are of interest to librarians and other information professionals. If you would like a full listing of current and forthcoming titles, please visit our website www.chandospublishing.com or email info@chandospublishing.com or telephone +44 (0) 1223 891358.

New authors: we are always pleased to receive ideas for new titles; if you would like to write a book for Chandos, please contact Dr Glyn Jones on email gjones@chandospublishing.com or telephone number +44 (0) 1993 848726.

Bulk orders: some organisations buy a number of copies of our books. If you are interested in doing this, we would be pleased to discuss a discount. Please email info@chandospublishing.com or telephone +44(0) 1223 891358.

Keeping the User in Mind

Instructional Design and the Modern Library

VALEDA DENT GOODMAN

Chandos Publishing
Oxford • Cambridge • New Delhi

Chandos Publishing
TBAC Business Centre
Avenue 4
Station Lane
Witney
Oxford OX28 4BN
UK
Tel: +44 (0) 1993 848726
Email: info@chandospublishing.com
www.chandospublishing.com

Chandos Publishing is an imprint of Woodhead Publishing Limited

Woodhead Publishing Limited
Abington Hall
Granta Park
Great Abington
Cambridge CB21 6AH
UK
www.woodheadpublishing.com

First published in 2009

ISBN:
978 1 84334 486 5

British Library Cataloguing-in-Publication Data.
A catalogue record for this book is available from the British Library.

Typeset by Domex e-Data Pvt. Ltd.
Printed in the UK and USA.

This book is dedicated to my wonderful, loving family (Mom, Dad, Howie, Ro, Karen, George, Dan, Trent, Chante, Carol, and all of my nieces and nephews!!), my very best friend Chantal, and my close friends Ingrid and Lauren. Most of all, the book is dedicated to my husband and soul mate, Geoff, who profoundly changed my life forever – and gave me the courage and confidence to undertake the enormous task of writing my first book.

About the author

Valeda Dent Goodman, MSW, MILS is a second-generation librarian and is currently Associate University Librarian for Research and Instructional Services and Associate Professor at Rutgers University in New Brunswick, New Jersey. Much of her work is concerned with understanding user research behaviors and the implications for information and research services. A native of New York City, she was previously Associate Professor and head of the reference division at the Hunter College Library in New York, and project director for the MALIBU digital library project in London, UK. She holds a Masters degree in Social Work from the University of Michigan School of Social Work and a Masters degree in Information Science from the University of Michigan School of Information. Her diverse research interests include user experience (UX), new uses of technology, information literacy, and rural libraries and literacy.

Valeda has is authored numerous journal articles, which have been published in academic journals such as *New Library World, Libri, VINE: The Journal of Information and Knowledge Management Systems,* and *Reference and User Services Quarterly*. She has also presented her work at national and international venues such as the Online Information Conference in London, the American Library Association Annual Conference, the Ethnography in Education Conference, and the Pan-African Conference on Reading in Swaziland. She is currently working on a manuscript on the impact of rural village libraries in Africa.

In her spare time Valeda enjoys running marathons – she has completed marathons in Los Angeles, Philadelphia, Houston, New York City, Austin, and numerous other cities – and spending time with her nephews. She currently lives in Westchester County, New York with her husband, Dr. Geoff Goodman, a clinical psychologist and a faculty member at Long Island University in New York.

Foreword

The rise of instructional design

Most would agree that teaching is an art, a process fundamentally built on iteratively understanding the learning needs of the students and crafting an engaging learning experience that seeks to address those needs, given specific learning objectives. In creating any instructional media resource, one is in fact assuming the indirect role of a teacher. Inherent in this role are certain challenges, such as deciding how to engage students, how best to define the learning objectives, and determining how to integrate learners' knowledge levels and learning styles.

As with any other art form, there are formalized yet flexible practices in place that help us to better approach the instructional design process. Instructional design is based on the notion that the right kind of learning can be designed through a formalized analysis of learning needs, and the subsequent systematic development of learning resources that take into consideration those needs and the overall objectives. The benefits of using instructional design within organizations are many, ranging from the creation of more pedagogically effective resources, to collaborations with instructional designers who are empowered with useful tools, best practices, learning models, a common language, and a community of other designers. Within universities, and more specifically within academic libraries, instructional design has

a new and emerging role. Accessing information is no longer a central learning theme, rather, it is the discovery of information and understanding how that information is relevant and applicable to solving problems and achieving goals. In other words, the ubiquity of information and technology has changed the educational landscape, along with the needs of learners, and thus the design of media resources that address those needs has also changed. There are many examples of other fundamental shifts within education. Collaborative learning, which has taken on new dimensions with the rise of social networks, is one such. The increasingly knowledge-based nature of the workplace, which demands a new set of twenty-first-century skills (including but not limited to creative problem solving, emotional intelligence, and information literacy), is another. An additional sea change is the prevalence of mobile technology and increased computer access, which has given rise to the concept of "just-in-time" learning and the ability to obtain information via many different access points. The gamer generation is also looking for more engaging hands-on experiences through technology beyond the first generation of "page-turner" e-learning resources of the 1990s.

These shifts are forcing us to better understand the context in which learning is taking place, the shifting needs of learners and learning styles, and countless others elements influential in the design of media-based learning resources and the resulting learning process.

The challenge ahead

One key challenge that lies ahead for the field of instructional design is the decrease in focus on the transfer

of knowledge – the notion of encapsulating knowledge and streamlining its delivery directly to the learner. This concept is still apparent in early and even more recent instructional media. The fundamental problem with focusing solely on knowledge dissemination is that this is not in keeping with the growing body of literature which supports contextual and experiential learning approaches – methods which map to higher levels of learning transfer and the application of knowledge to real-world situations.

Another intriguing development that has bearing on instructional design and its use in a variety of settings is that of game design. In game design, the focus is on the experience. This is best illustrated by the different creative approaches taken by a game designer versus an instructional designer. A traditional instructional designer will often focus on the content that a course will cover, whereas a game designer defines the behaviors the learner will be asked to perform, the context in which those behaviors will be performed, and the information required to empower the learner to perform those behaviors. When applied to instructional design, this method represents a kind of experiential learning, and a shift to a more experience-based approach. The ultimate goal is the creation of resources that go beyond knowledge dissemination and that help students accumulate experiences that enable them to build conceptual frameworks for solving problems and dealing with real-world situations.

The academic library provides an opportunity for librarians to try their hand at crafting engaging, media-based instructional experiences that simulate real-world problems of information seeking and evaluation. These experiences may be powerful enough to shape learners' behavioral, affective, cognitive, and social perspectives.

There is no one way of accomplishing this goal, but, as with works of art, there are creations that we can look to as models that may represent a new, emboldened field of instructional design.

After all, teaching is an art.

Ralph Vacca

Chief Learning Architect and Co-founder, Kognito Interactive

Acknowledgments

I would like to acknowledge and thank Judith Oppenheimer and Glyn Jones at Chandos Publishing for working with me on this project. I would especially like to thank Ralph Vacca, who understands instructional design, shares his knowledge, practices what he preaches every day, and graciously contributed to this book in a variety of ways. I would also like to acknowledge the team at Kognito Interactive (www.kognito.com) in New York City – their dedication to the craft of instructional design is apparent in everything they do. Cover design by Anne H. Berry. Finally, I would like to thank my colleague Steven Bell, who is among the precious few librarians who understand how quickly our landscape is changing, and the importance of staying relevant.

Introduction

This book is about instructional design and its potential application within the academic library. When I first began working on this project, one of the first things I did was to educate myself about what instructional design is *not*, since the term is used broadly and in a variety of contexts. Instructional design is not graphic design, it is not software design, it is not website design. It can be seen as both an art and a science. It is also a profession. The tools of instructional design are many – chalk and chalkboard, pen and paper, a computer, building blocks, a movie on a screen. Instructional design and instructional technology design for libraries are areas of growing interest that have, for the most part, received very little attention. As a librarian, I am always interested in finding ways to improve how we teach patrons to use library resources, and instructional design is a powerful approach. Instructional design principles can guide the creation of engaging, often virtual, products and programs for enhancing the e-learning landscape. They blend creativity, process and technology to create learner-centered products that help users learn a variety of complex research and information skills. They also provide guideposts for librarians and others who create instruction and want to make sure learning objectives are being met. Fueled by the need for asynchronous learning, the availability of the web, and the need to evaluate learning outcomes, modern-day instructional design covers a wide

range of approaches and models, and has its historical roots in systems engineering, education, and psychology.

So what *is* instructional design, and where is it used? In doing research for this book, I came across many definitions of instructional design. Here I offer two definitions. First, a relatively comprehensive one adapted from the University of Michigan: "Instructional Design is the systematic development of instructional specifications using learning and instructional theory to ensure the quality of instruction. It is the entire process of analysis of learning needs and goals and the development of a delivery system to meet those needs. It includes development of instructional materials and activities; and tryout and evaluation of all instruction and learner activities."[1] Second, a description of instructional design by authors Bell and Shank (2007) from their book *Academic Librarianship by Design – A Blended Librarian's Guide to the Tools and Techniques*, one of the few books to address instructional design within the academic library context: Instructional design is the "systematic creation of an educational experience that will help students achieve a specified set of learning outcomes" (2). The authors go on to stress that the deliverables of the instructional design process are usually some sort of learning activity or instructional product, and that instructional designers are experts in "organizing the curriculum in a way that achieves the best pedagogical outcomes" (ibid., 3).

Instructional design has been embraced in certain industries more than in others. It has also been used widely without being called such – every time a company hires someone to develop a training plan for a new procedure, product, or service, that individual is, in fact, designing instruction. Instructional designers are also finding a place within higher education, although this is still relatively

uncommon. Colleges and universities typically hire instructional designers to assist faculty, librarians, staff, and administrators in understanding and designing learning tools, and incorporating them into their syllabi. Instructional design programs in higher education have increased considerably in the United States and in other countries since the early 1990s; there definitely seems to be recognition that instructional design is a powerful tool for helping individuals to learn more effectively.

There are a number of implications for today's academic librarians with regard to teaching and learning. How do academic librarians make use of their expertise to develop products that reach broader audiences, but that can also be tailored to specific disciplines? How do libraries build environments that support e-learning, encourage the infusion of technology, and are nimble enough to adjust quickly to changing user needs? How do we teach library users to think more critically about the type of information they are looking for, its value, where it might be found, who is responsible for it, and how it might be integrated with their work or meet other information needs? Librarians have long embraced the role of educators, focusing on finding the best ways to prepare users for this rich information odyssey. Librarians teach in classrooms, in virtual environments, at the reference desk, in their offices, in large lecture halls. They teach very small groups, large groups, and individuals. Learners often have disparate skill levels, so that even information taught in the most general of terms must be assumed to be "a new language" for many. Librarians understand that, as time goes on, and users have more and more self-directed access to information, they need to find ways to advantage the skills they have, learn new skills, and mix all of that up to create better ways of facilitating

learning. It is important that what used to be known simply as "library skills" be broadened, and integrated across the academy into courses and curricula. This, as librarians everywhere know, is easier said than done. A part of the problem is a lack of understanding at the faculty and institutional levels as to why research and information literacy skills are important. Given this, what does instructional design have to offer the academic library? What lessons can be learned from the ways in which instructional design is used in other fields? Are there some instructional design models that are more useful in library settings than in others? What are some practical ways in which instructional design can be applied, and what might be some potential administrative, managerial, and institutional impacts? These are all questions that will be discussed in this book, which aims to provide a down-to-earth look at instructional design and its uses in the academic library.

The book contains ten chapters. Chapter 1 provides a brief history of instructional design. The second chapter details the main theories of learning, each of which has implications for instructional design and its effective application. There are many different instructional design models, far too many to address in one book. Chapter 3 sifts through this sandbox and provides an overview of six instructional design models that have relevance for academic libraries. The landscape of higher education continues to change, and Chapter 4 presents some background information on how these shifts in higher education impact the role of instructional design within colleges and universities. Chapter 5 takes a look at the integration of Library 2.0 and Web 2.0, social networking tools, new media, user experience and instructional design. Chapter 6

is a critical chapter that focuses on the use of instructional design specifically for library instruction and information literacy education. Chapter 7, contributed by Ralph Vacca (who also authored the Foreword), is a case study of a virtual instructional product created for an academic library, using the principles of instructional design. The chapter contains a design and development manuscript as well as the actual content outline and script. Chapter 8 looks at challenges to the implementation of instructional design practices in libraries. Chapter 9, contributed by Steven Bell, unveils the concept of "design thinking" and the connection to instructional design and library learning content. The final chapter explores new territory by tackling the intriguing and somewhat mysterious topic of the semantic web, and the myriad possibilities related to instructional design. These chapters should blend seamlessly to facilitate further discussion and give the reader a unified sense of the world of possibilities associated with instructional design and the modern library.

This book was an extraordinary one to write, and the project has not only influenced the way I see librarians as educators, but has also made me think more about the many ways in which librarians influence learners. I am really excited about the contributions of Ralph Vacca, Chief Learning Architect and Co-founder of the New York City-based interactive media design firm, Kognito Interactive, and Steven Bell, Associate University Librarian for Research and Instructional Services at Temple University. Their chapters have helped to make the content of the book not only more comprehensive, but also more engaging, more practical, and more useful. The essence of librarianship is changing, and there are many ways of seeing and thinking that are quite different from even ten years ago. I hope that

this book will encourage the exploration of instructional design for those who read it, and stimulate reflection and new ideas about the ways it may be more useful to librarians.

Valeda Dent Goodman
November 1, 2008

Note

1. University of Michigan School of Education, Software and Design Authoring course, web page, www.umich.edu/~ed626/define.html (accessed 22 November 2008).

1

A brief history of instructional design

Early foundations of instructional design

Depending on where you look for a definition, it can be hard to get a clear sense of the history of instructional design, an area that has evolved as a discipline since the mid 1970s. Most educators and scholars will agree that instructional design has its roots in psychology (cognitive and behavioral), education, and systems design, and that it evolved as groups of educators and trainers looked for more efficient ways to teach certain skills to certain populations, most significantly to large groups such as those in the military. The implied meaning of instructional design may change, depending on whom you are talking to. An instructional designer in an educational setting may be focused on designing the systems (virtual or non-virtual) to help people learn something. The learning can take place anywhere – in a classroom, one on one, virtually – but the emphasis is on the inclusion of learning theory so as to inform what type of instruction will work best. When instructional technologists refer to instructional design they may be referring to a rigorous process that focuses on needs assessment, development, implementation, evaluation and

re-implementation. The focus is on the effective and efficient transfer of information. There are many fields that overlap with instructional design, like information design, graphic design, and other professional areas where a design element is coupled with information transfer and learning.

Two definitions of instructional design were presented in the Introduction, but it is safe to say that the term "instructional design" is used in a variety of settings, and may even mean slightly different things to different people. There are also variations that may sound similar: instructional technology design, instructional development, and instructional systems design, for instance. A number of researchers, including Kenneth Silber (1977), talk about the differences in the terminology and the fact that they are often (and sometimes erroneously) used interchangeably. Silber was the first to describe instructional development as a "systematic approach to the design, production, evaluation and utilization of complex systems of instruction, including all appropriate components and a management pattern for using them" (1977, 172). He clarified that instructional development is "larger than instructional design, which is only one phase of instructional development." He further stated that instructional product development is also not instructional systems design, but another, smaller component of this category. Dick and Carey (1985, 2) explain the concept of a systems approach to designing instruction: "a system is technically a set of interrelated parts, all of which are working together toward a defined goal," and they further state: "the most easily understood systems are those we create rather than those that occur naturally" (ibid., 3). Dick and Carey go on to describe how the notion of systems is related to instructional design. They advance the idea that the instructional process is itself a system (ibid.). "The purpose of the system is to bring about learning. The

components of the system are the learners, the instructor, the instructional materials, and the learning environment. These components interact in order to achieve the goal" (ibid., 2). Reiser (2001, 58) summarizes these differences in terminology:

> Over the past four decades, a variety of sets of systematic instructional design procedures (or models) have been developed, and have been referred to by such terms as *the systems approach*, *instructional systems design* (*ISD*), *instructional development*, and *instructional design* (which is the term I will usually employ in this article). Although the specific combination of procedures often varies from one instructional design model to the next, most of the models include the analysis of instructional problems, and the design, development, implementation and evaluation of instructional procedures and materials intended to solve those problems.

The interest in and use of instructional design has fluctuated since the 1970s and 1980s. Noted instructional design systems theorist Walter Dick (1987) talked about the origin of instructional design as hailing from the World War II era, when there was a profound need to train large groups of people for military activities. Psychologists were instrumental in developing these early instructional design practices, and they were informed by cognitive, educational and behavioral psychology principles. After the war, many of those who had worked on the development of instructional design programs continued to do work in the area, which continued through the 1940s and 1950s (Reiser, 2001). In 1981, at an international conference on individualized instruction, Dr. Russell Watson, an educator

and administrator in the US Armed Forces, talked about the instructional design process as it applied to the military:

> In 1965 the United States Air Force, looking for a more pragmatic way to teach soldiers a variety of tasks related to this branch of the military, implemented what was then one of the first instructional design models. It consisted of five steps, including needs assessment, system evaluation, development of learning outcomes, planning the instruction and evaluating the outcomes. As defense machinery was becoming more and more sophisticated, the educational background of entry level soldiers was becoming lower and lower. The potential solution to this problem was in the form of a "systems approach" to training. The system selected for use by the Army was Instructional Systems Development (ISD), developed in 1975 by Florida State University. ISD is a comprehensive five phase process encompassing the entire training/educational environment. Although ISD is a systematic step-by-step approach, it has the flexibility to be used with both individualized and traditional instruction. It is however, specifically orientated towards the use of behavioral/performance objectives and criterion-referenced tests. (Watson, 1981)

Systems engineering was another influence on the development of instructional design. Molenda (1997, 43) notes that it was in the late 1960s that systems engineering principles began to be used within higher education. Silvern (1965) developed an instructional design course, "Designing Instructional Systems," that grew out of his experiences of crafting instruction for the military. During the early 1970s, the Instructional Development Institute, a joint project between

Michigan State University, Syracuse University, and the University of Southern California, taught hundreds of teachers instructional design methodology, loosely based on the engineering principle of systems design (Molenda, 1997, 43).

Moving towards the 1950s and 1960s, there was a flurry of research and exchange of ideas that eventually influenced the future development of the field. The work of psychologists B.F. Skinner and Benjamin Bloom was also a notable influence during this time, as educators sought to design instruction around observable behaviors.

The role of psychologists in the development of instructional design

In 1954, B.F. Skinner published *The Science of Learning and the Art of Teaching*. It was this work, which focused on behavioral learning theory (Driscoll, 2002, 60) and programmed instruction (Reiser, 2001), that provided the initial framework for instructional design techniques used in the military during those early years. In his work, Skinner talks about the connection between how humans learn and the way in which learning materials are presented. Skinner suggests that instructional materials should be presented in steps, require learners frequently to answer questions about what is being presented, provide immediate feedback, and allow learners to pace themselves (ibid., 59). Skinner also believed that the process of learning could be observed by comparing the behavior of the learner before the instructional intervention and afterwards. Any changes in the behavior of the learner were attributed to the instruction (Driscoll, 2002, 60). The model provided a process for improving the instructional materials by constantly reviewing them for effectiveness, then revising them to better meet the learning

objectives. The concept of programmed instruction and the concurrent development of educational objectives was further developed by researchers such as Mager, whose research focused on teaching educators how to write clear, measurable objectives (1962). Reiser (2001) describes Mager's work as highlighting "how to write objectives that include a description of desired learner behaviors, the conditions under which the behaviors are to be performed, and the standards (criteria) by which the behaviors are to be judged. Many current-day adherents of the instructional design process advocate the preparation of objectives that contain these three elements." The use of objectives is important because it remains a key component of modern-day instructional design.

In 1956 Benjamin Bloom, an educational psychologist working with a group of scholars from the University of Chicago, developed perhaps his most famous publication, *Taxonomy of Educational Objectives, Handbook 1: Cognitive Domain* (Bloom et al., 1956). Bloom's Taxonomy, as it came to be known, was the first to categorize both instructional objectives and the evaluation of those objectives. There were several key concepts represented in Bloom's work that proved to be very important to the field of instructional design. To this day, Bloom's Taxonomy provides direction to educators by helping them to create measurable learning objectives and ways to measure whether these objectives have been met. This process is at the very heart of the instructional design process. Bloom's Taxonomy describes three areas or domains, presented as a hierarchy: affective (emotional), psychomotor (physical) and cognitive (knowledge, comprehension). Learning in each area is dependent on knowledge gained at the lower levels.

In 1962, Robert Glaser, an American educational psychologist perhaps best known for his work at the

University of Pittsburgh, introduced the terminology "instructional systems," or "instructional systems design." This term is the closest predecessor to the one we use today, "instructional design." His work was based in part on the theories of the psychologists named above, most notably Skinner and Bloom. Glaser's instructional system had four distinct steps, including learning goals, entering or beginning behaviors, instructional procedures and performance assessment. Glaser's system also detailed test components that used criterion-referenced measures to determine mastery of certain competencies. About the same time, in 1962, Robert Mager published *Preparing Objectives for Programmed Instruction.* This work advanced the creation of specific, measurable instructional objectives to guide both the instructor and the learner – a key component of nearly every instructional design model.

However, it was Robert Gagne, who in 1965 published *The Conditions of Learning and the Theory of Instruction*, also based to some extent on the work of the aforementioned scholars, who had perhaps the greatest impact on the field. The main focus of his book was the five domains of learning: verbal information, intellectual skills, psychomotor skills, attitudes and cognitive strategies. Gagne's observations had a profound influence on the learning community at the time, because people began to realize that the skills one needed to learn to ice skate (motor skills) were very different from the skills one might need to learn to read (verbal skills). This would, of course, impact how one was taught and the type of instruction a learner might receive. Gagne was perhaps the first theorist to group the three domains (cognitive, behavioral and psychomotor) into the learning mosaic. Gagne documented nine key events which help to advance learning, the articulation of which

still heavily influences instructional design at all levels. These nine events are:

1. Gain attention
2. Inform the learner of objectives
3. Stimulate recall of prior learning
4. Present stimulus material
5. Provide learner guidance
6. Elicit performance
7. Provide feedback
8. Assess performance
9. Enhance retention transfer. (Gagne, 1965)

Gagne later worked with these same principles and applied them to learning in multimedia environments.

In *Principles of Instructional Design* (1992, 4) Gagne presents five assumptions that he describes as being characteristic of designed instruction. First, he suggests that instructional design must target the individual learner. Obviously, most of the educational settings where learning takes place are groups; however, good instructional design considers fully the individual learner. Second, instructional design does not happen all at once. Gagne suggests that there are short-term phases and long-term phases. He goes on to say that these short-term and long-term plans should be kept separate and that educators should focus their efforts accordingly. Gagne's third assumption is that instructional systems have the power to affect individual human development. This is an important point for librarians, because as educators we typically forget the impact we can have on our users. In terms of instructional systems design, Gagne proposes that "a fundamental reason for instructional design is to ensure that no one is

'educationally disadvantaged' and that all students have equal opportunities to use their individual talents to the fullest degree" (1992, 5). The fourth concept is that instructional design should occur within the larger framework of an instructional system, and not as a stand-alone effort. Gagne is famous for exploring the systems approach to instructional design: "The systems approach to instructional design involves the carrying out of a number of steps beginning with an analysis of needs and goals and ending with an evaluated system of instruction that demonstrably succeeds in meeting accepted goals" (ibid.). Finally, Gagne points out that instructional design must "be based on the knowledge of how human beings learn" (ibid.).

Gagne also (ibid., 8) urges instructional designers to create instruction that incorporates three fundamental learning principles, each of which is based on foundational learning theory: contiguity (the situation surrounding what needs to be learned is presented at the same time as the desired response or outcome); repetition (the situation involving what is to be learned and the desired response needs to be repeated and practiced) and reinforcement (a new skill is best acquired when connected to old skills, enjoyed by the learner, and the two become contingent upon one another). Gagne provides a sound rationale for integration of each of these concepts into instructional design, and this can be a lesson to any librarian working in a teaching environment.

Other key influences

Instructional design is a combination of a number of different ideas, principles and guidelines that represent a broad intersection of theories on teaching and learning.

There are a number of other key influences, as Reiser (2001, 61) indicates: "In the early and mid-1960s, the concepts that were being developed in such areas as task analysis, objective specification, and criterion-referenced testing were linked together to form processes, or models, for systematically designing instructional materials." These criterion-referenced tests were used to assess how well a student could perform a certain task, and differed from norm-referenced tests, which depend on how well all the test takers do (Reiser, 2001). Glaser (1963) argued that this type of test could be used to provide a baseline measure for how well students had met learning objectives established by instructional design programs.

The historical development of instructional design was also heavily influenced by the theory of Constructivism. In 1932, Frederic Bartlett, a British experimental psychologist, theorized that how people learn is actually a coming together of their experiences, and that they interpret the world around them (and anything that is to be learned) on the basis of their worldview and experiences. Schulte (1996, 25) provides the following definition of Constructivism:

> Constructivism says that learners bring their personal experiences into the classroom and these experiences have a tremendous impact on students' views of how the world works. Students come to learning situations with a variety of knowledge, feelings, and skills, and this is where learning should begin. This knowledge exists within the student and is developed as individuals interact with their peers, teachers, and the environment. Learners construct understanding or meaning by making sense of their experiences and fitting their own ideas into reality.

The instructional principles associated with Constructivism include requiring learners to:

1. Solve complex and realistic problems
2. Work together to solve those problems
3. Examine the problems from multiple perspectives
4. Take ownership of the learning process (rather than being passive recipients of instruction)
5. Become aware of their own role in the knowledge construction process. (Driscoll, 2000)

Merrill (1991) suggested the following constructivist assumptions:

1. Knowledge is constructed from experience
2. Learning is a personal interpretation of the world
3. Learning is an active process in which meaning is developed on the basis of experience
4. Conceptual growth comes from the negotiation of meaning, the sharing of multiple perspectives and the changing of our internal representations through collaborative learning
5. Learning should be situated in realistic settings
6. Testing should be integrated with the task and not a separate activity. (Merrill, 1991, 46)

Constructivism is highly relevant for library instruction, especially within the framework of instructional design. Librarians may take from this theory the importance of understanding how their students see the world in order to design instruction that is going to be effective. Hands-on problem solving moves to the forefront as a teaching tool,

and standardized scripts or curricula take a back seat. Evaluative activities such as tests should focus on real-world problem solving, and less on recitation and recall of endless facts, dates and events. The theory of Constructivism is discussed further in the next chapter.

International development

While much of the early development of instructional design occurred in the United States, the concept was also developed in areas of Europe as early as the eighteenth and nineteenth centuries (Einsiedler, 1997, 269). It is only since the late 1960s that research on the design of instruction and better teaching methods has grown noticeably on an international scale. There are some key differences between the development of instructional methods in the United States and in Europe, one being that in the United States the approach to learning theories was, for the most part, grounded initially in Behaviorism and later in Cognitivism (see the next chapter). In Europe, more emphasis was placed on broad concepts such as "discovery learning" (ibid., 275). Learning approaches such as the Montessori method and others, Einsiedler suggests, may be seen as the predecessors of modern-day instructional design. Influences included psychologists such as Mueller, whose focus was on the role of the imagination in the learning process. Gestalt psychology also played a role as psychologists began to consider the role of the "complete cognitive structure" in the learning process (ibid., 270). Jean Piaget, a developmental psychologist best known for his work in child development, influenced later instructional design theorists by advancing the impact of Constructivism on learning. Hans Aebli (1951) advanced active learning methods (learning by doing

and/or acting), hands-on practical learning that, he proved, supported the learning of students. Einsiedler suggests that "the work of Aebli, which unfortunately is not so well known in English-speaking countries, is more important for the instructional theory than is the developmental psychology of Piaget. Early on, Aebli investigated the connection between external activities and internal cognitive advancements" (1997, 272). Each of these influences is important, as they highlight the fact that, globally, those investing in educational practice were looking for better ways to teach and working to document more effective learning strategies.

In order fully to make sense of instructional design and its application, a brief overview of how we learn and key learning theories is necessary. The next chapter will provide this review before moving on to a discussion of specific instructional design models.

References

Aebli, H. (1951). *Psychological Didactics. The Application of Piaget's Psychology to Didactic*, Neuchatel, Switzerland: Delachaux and Niestle.

Bloom, B. et al. (1956). *Taxonomy of Educational Objectives: The Classification of Educational Goals*, Chicago, IL: Susan Fauer Company, Inc.

Dick, W. (1987). A History of Instructional Design and its Impact on Educational Psychology. In J. Glover and R. Roning (eds), *Historical Foundations of Educational Psychology*, New York: Plenum.

Dick, W. and Carey, L. (1985). *The Systematic Design of Instruction*, New York: Harper Collins.

Driscoll, M. (2002). Psychological Foundations of Instructional Design. In R. Reiser and J. Dempsey (eds), *Instructional Design and Technology*, Upper Saddle River, NJ: Pearson Education, Inc.

Einsiedler, W. (1997). Research on Instructional Methods: A European Perspective. In R. Tennyson, F. Schott, N. Seel, and S. Dijkstra (eds), *Instructional Design International Perspectives Vol. 1: Theory, Research and Methods*, Mahwah NJ: Lawrence Erlbaum and Associates.

Gagne, R. (1965). *The Conditions of Learning and the Theory of Instruction*, Fort Worth, TX: Harcourt Brace College Publishers.

Gagne, R. (1992). *Principles of Instructional Design*, Fort Worth, TX: Harcourt Brace and Jovanovich.

Glaser, R. (1963). Instructional Technology and the Measurement of Learning Outcomes: Some Questions. *American Psychologist*, vol. 18, pp. 519–21.

Mager, R. (1962). *Preparing Objectives for Programmed Instruction*, Belmont, CA: Fearon.

Merrill, M.D. (1991). Constructivism and Instructional Design. *Educational Technology*, vol. 31, no. 5, pp. 45–53.

Molenda, M. (1997). Historical and Philosophical Foundations of Instructional Design: A North American View. In R. Tennyson, F. Schott, N. Seel, and S. Dijkstra (eds), *Instructional Design International Perspectives Vol. 1: Theory, Research and Methods*, Mahwah NJ: Lawrence Erlbaum and Associates.

Resier, R. (2001). A History of Instructional Design and Technology: Part II: A History of Instructional Design. *Educational Technology Research and Development*, vol. 49, no. 2, pp. 57–67.

Schulte, P. (1996). A Definition of Constructivism. *Science Scope*, vol. 20, no. 6, pp. 25–7.

Silber, K. (1977). *Educational Technology: Definition and Glossary of Terms, Volume I*, Washington, DC: Association for Educational Communications and Technology.

Silvern, L. (1965). *Basic Analysis*, Los Angeles, CA: Education and Training Consultants Co.

Skinner, B.F. (1954). The Science of Learning and the Art of Teaching. *Harvard Educational Review*, vol. 24, no. 2, pp. 86–97.

Watson, R. (1981). Instructional System Development. Paper presented to the *International Congress for Individualized Instruction*, EDRS publication, ERIC document number 209 239.

2

How we learn: fundamental learning theory and the connection to instructional design

Schiffman (1995) suggests that learning theory is an essential component of any instructional designer's repertoire of knowledge. This is because in order to design instruction, instructional designers must understand the psychology of how it will be absorbed by learners. Chapter 1 reviewed the history of instructional design and described the role of cognitive and educational psychologists as key players in the early instructional systems design movement. Yet, the theory behind how we learn is often not incorporated widely into the design of instruction within the academic library framework. There are many reasons for this – lack of expertise, lack of time, lack of clear objectives – but it does not mean that understanding how library users and others on the receiving end of instruction learn is not highly beneficial to the design of instruction. There is an extensive body of knowledge and research on how we learn and acquire knowledge, but there are three broad, foundational learning theories that are important to understand within the instructional design mosaic: Behaviorism, Cognitivism and Constructivism. This chapter will provide a brief overview of these theories and of the key figures in each area, and illustrate the connection to instructional design.

Learning is characterized in many different ways. For the behaviorist, learning is a recognizable change in behavior. Learning can be external to the student, or internally focused (Ramsden, 1992). Learning as a process is made up of many different events, some simple, some complex. There are also distinctions between the types of learning that occur for individuals. Ryle (1949) discusses the difference between levels of knowing about something and knowing how to do something, stating that "learning how or improving an ability is not like learning that or acquiring information. Truths can be imparted, procedures can only be inculcated, and while inculcation is a gradual process, imparting is relatively sudden. It makes sense to ask at what moment someone became apprised of a truth, but not to ask at what moment someone acquired a skill" (ibid., 58). Learning as a process may be task conscious or acquisitive in nature, or learning conscious and formalized. Task-conscious or acquisition learning takes place when a learner is focused on a specific activity and learning what it takes to navigate that task. It is not concerned with theories or principles. Smith (1999) suggests that parenting is a good example. Learning-conscious or formalized learning is the type of learning that goes on in a classroom, where students are aware that they are being taught and that there is a learning process going on. Interestingly enough, these types of learning are not mutually exclusive: "Both are present in schools. Both are present in families. It is possible to think of the mix of acquisition and formalized learning as forming a continuum" (ibid., 3).

Behaviorism

Behaviorist theory suggests a relatively permanent change in behavior, due to certain experiences. These changes are

external (Ormrod, 1999) and can be observed and measured in a scientific manner (Good and Brophy, 1990). Early pioneers in the area advanced that how we learn has far less to do with our mental capacities or emotional states and much more to do with how we interact with and respond to our environment. Behaviorism focuses solely on outward, demonstrable actions and has little regard for internal processes that may impact how we act and learn. These interactions and responses can also be manipulated or conditioned, and early experimentation demonstrated the impact of conditioning on behavior. There are several key elements of Behaviorism: reinforcement, contiguity, repetition, variation, intermittent reinforcement, and extinction (Carlile, Jordan and Stack, 2004, 9).

Scholars such as Pavlov, Watson, Thorndike and Skinner were early behaviorists, although each had a particular area of concentration. Ivan Pavlov is the architect of perhaps the best-known conditioning work, demonstrating in the early 1920s that by linking a neutral stimulus and an unconditioned stimulus, he could predict certain responses in his subjects. Researchers frequently credit John Watson, an American psychologist who practiced during the early and mid 1900s, with being the founder of the American Behaviorism movement. His work incorporated a lot of the research conducted by Pavlov and, like Pavlov, Watson initially worked with animals to conduct his research. Watson is quoted as saying "give me a dozen healthy infants, well-formed, and my own specified world to bring them up in and I'll guarantee to take any one at random and train him to become any type of specialist I might select – doctor, lawyer, artist, merchant-chief and, yes, even beggar-man and thief, regardless of his talents, penchants, tendencies, abilities, vocations, and race of his ancestors" (Watson, 1930, 104). One of the most-often referenced experiments

of the time was Watson's "Little Albert" experiment, conducted by Watson and his assistant Rosalie Rayner in 1920. They sought to demonstrate aspects of classical conditioning by eliciting certain reactions from a child who was exposed to pairings of unconditioned, neutral and conditioned stimuli (Watson and Rayner, 1920).

B.F. Skinner, another key founder, is perhaps best known for his creation of the "Skinner box" in connection with his research on operant conditioning, which enabled him to observe how animals reacted to their environment. Skinner coined the phrase "radical behaviorism," which allowed for thoughts and feelings to be considered as part of the behavioral mosaic. Skinner also researched the role of reinforcement in behavior and learning, suggesting that positive reinforcement was a much more powerful tool than was punishment. Skinner wrote *The Behavior of Organisms* in 1938 and also designed "the teaching machine," a tool he created to facilitate better teaching in the classroom.

American psychologist Edward L. Thorndike focused his work on theories of intelligence. Some of his better-known findings led to the conceptualization of the Law of Effect, the Law of Readiness and the Law of Exercise. Each of these concepts connected responses and stimuli to satisfaction and discomfort. Four main concepts were derived from Thorndike's principles: learning requires both practice and rewards (laws of effect/exercise); a series of stimulus-response connections can be chained together if they belong to the same action sequence (law of readiness); transfer of learning occurs because of previously encountered situations; and intelligence is a function of the number of connections learned (law of exercise) (Thorndike, 1911). Thorndike also investigated the role of psychology in educational settings and suggested that "psychology contributes to knowledge of methods of teaching in three

ways. First, methods may be deduced outright from the laws of human nature ... Second, methods may be chosen from actual working experience, regardless of psychology, as a starting point ... Third, in all cases psychology, by its methods of measuring knowledge and skill, may suggest means to test and verify or refute the claims of any method" (Thorndike, 1910).

Behaviorism has a variety of implications for instructional design practitioners. On the negative side, it suggests that learners do not have much flexibility in terms of how or what they learn. Carlile and Jordan (2005, 15) refer to this, saying "the influence of behaviourism on education has been both malign and benign. Behaviourism assumes, at its most sinister, the kind of authoritarian manipulation of people you find implicit in the kind of 'conditioning' that Anthony Burgess attacked in his book *A Clockwork Orange*. Behaviourism allows little room for creativity, independent learning or for the concept of mind at all." On the other hand, Behaviorism did have a positive influence on instructional practices and design. The use of repetition, the creation of written goals and learning objectives, and the specific details of what type of outcomes should be expected with each educational intervention owe to behaviorist theory (Carlile and Jordan, 2005). Carlile and Jordan go on to suggest that "behaviourism works best in the teaching and assessment of competencies, where you want to test and verify that the student or trainee does indeed possess the requisite skills or competencies" (ibid., 16). They list eight behaviorally relevant guidelines for teaching and instruction:

1. List the learning outcomes
2. Assessment must be based on these learning outcomes
3. Break the material down into smaller units

4. Carefully sequence these units according to the desired learning
5. Present the rules for learning the topic
6. Ensure that the learner actively responds
7. Provide opportunities for frequent learner feedback
8. Reinforce correct behavior with immediate rewards. (Carlile, Jordan and Stack, 2004, 10)

Cognitivism

Cognitivism is based on the idea that our learning is far more complex than a series of learned or stimulated behaviors. It suggests that experience plays a significant role, and that the changes are not as readily observable as they are in the behaviorist model. Cognitivism gained popularity in the mid to late nineteenth century. It was not intended to completely discredit the behaviorist movement, but rather to suggest that there were also mental, motivational and emotional aspects to learning. Although the role of the environment is not totally discounted, the emphasis is on the series of mental events or processes that occur as an individual attempts to learn something new. The events may include various levels of information intake, synthesizing and evaluation. Teaching thus becomes an attempt to harness these processes to facilitate more effective learning. The foundational research in the area included the investigation of attention, memory and perception. How the mind works to organize, store and then retrieve new information are key concepts in Cognitivism, and these activities also play a role in the practice of instructional

design. Carlile and Jordan describe several cognitivistic guidelines related to teaching and instructional design:

1. Promote active listening
2. Do not overload short term memory by presenting too much material at once
3. Do not lecture for more than twenty minutes without a break
4. Chunk materials into groups or categories to facilitate retention
5. Make the structure and patterning of the material explicit for learners
6. Present material in more than one form to facilitate transfer to long term memory
7. Give learners the opportunity to revisit topics to strengthen retention
8. Use key words and terms as memory cues
9. Outline the meta-cognitive strategies needed for your subject. (Carlile and Jordan, 2005, 19)

The teacher/instructor still plays an important role in cognitivist theory. Jean Piaget, Jerome Bruner and David Ausubel are key figures in the field, responsible for concepts such as Piaget's Theory of Development, Discovery Theory of Learning (Bruner) and Assimilation Theory (Ausubel).

Jean Piaget is best known for his work with children and articulating one of the best-known models for child development. Paiget's four stages of development (sensorimotor, preoperations, concrete operations and formal operations) are based on cognitive theory and demonstrate that, as children grow, their cognitive structures become more and more sophisticated as they learn to

integrate and then respond to different experiences. Piaget's work has implications for educators in that teachers must not discount the power of a child's experience on learning, and that any material taught in the classroom should be in keeping with the various developmental stages that a child learner goes through.

Jerome Bruner is an American psychologist who focused on educational and learning psychology. He worked with both adults and children, and his work was novel in that it approached learning by contextualizing the narrative or story. Bruner studied how people make sense of their world, and how learning takes place. He believed that people could learn almost anything at any point in their lives, provided the information and learning were structured in certain ways: "We begin with the hypothesis that any subject can be taught effectively in some intellectually honest form to any child at any stage of development" (Bruner, 1962, 33). Bruner suggests that there are three ways that children in particular represent and give meaning to thoughts and events: the enactive mode, where actions are the key to interacting with objects; the iconic mode, where visual images are the key to interacting with the surrounding environment; and the symbolic mode, in which language is the key element in terms of interacting with the surrounding environment.

American psychologist David Ausubel concentrated primarily on educational psychology and how school-based or intentional learning takes place. Ausubel described the concept of meaningful learning – the idea that learners derive meaning by relating old information that has been integrated with their experience and worldview, and new information. Ausubel (1963) proposed three organizational strategies for instructors so that content and learning would be more meaningful. These are summarized nicely by Driscoll (1994, 118): subordinate to

the new information; superordinate to the new information; or coordinate with existing information. He also developed specific teaching strategies for instructors to support meaningful learning, including those of the advance organizer (a way to link previously learned material with new material), the comparative organizer and the concept of progressive differentiation.

Constructivism

Constructivism is the last of the three major learning theories. It is perhaps the most complex, suggesting that learning takes place as people experience the world and build meaning based on those experiences. Psychologists Bruner and Piaget, mentioned above, are also frequently referenced as key figures in the constructivist movement. "Constructivists claim that people construct their own meaning by building on their previous knowledge and experience. New ideas and experiences are matched against existing knowledge, and the learner constructs new or adapted rules to make sense of the world. Constructs are created which are representations of the world. These are used to measure and validate current experience and to predict new experience. Constructivism therefore is a dynamic process where small localized changes in these constructs may lead to this change in overall understanding" (Carlile and Jordan, 2005, 19). Carlile, Jordan and Stack relate nine parameters of Constructivism for instruction:

1. Approach material from the learner's perspective and values
2. Acknowledge and accommodate student diversity (ability, age, gender, culture, nationality)

3. Encourage reflection through the use of learning journals
4. Present an overview of the topic, including purpose and objectives
5. Explain the relevance of the topic
6. Build on what is already known
7. Encourage active learning and discovery
8. Give timely feedback on performance
9. Constructively align objectives, strategies and assessment. (Carlile, Jordan and Stack, 2004, 17)

There are a number of constructivist influences that impact instructional design in libraries. In both behaviorist and cognitivist practice, the focus is on the teacher/instructor, not the learner. Constructivism lays the groundwork for a more learner-centered focus, which means that the background, learner strengths, learner preferences, learning readiness, motivation and even personality traits of the learner are taken into account. The Myers-Briggs Inventory, for instance, works from the premise that individual personality characteristics may provide valuable information about which learning areas may be best for individuals (Myers and Briggs, 1980). Constructivism also proposes a diverse range of learning skills and styles, due to the varied experiences that learners bring to the classroom. Thus adults have very different learning profiles than do children because they have had more experiences upon which to base their understanding of the world.

There are some key theorists who have used constructivist foundations to explicate learning theory. Knowles (1980) detailed the differences between child learners (pedagogic learning) and adults (andragogic learning). While child learners rely on others to decide what is important, adult learners decide this for themselves. Children accept

information at face value, while adults use experience to validate information. Children do not necessarily expect what they learn to be immediately useful, while in most cases adults do. Children do not have much experience on which to base their ideas; adults have quite a bit more. Finally, children cannot act as a resource group, and adults can. Each of these differences corresponds to five assumptions about the adult learner: the concept of self, experience, readiness, orientation and motivation (ibid.). Knowles further suggests that, for instruction to be effective with adults, it should be clear as to why they are learning something, the instruction should include active problem solving and it should be immediately applicable in some meaningful way.

In addition to andragogic learning concepts, ideas such as multiple intelligence theory (Gardner, 1999) and emotional intelligence (Goleman, 1996) also use constructivist principles to inform their design. Multiple intelligence theory suggests that there is more than one type of intelligence, a result of a wide variety of individual potential, experience, practice and motivation (Gardner, 1996). Some of these intelligences include linguistic intelligence, logical-mathematical intelligence, spatial intelligence, kinesthetic intelligence, musical intelligence and interpersonal intelligence (Hyland, 2000, 32). Goleman's emotional intelligence theory advances that emotions play a key role in all areas of our lives, including how we learn. Experiential learning, which places greater emphasis on *doing*, seems particularly relevant to the type of instruction frequently seen in academic library settings, where users engage in active learning using the resources that are being demonstrated, normally applied to a current assignment or class-related task. Houle (1980, 21) describes experiential learning as "education that occurs as a direct participation in the events of life." Kolb and Fry (1975) developed a spiral model for experiential learning, consisting of four main elements:

concrete experience, observation and reflection, forming abstract concepts, and testing in new situations.

Connecting learning theory and instructional design in libraries

Instruction in academic libraries often means mixed audiences of learners. New college students may be as young as 17, while returning or non-traditional students can be of many different ages. Paying attention to the diversity of learning groups is important in terms of designed instruction. The National Research Council (2000, 51) suggests that "it is especially important to understand the kinds of learning experiences that lead to transfer, defined as the ability to extend what has been learned in one context to new contexts." The transfer of learning is key with regard to the information librarians teach users – a user must be able to contextualize the use of a database as a tool for research and transfer/apply searching techniques to a wide variety of different resources. Users must also be able to transfer general knowledge about how electronic resources work to the resources in their disciplines.

There are a number of implications for libraries, especially having to do with the provision of online learning, using multimedia tools. Tempelman-Kluit (2006, 364) suggests that "online library instruction has not traditionally been designed based on educational learning theories. Rather, much of it has been designed in the structure and format of print, with little thought given to the pedagogical approaches that support web-based learning." Tempelman-Kluit goes on to discuss the advantages of using learning theory as a foundation for building library content,

specifically multimedia content. Six concepts are relevant for enhancing instructional design activities:

1. The modality effect
2. Dual coding theory of multimedia
3. Contiguity (temporal and spatial considerations)
4. Redundancy effect
5. Constructivism
6. Segmenting. (Tempelman-Kluit, 2006, 365)

The modality effect suggests that online learning is enhanced when information is presented visually and verbally. Tempelman-Kluit provides an example of this as follows: "Instruction that employs both memory channels, such as coupling animation and narration, is a more effective delivery mode than coupling animation with on-screen text, which utilizes only the visual-processing channel of working memory" (ibid., 366). A web page with html only is therefore not as rich a learning medium. The principle of contiguity asserts that when "images and text are provided close together, connections linking the two types of information will be made more easily and mental models leading to meaningful learning will occur" (ibid.). Temporal contiguity is similar, and suggests that visual and verbal information be presented at the same time to the learner. Redundancy is meant to decrease the cognitive burden of the learner, and to focus learning energies on the material to be learned. If text and images (both visual) are both presented and require the learner to take them in order to understand a concept, this can lead to an overload of the visual channel (ibid.). Narration (verbal) and images (visual) therefore are a much better pairing because they use different channels.

The idea of Constructivism, covered earlier in this chapter, is also useful in terms of allowing users to define for

themselves what type of instructional content they need at any given moment, and even what methods of delivery might be best. Designers of instruction are therefore urged to integrate choices into tutorials and other learning activities. Tempelman-Kluit (2006) advises that self-directed learners such as those who endeavor to use library tutorials on their own may feel "locked in" if there are no choices in terms of speed of delivery, navigation and mode of delivery. Finally, segmenting is a basic principle often employed in instructional design. Bruning et al. (2003) indicate that a segmented learning task either reduces the overall load or enables the learner to handle the workload with greater efficiency. Breaking down instruction into more manageable concepts allows learners to process smaller pieces of information and integrate them into their mental models.

There are a number of considerations that also have to do with learning environments. It is not stretching a point to say that libraries themselves are learning environments, and the focus on instruction and information literacy education makes this even more so. The National Research Council recommends that learning environments need to be taken into account as part of the process of teaching (2000, 131). It names four different types of learning environment: learner centered, knowledge centered, assessment centered and community centered (ibid.). Learner-centered environments are those that "pay careful attention to the knowledge, skills, attitudes, and beliefs that learners bring to the educational setting" (ibid., 133). The Council implies that this approach takes into account cultural differences of the learner, as well as other indicators of what the learner is thinking, how they perceive the information being shared, and any challenges to learning. Knowledge-centered environments "help students to become knowledgeable by learning in ways that lead to understanding and subsequent transfer" (ibid., 136). This may

include a focus on activities that provide students with a context for learning in a certain area, for instance (ibid.). Assessment-centered environments use various means to determine how effective instruction is, and ways to improve instruction. Finally, community-centered environments take into account factors outside of the classroom that impact student learning. These may include the role of the school, the neighborhood, friends and family and, to a certain extent, the world beyond local or state borders (ibid., 145).

The National Research Council (2000) concludes that each of these factors should be taken into account when evaluating teaching practices, spaces and programs. No one model will be able to support effective learning – at some point, each of the four aspects must be considered. Academic libraries should focus on the areas where there are already strengths, and build on learner- and knowledge-centered aspects of instructional programs. Libraries struggle to integrate assessment as a routine practice in many instructional venues, and these efforts will continue to be both a challenge to librarians and critical to the improvement of instructional efforts. Community-centered work is much more of a challenge for academic libraries, typically not as involved in the life of the community as are public libraries.

The next chapter will introduce some key instructional design theories, highlight important connections to learning theory, and illustrate how these theories may be relevant within library instructional settings.

References

Ausubel, D. (1963). *The Psychology of Meaningful Verbal Learning*, New York, NY: Grune & Stratton.

Bruner, J. (1962). *The Process of Education*, Cambridge, MA: Harvard University Press.

Bruning, R. et al. (2003). *Cognitive Psychology and Instruction*, Upper Saddle River, NJ: Pearson Merrill Prentice Hall.

Carlile, O. and Jordan, A. (2005). It Works in Practice But Will it Work in Theory? The Theoretical Underpinnings of Pedagogy. In G. O'Neill, S. Moore, and B. McMullin (eds), *Emerging Issues in the Practice of University Learning and Teaching*, Dublin, Ireland: AISHE.

Carlile, O., Jordan, A. and Stack, A. (2004). *Learning by Design: Learning Theory for the Designer of Multimedia Educational Materials*, Waterford, UK: WIT/BBC Online.

Driscoll, M.P. (1994). *Psychology of Learning for Instruction*, Needham Heights, MA: Allyn & Bacon.

Gardner, H. (1999). *Intelligence Reframed for the 21st Century*, New York, NY: Basic Books.

Goleman, D. (1996). *Emotional Intelligence*, London: Bloomsbury Press.

Good, T. and Brophy, J. (1990). *Educational Psychology: A Realistic Approach*, White Plains, NY: Longman Publishing.

Houle, C. (1980). *Continuing Learning in the Professions*, San Francisco, CA: Jossey-Bass.

Hyland, A. (2000). *Multiple Intelligences: Curriculum Assessment Project*, Cork: UCC Final Report.

Knowles, M. (1980). *The Modern Practice of Adult Education: From Pedagogy to Andragogy* (2nd edition), Chicago, IL: Follett.

Kolb, D. and Fry, R. (1975). Toward an Applied Theory of Experiential Learning. In C. Cooper (ed.), *Theories of Group Process*, London: John Wiley.

Myers, I. and Briggs, K. (1980). *Gifts Differing*, Palo Alto, CA: Consulting Psychologists Press.

National Research Council (2000). *How People Learn: Brain, Mind, Experience and School*, Washington, DC: National Academy Press.

Ormrod, J. (1999). *Human Learning* (3rd edition), Upper Saddle River, NJ: Prentice-Hall.

Ramsden, P. (1992). *Learning to Teach in Higher Education*, New York, NY: Routledge.

Ryle, G. (1949). *The Concept of Mind*, London: Hutchinson & Company Publishers.

Schiffman, S. (1995). Instructional Systems Design: Five Views of the Field. In G. Anglin (ed.), *Instructional Technology: Past, Present and Future* (2nd edition), Englewood, CO: Libraries Unlimited, Inc.

Skinner, B.F. (1938). *The Behavior of Organisms. An Experimental Analysis*, New York, NY: D. Appleton-Century Company, Inc.

Skinner, B.F. (1958). Teaching Machines. *Science*, vol. 128, pp. 969–77.

Smith, M. (1999). Learning Theory. In *The Encyclopedia of Informal Education*, available from www.infed.org/biblio/b-learn.htm (accessed 20 March 2008).

Tempelman-Kluit, N. (2006) Multimedia Learning Theories and Online Instruction. *College and Research Libraries*, vol. 67, no. 4, pp. 364–369.

Thorndike, E.L. (1910). The Contribution of Psychology to Education. *Journal of Educational Psychology*, vol. 1, pp. 5–12.

Thorndike, E.L. (1911). *Animal Intelligence*, New York, NY: Macmillan (Reprinted Bristol: Thoemmes, 1999).

Watson, J. (1930). *Behaviorism* (revised edition), Chicago, IL: University of Chicago Press.

Watson, J. and Rayner, R. (1920). Conditioned Emotional Reactions. *Journal of Experimental Psychology*, vol. 3, no. 1, pp. 1–14.

3

The many faces of instructional design: highlighting the diversity of instructional design models

Gustafson and Branch (1997, 10) suggest that "there are literally hundreds of instructional design models in the literature." This chapter will highlight just six of these models in order to illustrate this diversity, and then reference them in connection with the application of instructional design within the academic library. Instructional design principles definitely have a place within higher education, but not all models are entirely relevant or appropriate.

To begin, it is important to understand why instructional design models are different from traditional approaches to teaching. The key differences may be summarized as follows:

1. Rigorous needs analysis identifies the most critical material and makes it a priority of the course
2. The course/instruction is designed around a specific audience
3. The course content is derived from learning objectives that clearly and specifically identify what a student is to learn
4. The course content is delivered in a variety of methods and carefully scripted to evoke maximum learning and retention

5. Evaluation is varied and frequent
6. Evaluations are keyed to the learning objectives
7. Evaluations are used both as a teaching tool and a feedback tool that allows instructors to improve the content. (CogSim Educational Consulting, 2007)

Logan (1982) suggests that there are three very general types of instruction. The first type of instruction relies on the master teacher (ibid., 1). The teacher, who can be an expert in a single field or a variety of fields, selects the knowledge he/she wishes to share, based on personal commitment, interest and motivation. The disadvantage, Logan states, is that when the master teacher dies, so too does the creation of original material (ibid.). The second type of instruction is driven by the learner. According to Briggs (1970, 1), this method is far more spontaneous and the instruction is created on the basis of the learner's needs. The teacher merely provides a location, the materials, certain resources and feedback (Logan, 1982, 1). The third type is based on a more scientific approach to the learning and is really what would be referred to as the instructional systems design model. This model uses a formula that includes outcomes, determining how to achieve those outcomes, and looking toward improving performance on the part of the learner (ibid., 2). The advantages of using such a model include that it can be used for large groups and for different subject matter – a flexibility that is lacking in the other two approaches.

Gustafson and Branch (2002) suggest that all instructional design models have characteristics in common: they are learner-centered, goal-oriented, focused on real-world performance, focused on measureable outcomes that can be evaluated for reliability and validity, are empirical and represent a team effort (ibid., 21). Gustafson and Branch go on to address each of these characteristics in turn.

Learner-centered instructional design implies that the learner is the focus of the process and that all considerations are in support of creating the best possible learner experience. Goal setting represents the first and perhaps most important initial step in the process. The instructional design process should focus on providing the learner with some authentic, real-world knowledge or skill, otherwise it will not be so meaningful to the learner (Gustafson and Branch, 2002). The evaluation of the outcomes is key – if they cannot be measured, it is difficult to know what learners have retained. The empirical nature of the instructional design process means that data collected before, during and after the instruction helps to guide the improvement of the teaching. Finally, the best approach to instructional design is a team approach, since it requires skills that cross disciplines and individual strengths.

Six examples of instructional design models

This section will present six models that have the common components referred to above, but which represent them in very different ways. They are the Dick and Carey model, the ADDIE model, the BLAAM model, the Morrison, Ross and Kemp model, the ASSURE model and the ARCS model.

Dick and Carey model

This instructional design model was first developed in 1968, as part of a course taught at Florida State University. Dick and Carey (1985, preface) state that "the model has been most heavily influenced by the work of Robert Gagne, Leslie Briggs, Robert Mager, Robert Glaser and Lee Cronbach."

They further clarify the orientation of the model, stating that it is a "behaviorally oriented model stressing the identification of skills students need to learn, and the collection of data from students to revise instruction" (ibid., preface). Dick and Carey's model is referenced frequently in the literature as being one of the most influential early models. The systems approach, which is the foundation of the model, has as its goal "to see the important role of all the components in the process" (ibid., 3). The focus of the model is the procedures that, when used as a system, produce a desirable set of outcomes for the user and the learner. Dick and Carey emphasize that their systems model represents more than twenty years of research on the learning process and learning theory and brings together concepts from behavioral psychology, educational psychology and cognitive psychology. The model is unique in that it amplifies the systems approach to designing better teaching. This emphasis is still a major influence on instructional design. The focus on learning outcomes, the connection between each of the components and their relation to the learning outcomes, and the empirical nature of the model are all reasons for its effectiveness (ibid., 7). Implementation of the model can occur in a variety of ways – a teacher can deliver the designed instruction in person; instruction can be delivered electronically and/or virtually; or a combination of both delivery methods can be used. There are ten interconnected components of the Dick and Carey model:

1. Identify an instructional goal – What do you want learners to be able to do when they have completed the instruction?
2. Conduct an instructional analysis – A step-by-step determination of what type of learning is required of the learners. The specific subordinate skills that a learner

must learn in order to master a particular process are detailed.

3. Identify entry behaviors and characteristics – What skills must learners have prior to beginning the instruction? What learner characteristics are important in terms of facilitating the most effective learning experience?
4. Write performance objectives – List the specific behavior skills to be learned, the conditions under which they must be performed and the criteria for successful performance.
5. Develop assessment instruments (criterion-referenced test items) – Based on the objectives listed above, develop an evaluative tool to measure the learner's ability to achieve what was described in the objectives.
6. Develop instructional strategy – Based on the five preceding steps, identify the strategy to achieve the instructional outcomes, and select the method for delivery.
7. Develop and select instruction – Produce the relevant instructional materials.
8. Design and conduct formative evaluation – Use small groups or individuals to test the instructional materials prior to use. This will allow for revision prior to distribution.
9. Revise instruction – Feedback from the formative evaluation is used to identify difficulties experienced by learners in achieving the objectives. These difficulties are then examined to determine if they are related to deficiencies in the instructional materials. The instructional materials are then revised accordingly.
10. Summative evaluation – A thorough evaluation of the effectiveness of the instruction is conducted at the conclusion of the process. (Dick and Carey, 1985, 2)

The ADDIE model

Perhaps the best-known label for a set of instructional design processes is ADDIE. ADDIE is actually an acronym that stands for analysis, design, development, implementation and evaluation. Unlike the Dick and Carey model, the ADDIE model has no one primary source or individual responsible for its development. In fact, Michael Molenda, an instructional design scholar, wrote "the most obvious place to start such a search is in the existing dictionaries and encyclopedias of instructional technology, education, and training. ADDIE does not appear in any of them" (Molenda, 2003, 1). He further goes on to state: "I am satisfied at this point to conclude that *the ADDIE Model* is merely a colloquial term used to describe a systematic approach to instructional development, virtually synonymous with instructional systems development (ISD). The label seems not to have a single author, but rather to have evolved informally through oral tradition. There is no original, fully elaborated model, just an umbrella term that refers to a family of models that share a common underlying structure" (ibid., 2). Because the principles are so generic, there may be hundreds of variations of the ADDIE concept, but they all share the same basic elements.

The ADDIE process is an example of an instructional systems design approach and is a conceptual representation of the processes involved (Reiser, 2002, 19). Reiser points out that the steps illustrated in ADDIE are usually not implemented in a linear fashion, and the power of the model is in the reiterative, flexible nature of the components. "For example, during the life of a project, as data are collected and the development team gains insights, it is often necessary to move back and forth among the activities of analysis, design, and formative evaluation and revision.

Thus, the iterative and self-correcting nature of the instructional design process emerges as one of its greatest strengths" (ibid., 19). McGriff (2000) defines the phases of the ADDIE process as follows:

1. Analysis

This phase is the foundation for all other phases of the instructional design process. During this phase, the problem is defined, the source of the problem identified and solutions examined. Specific research techniques such as needs analysis, job analysis and task analysis may be utilized. One of the most important products of this phase is the instructional goals. These goals and other related outputs from this phase form the inputs for the design phase.

2. Design

The focus of the design phase is the determination of how to reach the instructional goals determined during the previous phase of analysis. Some of the strategies used during this phase may include writing a description of the target population, conducting a more narrow learning analysis of the target population, writing test items, selecting a delivery system, and sequencing the instruction. As with the previous phase, the outputs of the design phase will become the inputs for the next phase.

3. Development

The purpose of the development phase is to generate the materials specific to the instruction, such as lesson plans. This phase also integrates the content and any media to be used during the lesson.

4. Implementation

Implementation indicates the actual delivery of the instruction, in whatever form that takes (in the classroom, in a lab, or virtually). This critical phase must ensure that the students understand the material being presented to them, that the learning objectives crafted in the early stages of the process are met, and that students can apply what they have learned in the appropriate settings (transfer of knowledge).

5. Evaluation

The final phase of evaluation allows instructors to measure how well the instruction has worked, then refine it so it becomes more effective. Evaluation can occur during the process (formative evaluation) and/or after the process is complete (summative evaluation).

The ADDIE concept presents a straightforward representation of these ideas that is easy to understand and follow.

The BLAAM model

The BLAAM model was first described in the 2007 book on blended librarianship by Bell and Shank (2007). The model is based on ADDIE but is tailored and condensed to better meet the needs of librarians, who often have few resources to devote to full-scale instructional design development (ibid., 55). BLAAM stands for Blended Librarians Adapted ADDIE Model. The phases of BLAAM are:

1. Assess
2. Objectives
3. Develop

4. Deliver
5. Measure.

During the *assess* phase, a needs analysis may be conducted and a problem statement developed (ibid., 56). The *objectives* phase includes the development of "clear, measureable objectives," very similar to the instructional goals articulated during the analysis phase of the ADDIE model (ibid.). The *develop* phase includes designing low-fidelity prototypes, implementation plans, and the "actual creation of whatever documents, multimedia, or materials are needed to conduct the instruction session" (ibid., 57). The fourth phase is *deliver*, and the final phase, *measure*, entails an evaluation of how the instruction met the objectives articulated earlier in the process.

The Morrison, Ross and Kemp model

The Morrison, Ross and Kemp (MRK) model, also an instructional systems design model, is known for its non-linear representation. Most applicable in classroom settings, it is usually represented by a series of concentric circles which are intended to convey the continuous nature of the design process. Researchers Gustafson and Branch (1997, 37) suggest that the MRK model primarily focuses on curricular design and planning. The model's developers consider the needs of the learner and focus less on the content (ibid., 39). The MRK model requires instructors to consider the following questions:

- What level of readiness do individual students have for accomplishing the objectives?
- What teaching and learning methods are most appropriate in terms of objectives and student characteristics?

- What media or other resources are most suitable?
- What support, beyond the teacher and available resources, is needed for successful learning?
- How is achievement of objectives determined?
- What revisions are necessary if a tryout of the program does not match expectations? (Kemp, Morrison and Ross, 1994, 6)

The MRK model also identifies nine elements of a successful instructional design plan:

1. Identify instructional problems, and specify goals for designing an instructional program
2. Examine learner characteristics that should receive attention during planning
3. Identify subject content, and analyze task components related to stated goals and purposes
4. State instructional objectives for the learner
5. Sequence content within each instructional unit for logical learning
6. Design instructional strategies so that each learner can master the objectives
7. Plan the instructional message and delivery
8. Develop evaluation instruments to assess objectives
9. Select resources to support instruction and learning activities. (Ibid., 8)

The ASSURE model

The ASSURE model, created by Heinich, Molenda, Russell and Smaldino (1996), is intended to support educators in

their use of different media and technology to enhance teaching and learning. It is most applicable in classroom settings. It does not have a graphical representation like some of the other models, but is represented, like ADDIE, as an acronym that stands for the following stages:

1. Analyze learners
2. State objectives
3. Select media and materials
4. Utilize materials
5. Require learner participation
6. Evaluation/review. (Heinich, Molenda, Russell and Smaldino, 1996)

The first step, that of analyzing the learners, must be completed in small increments. The creators suggest gathering only the most basic characteristics of the learners, their entry competencies and learning styles (ibid.). Clearly defining the learning objectives is the second step. Gustafson and Branch propose that "a rationale for stating measureable objectives is presented, including the role of objectives in strategy and media selection, assessment of learning, and communicating the intent of the instruction to learners" (1997, 42). The selection of media, the third step defined by the creators, stresses the importance of the method of delivery. This is exceptionally important today, where technology presents many different ways to reach learners. One way in which educators might brainstorm what media to use for delivery of instruction would be to evaluate the different attributes of various media, including but not limited to color, language, organization, integration of sound and pictures, and animation. Selection of media for instruction can be mapped to the most effective way of

presenting what needs to be learned. The fourth step in the model is to think through the use of materials in the educational setting. Actively involving the user by requiring user participation is the fifth step. This is somewhat different from other instructional design models that do not necessarily single out the learner for participation. The creators of this model felt the participation of the user and related feedback to be key to increased instructional effectiveness. Evaluation and review is the sixth and last step to inform the process. This step creates mechanisms for assessment that can then be used to improve future efforts.

The ARCS model of instructional design

The ARCS model was designed in the 1980s by John Keller at Florida State University. The acronym represents the following phases:

1. Attention
2. Relevance
3. Confidence
4. Satisfaction. (Keller and Keller, 1989)

The model differs from other instructional design models, as its foundation is workplace and psychological research on learning motivation. Teachers and instructors have long struggled with how to continually motivate students to learn and to want to learn. Researchers such as Pintrich (1999) suggest that motivation is a key factor in learning. There are a number of important components to the ARCS model. In their research, Porter and Lawler (1968) suggest that two key elements have to do with how learners see themselves in relation to what they are about to learn: they must value the activities/task they are learning, and they must believe that

they can successfully accomplish the task (ibid.). Small (1997b) describes this phenomenon further by saying that "in an instructional situation, the learning task needs to be presented in a way that is engaging and meaningful to the student, and in a way that promotes positive expectations for the successful achievement of learning objectives."

As noted above, there are four parts of the ARCS model: attention, relevance, confidence and satisfaction (Keller, 1983). The *attention* component provides various strategies designed to gain the attention of the student and maintain it. Keller (1987) suggests that providing novelty, presenting interesting questions and/or problem-solving opportunities, and using a wide range of media and methods to teach all increase the likelihood that a learner's attention will be captured. The concept of *relevance* is key, as it provides the link to the learner's interests and needs at the time of instruction (ibid.), and it calls for the instructor to articulate the learning objectives clearly and then match those objectives to learner needs and motives. Another strategy in this area might be presentation of the content "in a way that promotes positive expectations for the successful achievement of learning objectives" (Small, 1997b). The next component, *confidence*, helps learners to "develop a positive expectation for successful achievement" (Keller, 1983), and may include provision of challenging and meaningful opportunities for learning and for connecting students' success to their abilities and personal effort (ibid.). Finally, *satisfaction* provides strategies for reinforcement, such as an instructor providing feedback and recognition of student learning success, and building in consistent standards for the measurement of successful learning (ibid.).

There are also a number of additional instruments to help instructors determine how motivational their instructional designs are, from lesson plans to websites (Small, 1997a,

1997b; Keller, 1987b, 1989). The ARCS model presents an interesting instructional design approach for librarians, who often experience students as being unmotivated to learn information literacy skills or library-related matter. Applying the ARCS model and taking into account attention, relevance, confidence and satisfaction may help librarians to design instruction that not only meets the learning objectives but also enhances the learning experience for the students. This may in turn lead to increased participation in class, better retention of ideas and concepts, and students who are more engaged and interested in future sessions.

Deciding which model to use – classifying instructional design models

It is not possible or efficient to understand or review all of the various instructional design models. It does make sense to discuss the models that are most widely known and those that might, in turn, be used effectively within a library setting for instructional design. In their survey on instructional development models Gustafson and Branch review and classify thirteen models. Their taxonomy (1997, 27) provides an easy way to understand which models might be best applied in particular learning settings. They define three situations for the application of instructional design: classroom orientation, product orientation and system orientation. The *classroom orientation* category – a more traditional classroom student/instructor setting, where the students are enrolled in some type of coursework and participating in a curriculum – includes four models: the Gerlach and Ely model, the Morrison, Ross and Kemp model, the Heinich, Molenda, Russell and Smaldino model

(ASSURE) and the Reiser and Dick model. *Product orientation*, where instructional product development and implementation are the focus and very little contact with the end user is assumed, includes three models: the Van Patten model, the Leshin, Pollock and Reigeluth model and the Bergman and Moore model. Finally, *systems orientation* assumes that "a large amount of instruction, such as an entire course or entire curriculum will be developed" (ibid., 57). It includes six models: Instructional Development Institute (IDI); Interservices Procedures for Instructional Systems Development (IPISD)/Branson model; the Diamond model, the Smith and Ragan model, the Gentry model and the Dick and Carey model.

Librarians who teach know that not all learner groups are created equal, and the design of instruction for use in academic libraries should reflect the learning styles of the audience. The reality is that this is not always possible. How might libraries use instructional design principles to better integrate the learning needs of different user groups? Some of the models mentioned previously, such as the Morrison, Ross and Kemp model, focus on instruction "from the perspective of the learner rather than from the perspective of the content" (ibid., 6). The developers ask educators to consider key questions referred to earlier in this chapter. There is certainly no one way to approach the design of instruction for our audiences, and generally educators adhere to the spirit of instructional design, as opposed to any one model. The taxonomy of instructional design models presented by Gustafson and Branch (1997) may be useful in terms of narrowing models down to those that focus on classroom orientation, for instance. As librarians face a host of challenges when designing instruction, the application of a model may help to guide the activities associated with designed learning.

As academic libraries do not operate in a vacuum, the next chapter will discuss briefly the role of instructional design within the higher education framework. The future and success of instructional design programs in academic libraries may very well be influenced by adoption at the institutional level, and librarians and others with an interest in this area should be aware of the factors that impact implementation before they embark on complex instructional design initiatives.

References

Bell, S. and Shank, J. (2007). *Academic Librarianship by Design: A Blended Librarian's Guide to the Tools and Techniques*, Chicago, IL: American Library Association.

Briggs, L. (1970). *Handbook of Procedures for the Design of Instruction*, Pittsburgh, PA: American Institutes for Research.

CogSim Educational Consulting (2007). Available from www.cogsim.com/idea/idea/isd.htm (accessed 10 May 2008).

Dick, W. and Carey, L. (1985). *The Systematic Design of Instruction*, New York: Harper Collins.

Gustafson, K. and Branch, R. (1997). *Survey of Instructional Development Models* (third edition), ERIC Clearinghouse on Information and Technology, Syracuse NY: Syracuse University.

Gustafson, K. and Branch, R. (2002). What is Instructional Design? In R. Reiser and J. Dempsey (eds), *Trends and Issues in Instructional Design and Technology*, Upper Saddle River, NJ: Merrill Prentice Hall.

Heinich, R., Molenda M., Russell, J., and Smaldino S. (1996). *Instructional Media and Technologies for Learning*, New York: Macmillian.

Keller, J. (1983). Motivational Design of Instruction. In C. Reigeluth (ed.) *Instructional Design Theories and Models: An Overview of their Current Status*, Hillsdale, NJ: Erlbaum.

Keller, J. (1987). Strategies for Stimulating the Motivation to Learn. *Performance and Instruction*, vol. 26, no. 8, pp. 1–7.

Keller, J. (1987b). *IMMS: Instructional Materials Motivation Survey*, Tallahassee, FL: Florida State University.

Keller, J. and Keller, B. (1989). *Motivational Delivery Checklist*, Florida State University.

Kemp, J., Morrison, G. and Ross, S. (1994). *Designing Effective Instruction*, Upper Saddle River, NJ: Prentice Hall.

Logan, R. (1982). *Instructional Systems Development: An International View of Theory and Practice*, New York: Academic Press.

McGriff, S. (2000). ISD-ADDIE Model, available from http://ehopac.org/TransformationReports/ISD-ADDIEmodel.pdf (accessed 10 July 2008).

Molenda, M. (2003). In Search of the Elusive ADDIE Model. *Performance Improvement*, vol. 42, no. 5, pp. 34–6.

Pintrich, P. (1999). The Role of Motivation in Promoting and Sustaining Self-regulated Learning. *International Journal of Educational Research*, vol. 31, no. 6, pp. 459–70.

Porter, L. and Lawler, E. (1968). *Managerial Attitudes and Performance*, Homewood, IL: Dorsey Press.

Reiser, R. (2002). A History of Instructional Design and Technology. In R. Reiser and J. Dempsey (eds), *Trends and Issues in Instructional Design and Technology*, Upper Saddle River, NJ: Merrill Prentice Hall.

Small, R. (1997a). Assessing the Motivational Quality of World Wide Websites. ERIC Clearinghouse on Information and Technology, ERIC document number 407 930.

Small, R. (1997b). Motivation in Instructional Design, *ERIC Digest*, available from www.ericdigests.org/1998–1/motivation.htm (accessed 30 April 2008).

4

Instructional design and higher education

Foa (1989) suggests that instructional design has a dual role in higher education. Some institutions offer it as a discipline and field of study. However, the greater relevance is that of its functional application: "It functions as a support service to individual faculty, as a development unit that creates courses and whole curricula, and as an outreach activity that brings government and corporate contracts and dollars to the campus. Instructional design displays the potential to become a powerful contributor to a university's success" (ibid., 73). Foa goes on to cite several challenges faced by the modern university with regard to teaching, providing access to resources, and linking students with teaching faculty/scholars, some of which readily apply to the academic library as a unit of the university: new populations of learners, armed with raised consumer consciousness; changing knowledge structures; demands from students, employers, and communities for applied learning; a changing faculty, many of whom choose to teach part time while they engage in other professional endeavors, but all of whom are being pushed to improve their teaching skills; proliferation of off-campus sites where courses are offered, with a resulting need for cost-effective and comparable curriculum design; demands from state and federal governments, funding agencies and parents for greater

assessment and accountability; and the need to create external linkages with the corporate, military and non-profit sectors (ibid.). Academic libraries play a key role in supporting the goals and objectives of the university, and therefore face many of these same challenges, but perhaps to a lesser degree. Davidson-Shivers (2002, 260) outlines three major factors that impact higher education today: the reduction of finances and other resources, the decline in and competition for student enrollments, and the diversification of the student population. The author suggests that, due to these factors, many institutions struggle to find ways to provide high-quality, effective educational experiences. Three areas are hardest hit – the curriculum, the faculty, and infrastructure (ibid., 261). Impacts from these same stressors are mirrored in many academic library settings worldwide.

The instructional designer within academia

The role of the instructional designer is also changing globally within higher education. There are increasing demands because of distance education and e-learning initiatives. Instructional designers are most commonly seen as supporting the academic mission of the institution by providing curricular and other support to faculty and students. Campbell et al. (2007) describe another powerful concept in terms of the developing role of the instructional designer within higher education, and that is as an agent of change:

> Instructional designers work directly with faculty and other clients to help them think more critically about the needs of all learners, about issues of access, about the social and cultural implications of the use of information technologies, and about related policy

> development. As such, through reflexive and critical practice, and interpersonal agency, they are important participants in shaping interpersonal, institutional and societal agendas for change. Therefore, we view instructional design not simply as a technical methodology to be applied to design situations, but also as a socially constructed practice. (Ibid., 2)

As part of a four-year research study, the authors identified four different potential types of agency (means by which influence can be exerted) associated with change: interpersonal, professional, institutional and societal (ibid., 4). Interpersonal agency reflects the designer's connection with peers, faculty and others involved in the work of instructional design and most notably represents the fact that instructional designers recognize a "strong sense of moral responsibility to their clients and team members." This expression of obligation may include obligation to the learners, community building, and faculty development (ibid., 7). The second type of agency, professional agency, reflects the designer's obligation to the profession as a whole. This will include the designer's desire to "act in a professionally competent and ethical manner" and it may include providing advice on sound instructional strategies, and collaborating with faculty to build these into their lessons (ibid., 8). The third concept is that of institutional agency, which is represented by the designer's desire to "advance the interests, and perhaps align oneself with the tacit and explicit values of host institutions" (ibid., 9). The fourth concept, and perhaps the one that is most interesting, is that of societal agency. There are always ethical, cultural and social factors that influence learners, institutions and designers. For the instructional designer, this may be reflected in challenges to core values and learning styles,

ethical dilemmas and other challenges that rely on the human capacity for understanding, advocacy and empathy. Designers in the study shared a desire to "create a better world" through education – a key element of this concept (ibid., 11).

How do the findings of this study relate to librarians and their role as users of instructional design within higher education? Certainly, there are a number of parallels between these four dimensions for instructional designers, and librarianship. Librarians share many of the same motivations for going into their profession – wanting to level the playing field for those normally disadvantaged or challenged in terms of access to information and reading material, and teaching users to become better at finding what they need. Many librarians see themselves as agents of change and bring a strong personal commitment to the profession, to their institution and to society. Librarians who use instructional design methods within higher education may therefore have an orientation toward change similar to that of the instructional designers in the study by Campbell et al.

The role of e-learning

The role of e-learning within higher education continues to be a topic of interest for instructors, administrators and students. Gyambrah (2007) articulates five broad concepts that guide current discussion on higher education and the role of e-learning: access and equity; higher education as a trade commodity or a public good; the unbundling of the functions of the university; quality and quality assurance; and cultural and pedagogical issues (ibid., 100). In particular, the intersection of higher education and the role of e-learning reflects an area where instructional design

comes into play. E-learning, described as "learning facilitated and supported through the use of information and communications technology," (JISC, 2007) is today a mainstay of many academic institutions worldwide. This type of learning also applies within library environments, and increasingly so. E-learning involves the use of new media and multimedia, and may involve distance learning and the use of computer or computer-based products to provide instruction. Many institutions find that, along with the increasing demand for e-learning opportunities, there are also barriers to the adoption of e-learning technologies. One of the roles of the instructional designer in these cases is to assist the institution in examining these challenges and to work with faculty and administrators to identify ways to overcome them. Gyambrah (2007) explores the role of instructional design within this framework. He stresses the important use of models that have "evolved from classroom replication towards models that integrate technology and pedagogical issues" (ibid., 69). Conrad (2000) proposed that the importance of instructional design resides in the fact that it provides added instructional value through customization of content based on user need, as well as learning objectives based on outcomes by which learners can be evaluated.

Understanding the challenges

Instructional design seems to be a perfect fit for many of the needs of higher education today – from serving disparate learners to reaching distant populations. So why do we not see instructional design used more frequently in colleges and universities? CogSim Educational Consulting (2007), an organization devoted to supporting the use of instructional

design for teaching and assessment, proposes the following reasons for this slow adoption, some of which also impact on the use of instructional design within libraries:

- **Tradition:** Change is typically slow to occur within higher education.
- **Perceptions of academic freedom:** Suggestions related to teaching in any capacity may be seen as an intrusion upon faculty members' academic freedom.
- **Lack of teacher training:** Many graduate programs still struggle with finding a balance between educating graduate students in their disciplines and helping them prepare to teach.
- **Emphasis on research:** Institutions still struggle to find the right balance between emphasis on teaching and emphasis on research and publication by faculty.
- **Heavy class loads:** There is often not enough time dedicated to the instructional development process itself.
- **Dependence upon part-time instructors:** In many disciplines, the increased reliance upon adjunct faculty to teach means less face-to-face time for students with full-time faculty.

Terlouw (1997) details additional challenges to the adoption of instructional design practices in higher education. These constraints occur at three main levels – the administrative level, the curriculum level and the unit level (ibid., 343). At the administrative level, instructional designers must work within the "aims set for higher education." Large universities and colleges are slow to adopt change, and the author also points out that much of the time there are no clearly defined priorities (ibid.). This can lead to instructional designers not having a well-defined role or area

to contribute to within the institution. It can also be difficult for instructional designers to share new ideas and ways of thinking. The constraints presented at the curricular level include the cultural and historical foundations of curricular development as seen and upheld by the faculty, characteristics of the students, the development of content, and the available resources (ibid., 348). At the unit or course level, challenges include the development of instructional objectives and the "entry characteristics" of the students. The organization of the content and evaluation are further constraints (ibid., 357). The author indicates that one of the most unique and complicating factors of instructional design within higher education is the fact that it operates within an extraordinarily complex, multilayered system and must take into account not just the learning needs of students, but the attitudes and concerns of faculty, administration, resistance to change, internal and external funding sources, and availability of the resources necessary to implement instructional design at the curricular level (ibid., 364).

The library connection

How will the future use of instructional design within higher education impact libraries and librarians, both nationally and internationally? Gustafson (2002) suggests that those in areas where instructional design is likely to be used should evaluate certain relevant political, economic, social and technological trends that may have an impact (ibid., 334). The author describes several implications that readily apply to librarians as well as to others interested in or currently using instructional design. Performance improvement focuses on the need to equip learners, in this case students and others who are learning to use library resources, to

perform better (ibid., 336). Gustafson points out that one possible implication is that instructional design will support "finding ways to raise the performance of a much wider range of people than ever before" (ibid.). With more students enrolling in undergraduate programs, and with an ever-increasing need for these students to be educated about college-level research skills, this is certainly an important implication for academic libraries. Gustafson also emphasizes that it is impossible to have an instructional designer "directly develop instruction for all those in need" (ibid.). Instead, the focus should be on "tool building" rather than on "tool using" (ibid.). This will mean that instructional designers who work in library environments must be prepared with a diverse set of tools and related skill sets that can be used widely to create, revise and evaluate library instructional materials.

Asynchronous learning and access to asynchronous learning tools are also important components of instructional design within libraries. In addition to the growth in distance education offerings, libraries are faced with providing instruction to students on campus and locally who may never set foot in the physical building. Instructional design provides a way for librarians to work closely with faculty to design instruction that will be suited for in-class, in-person presentation as well as for virtual presentation. As Gustafson points out, "there will be little need to move people to the instruction as moving instruction to people becomes more common" (ibid., 337). Gustafson also references immersive, interactive and adaptive learning, and diversity and organizational change as areas that have considerable implications for instructional design within the higher education framework. Finally, there are serious implications with regard to the training of instructional designers and instructional design librarians. There is

growing interest in the field, and there are a number of avenues that those interested in library science and instructional design can follow in order to get training for and work in this area. However, it is still the case that those libraries that do hire and employ instructional designers describe the qualifications, duties and educational requirements very differently, which can sometimes lead to an unclear sense of place for instructional design librarians within the library and the institution. Libraries should thus pay careful attention to the professional development and ongoing support for those who are in instructional design roles, and try as much as possible to align the duties and qualifications with those of the profession.

Librarians, teachers and others who are involved in curricular planning must also pay attention to developments within education, such as the move away from knowledge-based education and toward competency-based education (Arguelles and Gonczi, 2000), a trend that is occurring much more rapidly internationally than in the United States. Competency-based education, which focuses on providing students with the skill set and ability to solve complex problems in their areas of work (Hoogveld, Paas and Jochems, 2005, 287), is seen as being much more effective and relevant to what students will do in their lives after they graduate. Knowledge-based education focuses primarily on the teaching of concepts and conceptual frameworks (ibid.). If we look closely at the world in which librarians teach students to use library resources, we will find that here also, many times, the process is competency rather than knowledge based. Students are being taught a specific skill or problem-solving approach in order to address a specific need or problem, such as identifying primary resources for use in a thesis. Hoogveld, Paas and Jochems (2005) suggest that teachers have key roles to play in terms of crafting

curricula, and one of these roles is that of instructional designer. "Teachers are expected to give up their role as 'knowledge transmitter'" and adopt the new roles of "coach" and "instructional designer," which include the ability "to translate abstract new curriculum principles into a meaningful sequence of authentic learning tasks" (ibid., 288). The authors suggest that training teachers how to design or redesign curricula based on this new trend is important, and suggest that the use of instructional systems design (covered in Chapter 2) might be an effective strategy.

The increase in multi- and interdisciplinary work and research on college and university campuses is another area that influences instructional design and the academic library. Library instruction that was once focused solely on research in one discipline must now take into account different research practices, needs and ways of working that are brought together in these multidisciplinary approaches. Students may need to know how to find and evaluate both primary historical documents *and* evidence-based case studies, and then apply these to solving complex problems in heterogeneous research teams. This requires a significantly different approach to library instruction now as compared to the 1980s and 1990s. Hoogveld, Paas and Jochems (2003) suggest that one helpful strategy for teachers in the face of the changing landscape of higher education is the team approach to instructional design. The researchers found that certain teachers who participated in collaborative efforts had better results than those teachers who designed instruction alone (ibid., 588). This is an interesting concept for librarians. Instructional design teams comprised of librarians, instructional designers from the institution and others working together, rather than one individual working alone, may be better able to develop creative instructional

design strategies to assist faculty with the incorporation of information literacy instruction into their curricula and lessons.

Can instructional design improve higher education?

One of the most important publications on the state of American higher education is what is commonly referred to as the Spellings Report, *A Test of Leadership: Charting the Future of U.S. Higher Education. A Report of the Commission appointed by Secretary of Education Margaret Spellings*. The Commission's preamble states the need for the report, saying that although higher education has made notable advances during past decades, "this commission believes U.S. higher education needs to improve in dramatic ways. As we enter the 21st century, it is no slight to the successes of American colleges and universities thus far in our history to note the unfulfilled promise that remains. Our year long examination of the challenges facing higher education has brought us to the uneasy conclusion that the sector's past attainments have led our nation to unwarranted complacency about its future" (Spellings Report, 2006, 6). The report covers several areas for consideration, including access, the cost of higher education, financial aid, learning, transparency and accountability, and innovation.

The report clearly implies a link between innovation, quality and instructional design inputs, and cites specific examples of the role of instructional redesign at a number of American universities. "From 1999 to 2004, Carol Twigg and the National Center for Academic Transformation at the Rensselaer Polytechnic Institute worked with 30 colleges

and universities to enhance quality of instruction, improve student learning, and reduce costs through the use of technology and innovative pedagogy. The participating institutions, which included Carnegie Mellon University, Northern Arizona University, and Tallahassee Community College, redesigned instructional approaches to improve some of their large, introductory courses. Instead of offering traditional lecture formats, instructors used active learning strategies to engage students in course material. These redesigned courses provided online access to Web-based tutorials, on-demand feedback, and support from student peer mentors. The use of technology reduced course preparation time for instructors and lowered instructional costs per student" (ibid., 20). In its findings, the report urges institutions to take more seriously the development and review of student learning outcomes, saying that "postsecondary education institutions should measure and report meaningful student learning outcomes" (ibid., 23), and furthermore, that "faculty must be at the forefront of defining educational objectives for students and developing meaningful, evidence-based measures of their progress toward those goals" (ibid., 23). Instructional designers are in strategic positions, as individuals with training and experience in crafting learning objectives, to support institutions and faculty in these efforts.

The EDUCAUSE Advisory Committee for Teaching and Learning (ACTL) emphasizes the impact of Web 2.0 technologies on what it refers to as "Instruction 2.0" in higher education (Campbell and Oblinger, 2007, 15): "Just as emerging Web 2.0 technologies are clearly reshaping the Web and online media, innovations in instructional practice and academic technology are now clearly moving higher education in new directions" (ibid., 15). The authors review

the top ten academic technology teaching and learning issues, as defined in the ACTL report, that require immediate consideration if academic technologists – some of whom may be instructional designers – are going to continue to support campus efforts to enhance the educational experience. The ten issues are:

1. Establishing and supporting a culture of evidence
2. Demonstrating improvement of learning
3. Translating learning research into practice
4. Selecting appropriate models and strategies for e-learning
5. Providing tools to meet growing student expectations
6. Providing professional development and support to new audiences
7. Sharing content, applications, and application development
8. Protecting institutional data
9. Addressing emerging ethical challenges
10. Understanding the evolving role of academic technologists. (Campbell and Oblinger, 2007, 15)

These reflect certain themes that will continue to be prevalent within higher education, such as assessment and best instructional practices, changes in social structures and the expectations of students and faculty, collaboration, and ethical issues (ibid., 16). Technology-related matters are of particular relevance to instructional designers: "As technology is integrated into contemporary society, higher education must balance the expectations of a new generation of technology-savvy students with the perspectives of an older generation of faculty" (ibid., 18) and, more to the point: "faculty self-identification with a specific academic

discipline contrasts with students' interdisciplinary collaboration. Academic technologists who serve faculty and students are thus caught between competing frameworks and expectations" (ibid., 18). The authors suggest that one way to improve this is through broad collaborations of librarians, faculty, instructional designers, and technologists (ibid. 18).

In 2004, the Centre for Teaching and Educational Technologies (CTET) at Royal Roads University (RRU) in British Columbia, Canada, conducted a pilot project to define quality guidelines for online courses (Chao, Saj and Tessier, 2006). The report used standards already developed on e-learning to guide the research questions and proposed a framework for addressing quality in a more systematic fashion, consisting of the following five connected components:

1. Curriculum design
2. Teaching and facilitation
3. Learning experience
4. Instructional design
5. Web design and course presentation.

The authors describe the role of instructional design as follows: "*Instructional design* deals with the connection among learning outcomes, course activities, teaching strategies, and the use of media and technology. The highly collaborative working relationship between instructional designers and instructors ensures shared responsibility for sound instructional design for a course" (ibid.). Again, instructional design within higher education is seen as being an important part of a dynamic learning environment capable of responding to learner needs and to changing technological and social expectations, and incorporating

best practices to improve the quality of online and in-person instruction.

While it seems clear that instructional design is being used more and more within higher education, the future of its application is less clear. As key units within the academy, libraries must also be participants in discussions about the design of instruction at the institutional level, as many of the issues are the same. There are also instances where libraries are the campus leaders in terms of the use of instructional design – this represents a major opportunity for discussion and the sharing of best practices.

So far, the history of instructional design, relevant learning theories, and pressing higher education factors have been discussed. Chapters 5 and 6 will present key areas where instructional design and library activities intersect by highlighting practical applications of the related activities and processes. Phenomena such as social networking, new media, user experience, Web 2.0 and Library 2.0, as well as instructional outreach and information literacy will be discussed within the context of instructional design.

References

Arguelles, A. and Gonczi, A. (2000). *Competency-based Education and Training: A World Perspective*, Mexico City: Grupo Noriega Editores.

Campbell, J. and Oblinger, D. (2007). Top-Ten Teaching and Learning Issues, 2007, *Educause Quarterly*, vol. 30, no. 3, available from http://connect.educause.edu/Library/EDUCAUSE+Quarterly/TopTenTeachingandLearning/44831 (accessed 1 August 2008).

Campbell, K., Schwier, R., Kenny, R. (2007). The Critical, Relational Practice of Instructional Design in Higher

Education: An Emerging Model of Change Agency. *Educational Technology Research and Development*, available from http://www.springerlink.com/content/r512247450584133/fulltext.html (accessed 20 July 2008).

Chao, T., Saj, T. and Tessier, F. (2006). Establishing a Quality Review for Online Courses. *Educause Quarterly*, vol. 29, no. 3, available from http://connect.educause.edu/Library/EDUCAUSE+Quarterly/EstablishingaQualityRevie/39988#comment-922 (accessed 1 August 2008).

CogSim Educational Consulting (2007). Available at www.cogsim.com/idea/idea/isd.htm (accessed 10 May 2008).

Conrad, K. (2000). *Instructional Design for Web-based Training*, Amherst, MA: HRD Press.

Davidson-Shivers, G. (2002). Instructional Technology in Higher Education. In R. Reiser and J. Dempsey (eds), *Instructional Design and Technology*, Upper Saddle River, NJ: Pearson Education, Inc.

Foa, L. (1989). Power and Potential: The University and Instructional Design. In L. Foa and K. Johnson (eds), *Instructional Design: New Alternatives for Effective Education and Training*, National University Continuing Education Association, New York, NY: Macmillan.

Gustafson, K. (2002). The Future of Instructional Design. In R. Reiser and J. Dempsey (eds), *Instructional Design and Technology*, Upper Saddle River, NJ: Pearson Education, Inc.

Gyambrah, M. (2007). E-Learning Technologies and Its [*sic*] Application in Higher Education: A Descriptive Comparison of Germany, United Kingdom and United States. Dissertation, LMU München: Faculty of Psychology and Educational Sciences, available from http://edoc.ub.uni-muenchen.de/7358/1/Gyambrah_Martin_K.pdf (accessed 17 July 2008).

Hoogveld, A., Paas, F., and Jochems, W. (2003). Application of an Instructional Systems Design Approach by Teachers in Higher Education: Individual versus Team Design, *Teacher and Teacher Education*, vol. 19, pp. 581–90.

Hoogveld, A., Paas, F., and Jochems, W. (2005). Training Higher Education Teachers for Instructional Design of Competency-based Education: Product Oriented versus Process Oriented Worked Examples, *Teacher and Teacher Education*, vol. 21, pp. 287–97.

JISC (Joint Information Systems Committee) (2007). Available from www.elearning.ac.uk/effprac/html/start_defin.htm (accessed 8 August 2008).

Spellings Report (2006). *A Test of Leadership: Charting the Future of U.S. Higher Education. A Report of the Commission Appointed by Secretary of Education Margaret Spellings*, available from www.ed.gov/about/bdscomm/list/hiedfuture/reports/pre-pub-report.pdf (accessed 30 July 2008).

Terlouw, C. (1997). Instructional Design in Higher Education. In S. Dijkstra, F. Schott, N. Seel, and R. Tennyson (eds), *Instructional Design: International Perspectives: Volume I: Theory, Research, and Models*, Hillsdale, NJ: Lawrence Erlbaum.

5

In the mix: instructional design and the instructional mashup

A "mashup" is described as a fusing of bits and pieces of data from various sources to create something new, something better, something more engaging and more fun. The term initially referred to music sampling and to software applications, but these days a mashup can be anything that is a hybrid – a combination of previously existing ideas, tools, data, media, resources, practices and protocols. How can instructional design be "mashed" and seen as part of a larger, more exciting support mechanism for teaching that might include Library 2.0 and Web 2.0, social networking tools, new media and user experience? This chapter will explore these ideas.

By now, most librarians are familiar with the terms Library 2.0 and Web 2.0. They are topics that are always interesting and fun to talk about, and can often present opportunities for engaging users in very creative ways. Are there practical ways that Library 2.0 and Web 2.0, new media and constructs such as user experience can be blended with instructional design to create memorable learning experiences for users? The answer may be a resounding "yes."

Library 2.0 and Web 2.0 concepts (and to a certain degree, 3.0) continue to revolutionize the way users find, create and share information, and how they interact and connect with

other users. While many librarians still struggle to integrate and agree upon the terminology, there is recognition that, at the very least, discussions on Library 2.0 add to spirited discourse within the profession. There are many different ways that libraries seek to implement Library 2.0 services, and because this is an area that is still in flux there is very much a sense of exploration and experimentation. Users themselves have driven many of the 2.0 developments, which makes the adoption of 2.0 technologies even more attractive. "The heart of Library 2.0 is user-centered change. It is a model for library service that encourages constant and purposeful change, inviting user participation in the creation of both the physical and the virtual services they want, supported by consistently evaluating services. It also attempts to reach new users and better serve current ones through improved customer-driven offerings. Each component by itself is a step toward better serving our users; however, it is through the combined implementation of all of these that we can reach Library 2.0" (Casey and Savastinuk, 2006). Nash (2007) suggests that the concept of Library 2.0 is based on the Web 2.0 principles of "openness, interactivity, information-sharing, and networking," and provides a comparison to the traditional principles of the library, namely, "tight control of access (making sure it was equitable and predictable), veracity and reliability of data (peer-reviewed journals and monographs were most highly esteemed), 'authority' (only people with proper levels of 'authority' were considered competent enough to comment), and responsible use (citing and using properly, eschewing anything borrowed, reused, or reconfigured)" (ibid.).

While there is no absolute agreement on what can be defined as Library 2.0 services, products and initiatives, there are four key elements that should be present: Library 2.0 should be user-centered, socially rich, communally

innovative and provide a multimedia experience (Abrams, 2005). Miller (2008) adds that Library 2.0 provides an enhanced range of services and products to users: "information services from others do not threaten responsive and adaptable libraries. They validate much that we have always done, and bring information to a far wider audience than we have managed. We can learn from much that they have achieved, and combine this knowledge with our unique skills and assets in order to deliver a truly compelling set of services." Miller suggests that people who use libraries do so within a broader landscape that is increasingly web-based and, to a certain extent, Web 2.0-based. Miller (ibid.) describes the key elements of Web 2.0:

> Essentially, Web 2.0 offers a means by which data and services previously locked into individual web pages for reading by humans can be liberated and then reused, in ways sometimes referred to as 'mashing up' or 'mixing'. Importantly, it also introduces the notion of a 'platform', meaning that others can build applications on pre-existing foundations and thus benefit from economic scale without reinvention.

There are numerous manifestations of Library 2.0 – from open source catalogs that have been remixed or mashed to map to Facebook, Google and Amazon, to catalogs that allow users to tag items permanently for other users to view. Maness (2006) provides some examples of the progression from "Library 1.0" to "Library 2.0":

- Email reference/Q&A pages → Chat reference
- Text-based tutorials → Streaming media tutorials with interactive databases

- Email mailing lists, webmasters → Blogs, wikis, RSS feeds
- Controlled classification schemes → Tagging coupled with controlled schemes
- OPAC → Personalized social network interface
- Catalog of largely reliable print and electronic holdings → Catalog of both reliable and suspect holdings, web pages, blogs, wikis, etc.

Maness (ibid.) further states that "a profession steeped in decades of a culture of control and predictability will need to continue moving toward embracing facilitation and ambiguity. This shift corresponds to similar changes in library history, including the opening of book stacks and the inclusion of fiction and paperbacks in the early 20th century."

Michael Habib (2006) talks specifically of the use of Web 2.0 concepts within the academic library, first recognizing the impact of certain causal Web 2.0 factors: "Library 2.0 describes a subset of library services designed to meet user needs caused by the direct and peripheral effects of Web 2.0 services leveraging concepts of the Read/Write Web, the Web as Platform, The Long Tail, harnessing collective intelligence, network effects, core datasets from user contributions, and lightweight programming models" (ibid., 22). Habib poses a series of interesting questions on the relatedness of Web 2.0 and the academic library, some of which are highly relevant for instructional design. One question explores the ways Web 2.0 might be used to improve library instruction (ibid., 28). Habib suggests that academic libraries, because of the undergraduate demographic they serve, are strategically poised to take full advantage of Web 2.0. This has a lot to do with the creation of content by greater and greater numbers of internet users, in particular by teenagers and young adults,

as indicated by a survey by the Pew Internet Project (Lenhart, Fallows and Horrigan, 2006).

How can instructional design take advantage of 2.0 ideas and of such concepts as collective intelligence and the propensity of certain demographics (in this case undergraduates) to create web content, to improve library/research instruction? The idea of Instructional Design 2.0 may play a role. The concept has already been described by some in the instructional and media design professions. Chase (2008) describes one example of Instructional Design 2.0/3.0: "The utilization of emerging technologies to design dynamic, interactive multimedia teaching and learning resources. Emerging technologies are virtual reality and online games, modular content, mobile devices, interactive multimedia, artificial intelligence and the semantic web." The key is the integration of these ideas, along with 2.0's hallmarks of openness, interactivity, information sharing and networking (Nash, 2007).

What would Instructional Design 2.0 look like within the academic library? Imagine a user-focused instructional design effort which applied a traditional instructional design model such as ADDIE and blended the principles of 2.0 – openness, sharing, social connections, creativity, motivational experience and learning – to create instruction for students. Instructional Design 2.0, when used in the development and delivery of a library instruction module for a class, could support the creation of a collaborative and social learning environment. In an ideal world, this might lead to more motivated students and more effective learning. In the Instructional Design 2.0 scenario, a librarian and an instructor might begin by reaching out to students and asking them specific questions about what types of information would best help them to complete a short research paper on a current controversial issue. This initial enquiry would form

the basis of the *analysis* phase in the ADDIE model, but it would be modified to incorporate certain Web 2.0 concepts. For instance, the librarian might use social networking tools, such as Facebook, and open source applications found in academia, such as Moodle, to get feedback from students. This would facilitate the community of students in deciding which resources would be most helpful for them. The librarian and instructor could facilitate the discussion, then review, categorize and organize the results so that the students' most pressing needs emerged. These needs would then form the foundation for the lesson's learning objectives. Students might express that they do not know how the library is organized, or they might share that their assignment says they cannot use "internet sources," so what can they use? They might want to know whether an online article from *People* magazine is good enough to use for their assignment, and so on. There should be noticeable patterns in responses from the students – ranging from those who do not have even a vague concept of the library and its resources, to those who have used the library and are somewhat familiar with it.

There may be other creative ways for instructional design librarians to engage students and inform the instruction process by finding out from them what they need help with. Brian Matthews from the Georgia Institute of Technology presents an interesting example of reaching out to students using social networks: "I followed about 50 student blogs for a year and set up alerts on terms such as 'assignment', 'paper', 'library' and 'class'. Throughout the day I would check in and see if any of the students posted something matching my criteria ... Students would frequently post, 'I have to read this book or article,' 'I need to get going on this assignment or paper' and essentially chronicle their

lives ... I saw this as a natural extension of library outreach and an open invitation for interaction" (OCLC, 2007).

The next phases of *design* and *development* require the librarian to document the target population (the class), come up with the content for the instruction, identify specific tasks for the instruction, think about sequencing and how the instruction will be delivered. The librarian could consider providing a "menu" of different delivery systems for the instruction, enabling students to select the modes best suited for them. Librarians interested in the 2.0 approach might have students work collaboratively on parts of the assignment, and have them discuss what they think are relevant keywords, then search for and tag relevant articles using a social networking platform. The *design* phase might also specify that students have to find and share internet resources on a common topic, and discuss why the resources they have selected are or are not authoritative. During the *development* phase, the librarian might share plans for the instruction with other librarians and the course instructor, and ask for feedback. The *implementation* phase would entail the librarian delivering the instruction. A 2.0-based delivery might use podcasts, vodcasts, embedded interactive tutorials in social networking environments such as Facebook, integrated instruction with course management software and open source applications such as Moodle, online games, simulations, web-based video delivered via YouTube, and others. A 2.0 application of instructional design principles could include a way to reinforce the learning, with follow-up tips and reminders sent via SMS to students' cell phones, or RSS feeds to certain websites frequented by students.

The *implementation* phase is also an area where instructional design librarians can be even more creative and can take full advantage of 2.0 concepts. YouTube is the

most-used social media website on the internet (OCLC, 2007, 2–13). In a recent survey, OCLC found that 87 percent of users aged 15–21 and 74 percent of users aged 22–49 were users of YouTube (ibid., 2–15). As a result, a number of libraries have made their tutorials and other media available via YouTube, and while it remains to be seen how many of these are actually being used by students when they need the information, access to these resources is being supported by a familiar and popular medium. One implication of the implementation phase for any instructional design librarian working with an undergraduate population is understanding where the students gather virtually, and being aware of how, where and whom they ask for help. We know that students tend to ask one another for help and that they ask friends, parents and relatives more often than they ask librarians. Increasingly, they use social networks to inform themselves about many different aspects of their lives – not just social aspects – and this includes academic questions. This has some interesting ramifications for the design of library/research instruction.

The last phase, *evaluate*, could also take advantage of the collaborative nature of Web 2.0 and Library 2.0 and ask students to provide anonymous, thoughtful feedback on each other's assignments, submitted in conjunction with the course. The students would have to be given specific, simple, clear guidelines that mapped to the initial learning outcomes, and the feedback could then be reviewed and summarized by the librarian in connection with the instructor.

The above example uses standard instructional design processes as described by ADDIE to develop library/research instruction and incorporate social networking and collaborative activities to enhance the experience for the students. It also creates instruction that can be more student-centric – focused on the tools students use in everyday life to

communicate, work, share and learn. It is easy to envision how the integration of instructional design, library/research instruction and 2.0 concepts could lead to a more peer-driven experience where, eventually, the content itself would be created in collaboration with the students. This may be hard for many librarians to imagine right now, given that most students have very little sustained interest in library/research instruction and participate only when they have to. However, the role of the librarian is changing and librarians are being pushed to contend with the expectations created by interactivity, collaboration and content creation on the web. Tony Karrer (2006) summarizes this by saying: "Much of what we'll be doing in the future is not creating content ahead of learning, but working alongside, real time of our learning community helping them with content, helping them to become better learners, and looking at the content that is being created and improving it, providing structure or guides."

John Keller's ARCS model (Keller, 1983) of instructional design also provides an interesting opportunity to design instruction that is more plugged into 2.0 principles of openness, sharing, social connections, creativity, motivational experience and learning. The four components of the ARCS model are attention, relevance, confidence and satisfaction (ibid.) and, as discussed in Chapter 3, this model is different from other instructional design models because its primary focus is on motivating the learner. In settings where undergraduates are the main focus of library/research instruction, motivating and capturing the attention of the students may well hinge on integrating technologies and social networking tools that are novel, interesting, both familiar and new, and innovative. Making use of tools such as the social tagging/bookmarking tool de.li.ci.ous to manage virtual resources and share interesting web links, Zoho and Slideshare to create and share presentations

related to course assignments online, and TeacherTube to share videos created by instructors may be worth investigating as ways to engage students. Librarians could use these tools during the instructional design process and integrate the library content accordingly. Librarians need to pay particular attention to how integrating these and other tools might support attention-getting, be relevant to the students' work, give the students more confidence and increase student satisfaction during the learning process – which comprise the four elements of the ARCS model.

Social networking tools are not covered in depth in this book, but their prevalence in the virtual world and their use by college-aged students certainly makes them worth discussing, as they represent new opportunities for librarians to enhance instructional design and engage students. These tools, many of which are designed to facilitate creativity and information sharing, also map to services, skills and support traditionally provided by libraries and librarians. Here is a very short list of social networking tools that it might be worthwhile for librarians to investigate: Twitter, Facebook, Ning, Meebo, Slideshare, Zoho, YouTube, TeacherTube, de.li.ci.ous, Netvibes, Footnote, Flickr, Community Walk, Stumbleupon.

New media for the delivery of designed instruction

How might an instructional design librarian facilitate the integration of new media and emerging technologies into an information literacy or library/research instruction module? New media and attractive technologies abound, but not every up-and-coming technology is going to be relevant or effective in terms of instructional design and delivery. Librarians working with instructional design must therefore

evaluate carefully those ideas that have the most potential for adding to their current instructional efforts in some measurable way. This is true for many library-based initiatives – we know that technology is not always the best answer. In order for librarians to evaluate new media and new technologies and their relevance, they must stay current and up to date on technological developments. Liu, Gibby, Quiros and Demps (2002) suggest that good instructional designers are lifelong learners and are able to acquire new technological skills fairly quickly. Librarians working with designed instruction may also wish to be aware of what constitutes "new media." The term itself has been defined and is used in many different ways, although most people understand it as having something to do with digitization and the numeric representation and transmission of data. Some argue that new media is anything that is not old media – albums, analog tapes, and the like. The internet plays a key role in pushing the concept – websites that offer information and entertainment in various new media formats such as streaming video, MP3s, and downloadable podcasts can all tout the benefits of asynchronous access to information on demand. In addition, the ability of the internet to support commerce, trade, communication across physical boundaries, and real-time interaction, creativity and dialogue between people are a part of the new media mosaic.

Librarians already make good use of new media for a variety of purposes, including teaching. New media as a platform for the delivery of designed instruction may include the use of vodcasts-on-demand (downloadable video shorts) that focus on certain aspects of library/research instruction. These vodcasts could be made available via course management systems, pushed to departmental websites, and hosted on the library's web pages. Another new media platform that could be used is mobile computing. Librarians

are experimenting with the use of SMS and text messaging to communicate information – short reference answers, book locations and call numbers pushed from the library catalog (visit the University of Oregon's library website for an example of this) to students. This practice could be expanded, for instance, to enable students to sign up for SMS reminders offering brief instructional tips on using library resources to complete an upcoming assignment. The SMS messages would be delivered only during the time when students were working on their papers and would have to be designed so as not to be intrusive, and to be viewable and readable using mobile technology.

Learning objects and instructional design

Another area which has relevance for instructional design, especially in terms of online learning, is that of the learning object. Like the term "instructional design," "learning object" is very broad and can be conceptualized in a number of different ways. The Learning Technology Standards Committee of the Institute of Electrical and Electronics Engineers (IEEE) (2000) describes learning objects as:

> Any entity, digital or non-digital, which can be used, re-used or referenced during technology-supported learning. Examples of technology-supported learning include computer-based training systems, interactive learning environments, intelligent computer-aided instruction systems, distance learning systems, and collaborative learning environments. Examples of Learning Objects include multimedia content, instructional content, learning objectives, instructional

> software and software tools, and persons, organizations, or events referenced during technology-supported learning.

Beck (2007) further suggests that learning objects are smaller units of learning, typically ranging from two to fifteen minutes in length, that are self-contained, reusable, can be aggregated into larger collections of learning resources, and are tagged with metadata enabling them to be searched and located with ease. The National Learning Infrastructure Initiative (NLII) characterizes learning objects as:

> Digital resources, modular in nature, that are used to support learning. They include, but are not limited to, simulations, electronic calculators, animations, tutorials, text entries, Web sites, bibliographies, audio and video clips, quizzes, photographs, illustrations, diagrams, graphs, maps, charts, and assessments. They vary in size, scope, and level of granularity ranging from a small chunk of instruction to a series of resources combined to provide a more complex learning experience. (McGee and Suter, 2003)

Metros (2002) defines learning objects as having these key components: portability, accessibility, durability and interoperability. Portable learning objects work across platforms and course management systems; accessible learning objects can be located and delivered to the learner on demand; the durable learning object remains stable and reusable even as operating systems and software packages change; and the interoperable learning object can be exchanged globally among web browsers and course management systems (ibid., 5). Metros goes on to say that:

> learning objects are used in teaching and learning in a variety of ways. They can complement a traditional, face-to-face course, much like showing a video or film. They can be assigned as homework or as collateral subject matter. An instructor or course developer can select specific learning objects and mix and match them, either with each other or with other course materials and instructional activities for use in online learning environments. Students can integrate them into their digital papers and multimedia presentations. (Ibid., 4)

An important distinction is the integration of assessment: "We established that in itself, a digital resource, even if it does mediate learning, is not a learning object. Digital resources comprise simulations, movie clips, audio files, photos, illustrations, maps, quizzes, text documents, and much more. Thus, to be considered a learning object, the digital resource must include or link to (1) a learning objective (2) a practice activity, and (3) an assessment" (ibid., 5).

How do learning objects work?

> Instructional designers can build small (relative to the size of an entire course) instructional components that can be reused a number of times in different learning contexts. Additionally, learning objects are generally understood to be digital entities deliverable over the Internet, meaning that any number of people can access and use them simultaneously (as opposed to traditional instructional media, such as an overhead or video tape, which can only exist in one place at a time). Moreover, those who incorporate learning objects can collaborate on and benefit immediately from new versions. These

> are significant differences between learning objects and other instructional media that have existed previously. (Wiley, 2000)

Wiley also suggests that learning objects may be the "technology of choice in the next generation of instructional design, development, and delivery, due to its potential for reusability, generativity, adaptability, and scalability." To ensure effectiveness, learning objects should be developed and used within the framework of instructional design. Wiley poses some pivotal questions for instructional designers using learning objects: How should the concept of sequencing be addressed when using learning objects in designed instruction? How granular should learning objects be? These are not questions to which there are readily available answers, and much of the discussion continues within international standard-setting bodies such as the Learning Objects Metadata (LOM) Working Group of the Institute of Electrical and Electronics Engineers (IEEE). As each of the instructional design theories discussed previously in this book requires, any instruction must be tailored to the learner, and this is also the case with learning objects. Context, learner readiness and learning outcomes are all key factors.

Learning objects are a potentially powerful idea for librarians who want to use instructional design in their libraries, yet, it is rare to find discussion of or sustained use of learning objects within many library settings, as Shank (2003) points out. Most often, librarians create and re-create original learning material, and even unknowingly duplicate the efforts of their peers. The challenges librarians may face in working with learning objects include determining the exact nature of the object – for example, is a course syllabus a reusable learning object? Is a virtual tutorial consisting of several different sections a learning

object, and are the sections themselves learning objects? The emphasis on reusability and tagging may help to distinguish objects from non-objects. Michigan State University's Virtual University Design and Technology (VUDAT, 2007) unit provides the following examples of learning objects:

- a virtually available description and explanation of the Periodic Table of Elements
- the San Francisco Museum of Modern Art's multimedia guide titled "Making Sense of Modern Art"
- the National Cancer Institute's set of interactive charts and graphs on cancer mortality.

Examples from academic libraries might include:

- reusable podcasts detailing how to find course reserves
- a tutorial on selecting a research topic for a paper, which would be portable (e.g. hosted on the library's website, departmental websites, and within course management systems) and reusable within a variety of disciplines
- an interactive game teaching users how to read call numbers and locate books on the library shelves, which would also be reusable.

These learning objects could be used before classroom instruction and assigned by the instructor to the students for completion; they could be used during the actual class meeting and be available after the instruction for students to return to anytime they wanted. They could also be made available outside of the library and even outside of the institution. Each of these learning objects would need the requisite components advanced by Metros (2005) – a learning objective, a practice activity and an assessment – to be truly considered an effective learning object. Shank (2003) suggests that another role for instructional design

librarians might be assisting faculty with the creation and classification of their own learning objects, as well as helping faculty to locate useful learning objects. Online repositories of learning objects, such as MERLOT (a general repository of learning objects from a variety of disciplines) and the Wisconsin Online Resource Center, can be used to browse and locate learning objects for use in library and other instruction.

The user experience and instructional design

Another concept that is worth considering when designing instruction especially for delivery within technology-rich environments is that of the user experience or "UX". User experience integrates basic design elements such as usability, ease of use and functionality with more human-centered fundamentals such as value, findability, context, credibility and desirability (Morville, 2004). William Gribbons, Director of the Human Factors and Information Design program at Bentley College and an expert on user experience suggests that UX is the recognition and progression of what we (in this case, as librarians) value, and its subsequent integration into the instruction and services we produce. UX is deeply rooted in quantitative research and frequently makes reference to areas such as human cognition, the psychology of learning, and Behaviorism. Hallmarks of UX include user segmentation (recognizing that different user groups require different approaches and resources), consideration of human and emotional factors, simplicity, and associating experience with a "brand" users will remember and return to. The corporate and business worlds have embraced and debated the value of UX for many years

now, but it is easy to recognize when a company gets it right. An example would be Starbucks, which became internationally known as far more than just a place to get coffee: a place to meet friends, surf the internet via free Wi-Fi, and even experience new music and art. It is the whole of the user experience that creates customer loyalty and brand recognition over time.

How might UX apply to academic libraries and designed instruction? One key component of creating memorable user experiences has to do with consistency across access points, so no matter where or how users encounter library services – during instructional sessions, via the library website, interactions with reference librarians, virtual reference, library staff, phone calls – there is a sense of unified, seamless service and a clear communication of the library's values (good customer service, providing access to resources, providing access to new technologies, research assistance, and so on).

Efforts to create committed users through UX require the participation of library staff at many different levels, but there are also strategies that instructional design librarians can use to enhance UX. During the *design* phase of the instruction, instructional design librarians may build pervasive placement of recognizable library logos and service reminders into the instruction. Icons for virtual reference service, links to key web pages, to important phone numbers and to library hours should be persistent and included in virtual and paper instructional materials. Another key component in crafting the user experience has to do with moving complexity away from the user and into the system. In the case of library/research instruction, every effort should be made during the instructional design process to provide the direction that users need, but to keep the level of complexity low. This may be difficult, especially

given the complex nature of college and university-level research, and the complex nature of the databases and other resources students must access. Librarians recognize that users will often turn to the more simplistic methods for information gathering and research, such as using Google or other internet sites, rather than deal with these complexities. The instructional design process may certainly provide a means of highlighting and ameliorating some of these complexities as they are revealed.

The next chapter will connect instructional design and the academic library on a more practical level and highlight the role of the librarian as educator, as well as the process of integrating instructional design with library/research instruction and, specifically, information literacy education.

References

Abram, S. (2005). Web 2.0 – huh?! Library 2.0, Librarian 2.0. *Information Outlook*, vol. 9, no. 12, pp. 44–6.

Beck, R. (2007). What Are Learning Objects? Learning Objects, Center for International Education, University of Wisconsin-Milwaukee, available from www.uwm.edu/Dept/CIE/AOP/LO_what.html (accessed 29 April 2008).

Casey, M. and Savastinuk, L. (2006). Library 2.0: Service for the Next-generation Library. *Library Journal*, available from www.libraryjournal.com/article/CA6365200.html (accessed 16 November 2007).

Chase, D. (2008). Instructional Design 3.0, available from www.slideshare.net/february28/instructional-design-30 (accessed 20 July 2008).

Habib, M. (2006). Toward Academic Library 2.0: Development and Application of a Library 2.0 Methodology. Master's paper for the M.S. in L.S. degree, School of Information and Library Science of the

University of North Carolina at Chapel Hill, November, 2006, available from http://etd.ils.unc.edu/dspace/bitstream/1901/356/1/michaelhabib.pdf (accessed 15 July 2008).

Karrer, T. (2006). eLearning Technology Blog, available from http://elearningtech.blogspot.com/2006/11/big-question-for-november-future-of.html (accessed 15 April 2008).

Keller, J. (1983). Motivational Design of Instruction. In C. Reigeluth (ed.), *Instructional Design Theories and Models: An Overview of Their Current Status*, Hillsdale, NJ: Erlbaum.

Learning Objects Metadata (LOM) Committee of the Institute of Electrical and Electronics Engineers (2000). LOM Working Draft v.4.1, available from http://ltsc.ieee.org/doc/wg12/LOMv4.1.htm (accessed 2 June 2008).

Learning Technology Standards Committee of the Institute of Electrical and Electronics Engineers (2000). Learning Technology Standards Committee website, available from http://ltsc.ieee.org/ (accessed 2 June 2008).

Lenhart, A., Fallows, D., and Horrigan, J. (2006). Content Creation Online, available from www.pewinternet.org/pdfs/PIP_Content_Creation_Report.pdf (accessed 15 July 2008).

Liu, M., Gibby, S., Quiros, O., and Demps, E. (2002). The Challenge of Being an Instructional Designer for New Media Development: A View from the Practitioners, *Association for the Advancement of Computing in Education (AACE)*, available from http://eric.ed.gov/ERICDocs/data/ericdocs2sql/content_storage_01/0000019b/80/1b/19/14.pdf (accessed 14 June 2008).

Maness, J. (2006). Library 2.0 Theory: Web 2.0 and Its Implications for Libraries. *Webology*, vol. 3, no. 2, available from www.webology.ir/2006/v3n2/a25.html (accessed 23 December 2008).

McGee, P. and Suter, V. (2003). The Digital Repository Comes of Age: NLII Members are Turning Learning Objects into Knowledge Agents, available from http://connect.educause.edu/Library/ELI/TheDigitalRepositoryComes/42545 (accessed 17 July 2008).

Metros, S. (2002). Learning Objects in Higher Education, available from http://net.educause.edu/ir/library/pdf/ERB0219.pdf (accessed 3 January 2008).

Metros, S. (2005). Learning Objects – A Rose by any other Name. *EDUCAUSE Review*, vol. 40, no. 4, pp. 12–13.

Miller, P. (2008). Library 2.0: The Challenge of Disruptive Innovation, available from www.talis.com/resources/documents/447_Library_2_prf1.pdf (accessed 15 May 2008).

Morville, P. (2004). User Experience Design, available from http://semanticstudios.com/publications/semantics/000029.php (accessed 15 May 2008).

Nash, S. (2007). Web 2.0 and the Online Library: Paradoxes, Challenges, and Opportunities for the Online Learner, available from http://community.elearners.com/blogs/inside_elearning/archive/2007/11/29/Web-2.0-and-the-Online-Library_3A00_-Paradoxes_2C00_-Challenges_2C00_-and-Opportunities-for-the-Online-Learner.aspx (accessed 20 June 2008).

OCLC (Online Computer Library Center) (2007). *Sharing, Privacy and Trust in our Networked World*, Report to OCLC Membership, Dublin, OH: OCLC.

Shank, J. (2003). The Emergence of Learning Objects: The Reference Librarian's Role. *Research Strategies*, vol. 19, nos. 3-4, pp. 193–203.

VUDAT (Michigan State University Virtual University Design and Technology) (2007), available from http://vudat.msu.edu/ (accessed 15 January 2009).

Wiley, D. (2000). Connecting Learning Objects to Instructional Design Theory: A Definition, A Metaphor, and A Taxonomy. In D. Wiley, *The Instructional Use of Learning Objects: Online Version*, available from http://reusability.org/read/chapters/wiley.doc (accessed 29 April 2008).

6

Closing the gap between instructional strategies and instructional design

We know that there are specific nuances within library instruction that set it apart from classroom teaching. This makes it difficult to determine what the most logical applications of instructional design are for those librarians who want to use these models to help guide their efforts. Gagne et al. (1992) suggest that "the best way to design instruction is to work backwards from its expected outcomes." Most often, librarians are designing instruction for specific courses, much the way Gagne et al. describe it: "Design of the smaller components is simply referred to as instructional design since the focus is the piece of instruction itself, rather than the total instructional system" (ibid., 21). There are certain inherent connections between instructional design and library/research instruction, one of the most important being the evaluation of how people learn best in order to implement the most effective instructional practices. Bloom's Taxonomy (Bloom et al., 1956) is a very compelling theoretical framework for how learning takes place and is the foundation for a number of instructional design models. How do librarians evaluate the impact of learning across the three domains that Bloom defined (ibid., 7): affective (emotional), psychomotor (physical) and cognitive (knowledge, comprehension)? Dewald et al. (2000, 33) suggest

that, in order for librarians to develop effective instruction, they must consider a variety of instructional design-related issues, such as selection technology, incorporation of active learning and the assessment of the learning. Adamich (2003) talks about integrating information literacy, instructional design and information power, and focuses on how schools can integrate information literacy goals into the curriculum with a straightforward instructional design plan. He suggests the following simple questions that librarians can ask themselves when dealing with instructional issues:

- What is my goal?
- What are some keywords in my goal activity?
- What prior knowledge or terminology can I bring to my goal activity?
- What sources of information do I have available to me?
- What information do I want to obtain?
- How many sources can I use?
- What do I do when I get all my information gathered?
- How do I know that I completed my goal activity?
- How do I present my completion of the goal activity to others?
- What worked well in achieving my goal this time?
- What would I change? (Adamich, 2003, 26)

The challenge for librarians may be to discover the best ways to become more competent with instruction and the use of instructional design, and to gain formal training in the area. Instruction has become a mainstay of many academic reference librarian positions, yet it is not so common to hear discussions about the best ways to craft instruction using instructional design. In a study by Lynch and Smith (2001)

a review of academic library job postings from the 1990s found that most of them mentioned some type of instructional duties; yet, in a review of ninety-three graduate library school programs Julien (2005) found that 49 percent offered no formal courses in instruction. Schools that did offer courses in instruction covered a variety of topics within their curricula; however, there was no comprehensive coverage of topics related to instructional design, assessment of instruction, learning theory, or outcomes assessment (ibid., 213). Julien observes that "proficiency requires more formal training" (ibid., 212).

Jonassen et al. (1997) talk specifically about how librarians can use instructional design. He proposes using a constructivist approach to learning, which may include inquiry-based learning, discovery learning or problem-based learning (Allen, 2008). This approach requires knowledge of learners' internal mental models as part of the instructional design process. Jonassen suggests that learners construct their knowledge as they solve real problems, and that the learning goals that arise from this constructivist approach are more genuine and reflect learner-driven outcomes rather than teacher-driven ones (Jonassen 1999; Jonassen 2000). Allen (2008, 22) supports this, concluding, "constructivist approaches to online library instruction hold a great deal of promise for effective online learning." Allen indicates that this type of approach is contingent upon the inclusion of critical thinking skills and active learning, which in reality can be very difficult to implement. Librarians will recognize Allen's description of what, in many cases, passes for active learning: "many instructors believe that simply providing hands-on experiences for learners, such as recreating a database search after watching the instructor do a similar activity, qualifies as active learning" (ibid., 31). Ideally, librarians seeking to use true constructivist instructional

design methods to build more engaging information literacy sessions should structure these sessions so that the "concept follows the action rather than precede it" (Cooperstein and Kocevar-Weidinger, 2004, 141). Allen does offer a warning that not every student will benefit from constructivist-based learning experiences: "In environments where students are so inexperienced that they have very little prior knowledge to build upon, a constructivist-based approach would likely overwhelm them" (2008, 33). The connection between Constructivism and instructional design was discussed in Chapters 1 and 3 of this book.

The role of librarians as educators and teachers

Many librarians see themselves as educators and oftentimes learn about good pedagogy and teaching methods on the job as they begin to teach bibliographic instruction. The role of academic librarians in the academy has changed drastically over the past decade. The teaching responsibilities of librarians have increased in many libraries, but there has been no progressive move towards formally recognizing this role. As Simmons (2005, 299) suggests, "this role of librarian as disciplinary discourse mediator has not yet been recognized within the academic setting, even though this is a role that many academic librarians play in their daily interactions with students – particularly librarians in libraries with fully integrated information literacy programs. Further, this role for librarians has not yet been articulated in either the library or the higher education literature; and, therefore, librarians' pedagogical potential in the context of post-secondary education has not been fully tapped. Additionally, articulating this potential role for librarians in undergraduate education may develop a consciousness about disciplinary

practices among academic librarians, thereby encouraging more attention and deliberate instruction about disciplinary discourses."

Walter (2008, 51) suggests that "changes in scholarly communication, advances in information technology, and new models for professional staffing of academic libraries all present challenges to academic librarians and to the administrators who strive to integrate library services into the broader mission of the college or university." He further states that "academic librarians are increasingly responsible for a variety of activities directly related to teaching and learning, and that the scope of those responsibilities has expanded in recent years to encompass instruction delivered in the library, across the campus, and in online learning environments" (ibid., 52). As a result, the role of the librarian as teacher has been increasingly integrated into many position descriptions, a practice that has been on the increase since the late 1970s. Walter also asks, "to what degree is 'teacher identity' a recognized aspect of the broader professional identity of academic librarians?" (ibid., 53). Given these demands, the profession continues to struggle with the reality that many librarians are actually not truly prepared to teach. There are three questions that academic librarians should consider with regard to their role as educators:

- To what degree is academic coursework focused on instruction available to pre-service librarians as part of their professional education?
- In the absence of such coursework, what other avenues are available to become proficient in instructional responsibilities?
- What are the core competencies that should be mastered in order to be an effective teacher? (ibid., 56)

It is perhaps the last question that arises most frequently and has the greatest implications for librarians who teach.

Shonrock and Mulder (1993) conducted a research study based on a survey conducted in 1983 by the Association of College and Research Libraries Bibliographic Instruction Section's Education for Bibliographic Instruction Committee. The committee wanted to identify the key instructional proficiencies required by librarians. As a result, eighty-four proficiencies were classified and divided into two distinct categories, "those ... needed to conduct instructional activities and those ... needed to administer a librarywide program" (ibid., 139). Subsequent research went on to identify the twenty-five most important proficiencies, and where librarians had acquired them (ibid., 142–4).

1. Ability to design the curriculum for the goal
2. Ability to match instructional method to a given objective
3. Ability to match instructional method to a given academic level
4. Ability to determine a reasonable amount and level of information to be presented in a lesson plan
5. Ability to sequence information in a lesson plan
6. Ability to construct assignments which reinforce learning in a lesson plan
7. Ability to organize and structure ideas logically
8. Ability to deliver lectures, vary pace and tone, use eye contact, use appropriate gestures, and so forth
9. Ability to stimulate discussion and questions
10. Ability to verbalize search strategy
11. Ability to give clear, logical instructions
12. Ability to explain abstractions by devising analogies, metaphors, and so forth

13. Understanding of the structure of information within various disciplines and the categories of tools necessary to use the information
14. Ability to develop a search strategy
15. Ability to understand campus curricular needs as part of the planning process
16. Ability to relate aims of the institution to bibliographic instruction (BI) and BI to the library services
17. Ability to distinguish different levels of bibliographic instruction
18. Ability to set priorities during planning
19. Ability to inspire confidence and respect of the library director and other supervisors
20. Understanding of faculty priorities and value systems in order to promote a bibliographic instruction program
21. Understanding of student assignments and the role of the library in completing these assignments
22. Ability to be persistent and persuasive in "selling" bibliographic instruction to administration and faculty
23. Ability to find the best paths of communication within the institution and use them to promote bibliographic instruction
24. Ability to identify discrete library skills of relevance to student assignments
25. Ability to seek feedback regularly from the librarians offering instruction as part of the evaluation process.

The authors found that most of the twenty-five proficiencies they identified were related to "curriculum and instructional design" (ibid., 145). They also found that most of these skills had been "acquired via on the job training" as opposed to

having been learned in a formal setting (ibid.). Only very few librarians acquired these proficiencies while in library school. The authors found that only 14 percent of respondents learned how to distinguish different levels of bibliographic instruction while in library school; 3 percent learned how to design the curriculum for the goal; 3 percent learned how to match the instructional method to the given objective; 14 percent learned how to verbalize a search strategy; and 2 percent learned how to match an instructional method to a given academic level (ibid., 146). Instructional design models may supplement the knowledge librarians bring to the classroom and enhance the areas where there are deficits by providing a road map to help librarians to better plan their approach to teaching. A number of other scholars have also investigated the skills needed by librarians in order to be successful in the classroom, including, Smith (1982), Mandernack (1986), Powell (1988), Cain (1998) and Walter (2008).

Integrating information literacy and instructional design

The task of integrating best practices into instruction and being aware of certain proficiencies and their potential impact in the classroom is a challenging one. Professional organizations such as the Association of College and Research Libraries (ACRL) have developed and promoted guidelines to help librarians discern the most important teaching proficiencies. The ACRL Standards for Proficiencies for Instruction Librarians and Coordinators (ACRL, 2004) lists twelve categories of proficiencies for instruction librarians. They are:

1. Administrative skills
2. Assessment and evaluation skills

3. Communication skills
4. Curriculum knowledge
5. Information literacy integration skills
6. **Instructional design skills**
7. Leadership skills
8. Planning skills
9. Presentation skills
10. Promotion skills
11. Subject expertise
12. Teaching skills.

Section 6 is most relevant to this chapter. There are seven broadly defined instructional design skills under this section:

6.1 The effective instruction librarian collaborates with classroom faculty by defining expectations and desired learning outcomes in order to determine appropriate information literacy proficiencies and resources to be introduced in library instruction.

6.2 The effective instruction librarian sequences information in a lesson plan to guide the instruction session, course, workshop, or other instructional material.

6.3 The effective instruction librarian creates learner-centered course content and incorporates activities directly tied to learning outcomes.

6.4 The effective instruction librarian assists learners to assess their own information needs, differentiate among sources of information and helps them to develop skills to effectively identify, locate, and evaluate sources.

6.5 The effective instruction librarian scales presentation content to the amount of time and space available.

6.6 The effective instruction librarian designs instruction to best meet the common learning characteristics of learners, including prior knowledge and experience, motivation to learn, cognitive abilities, and circumstances under which they will be learning.

6.7 The effective instruction librarian integrates appropriate technology into instruction to support experiential and collaborative learning as well as to improve student receptiveness, comprehension, and retention of information.

Each of these guidelines maps to the key elements of a number of the instructional design models discussed in Chapter 3 of this book, including paying attention to learning readiness, expressing clearly written learning objectives, and the appropriate integration of technology into teaching. This is important, as it is indicative of the necessary intersection of what instruction librarians do, and the use of instructional design in the classroom. How, then, do librarians integrate teaching practice and instructional design as complementary parts of the same instructional landscape? The Morrison Ross Kemp (MRK) model provides an opportunity to demonstrate points of overlap with the ACRL guidelines. The model has nine identifiable elements, which are mapped in Table 6.1 to the relevant ACRL guidelines.

Table 6.1 **Mapping of MRK elements to ACRL guidelines**

MRK element	ACRL guideline
1. Identify instructional problems, and specify goals for designing an instructional program	6.1 Requires the instruction librarian to work closely with teaching faculty to define instructional problems and related solutions. "The effective instruction librarian collaborates with classroom faculty by defining expectations and desired learning outcomes in order to determine appropriate information literacy proficiencies and resources to be introduced in library instruction."

Table 6.1 **Mapping of MRK elements to ACRL guidelines (*cont'd*)**

MRK element	ACRL guideline
2. Examine learner characteristics that should receive attention during planning	6.6 Urges librarians to make sure they are aware of where the students are in terms of prior exposure to the material, and of other characteristics that will impact how well they are prepared to learn. "The effective instruction librarian designs instruction to best meet the common learning characteristics of learners, including prior knowledge and experience, motivation to learn, cognitive abilities, and circumstances under which they will be learning."
3. Identify subject content, and analyze task components related to stated goals and purposes	6.3 Suggests that librarians pay close attention to the development of the content for their classes, and match them to the original goals. "The effective instruction librarian creates learner-centered course content and incorporates activities directly tied to learning outcomes."
4. State instructional objectives for the learner	6.1 Incorporates both the instructor and the librarian clarifying the objectives of the session for the learners.
5. Sequence content within each instructional unit for logical learning	6.2 The order of presentation for any material is key to how effective the teaching is for the learner. "The effective instruction librarian sequences information in a lesson plan to guide the instruction session, course, workshop, or other instructional material."
6. Design instructional strategies so that each learner can master the objectives	6.4 Learners must be aware of where they are and their own learning readiness in order to allow them the opportunity to meet the goals of the session. "The effective instruction librarian assists learners to assess their own information needs, differentiate among sources of information and helps them to develop skills to effectively identify, locate, and evaluate sources."
7. Plan the instructional message and delivery	6.5 Material for learners should be delivered at a pace that will enhance learning. "The effective instruction librarian scales presentation content to the amount of time and space available."

Table 6.1 Mapping of MRK elements to ACRL guidelines (*cont'd*)

MRK element	ACRL guideline
8. Develop evaluation instruments to assess objectives	Aside from guideline 6.4, which urges librarians to support learners as they "assess their own information needs," there are no guidelines for the development of evaluation tools. Assessment of library instruction has long been a difficult task to accomplish with any regularity, and requires sustained attention by librarians to be successful.
9. Select resources to support instruction and learning activities	This element brings together all of the prior considerations for delivery of the instruction. ACRL guideline 6.7 requires librarians to integrate technology into instructional delivery as necessary: "the effective instruction librarian integrates appropriate technology into instruction to support experiential and collaborative learning as well as to improve student receptiveness, comprehension, and retention of information."

Instructional strategies that work

Instructional strategies – those best practices that enable educators to provide effective, engaging and focused instruction – are an important component to be considered within the framework of instructional design for academic libraries. How do librarians evaluate what makes sound instructional strategy before going into the classroom? Information literacy instruction faces a number of strategic challenges not at all dissimilar to those faced by distance learning programs. Media must be carefully selected, librarians must be sure to communicate with learners (both in person and virtually), librarians must make sure their course or lesson content is sequenced and populated with learning objects that will be effective for students and, to a certain degree, librarians should try to anticipate areas that

may be difficult for students and where they may need additional support. Bourdeau and Bates (1997, 378–9) illustrate ten instructional design elements that are relevant to distance learning – specifically, elements that may address three critical issues in distance education: access, attrition and quality. Each of the ten elements provides possible strategies for dealing with these issues. The ten instructional design elements are:

1. Media selection
2. Understandability, readability, explicitness and feasibility
3. Two-way communication
4. Learning activities
5. Student support
6. Peer collaboration
7. Feedback to students
8. Error anticipation
9. Evaluation of learning
10. Evaluation and revision of instruction. (Bourdeau and Bates, 1997, 380)

These elements map closely to instructional design models discussed in Chapter 3, many of which include some of the same principles. There are also parallels for teaching information literacy skills, as these same principles may ameliorate certain instructional and learning challenges. Bordeau and Bates propose that one of the ways to address accessibility in relation to instruction would be to use media selection as a strategy. This can be done by "developing fully readable, understandable, and feasible material and guidance" (ibid.) both in distance learning settings and in libraries. For dealing with challenges presented by attrition,

the authors suggest using the instructional design principle of two-way communication: "plan two-way, synchronous and asynchronous communication" with learners. In response to quality issues, determining "clear evaluation standards for learning outcomes" is key (ibid.).

Along with the discussion of what awareness, skills and preparation librarians need to teach is the notion of how librarians can know that what they teach is effective. Friedman and Fisher present twelve principles and instructional strategies to be considered when designing instruction:

1. Surveying student readiness
2. Defining instructional expectations
3. Providing effective evaluation and remediation
4. Providing contiguity
5. Utilizing repetition effectively
6. Clarifying communication
7. Reducing the student-to-teacher ratio
8. Providing reminders
9. Providing subject matter unifiers
10. Providing transfer of learning instruction
11. Providing teamwork instruction
12. Providing decision-making instruction. (Friedman and Fisher, 1998, 5)

The authors suggest that each of these strategies can be incorporated into current instructional programs, all geared toward enhancing student learning and supporting a more rewarding and fulfilling educational experience. Of the strategies listed, several stand out as being highly relevant in

library instructional settings. Surveying student readiness should be a prime focus of instructional librarians. Friedman and Fisher suggest that "achievement of learning objectives is enhanced when students possess the readiness capabilities necessary to achieve the learning objectives" (ibid., 7). The authors further state that "the preeminence of readiness in determining student success in achieving learning objectives cannot be overemphasized. Students who do not have the knowledge and skills necessary to perform the tasks that enable the achievement of a learning objective are not likely to achieve the objective, even if other effective strategies are employed in teaching the students" (ibid., 6). Librarians are often called upon to provide discipline-specific instruction with very little notice. For many librarians, there is no easy way for them to determine the level of readiness students may have in terms of information literacy. Thus, librarians must make certain assumptions about their audience when preparing to teach, or must find simple ways to gather some feedback about the students before teaching a class. In some cases, it may be possible to conduct a brief post-test with the aid of the faculty member, via email or in person, or by means of an online tutorial with an assessment component. Each of these strategies should be rolled into an instructional design plan as part of the initial determination of learning goals.

Next, librarians must be prepared to define their instructional expectations to the learners. This is a key foundational concept in the instructional design process. Friedman and Fisher suggest that, without a clear sense of what they are expected to learn in any given session, students "may not be able to process the available information to determine what is relevant and what is not; may not be able to determine the appropriate procedures

needed to accomplish the learning objectives; and may have difficulty in determining when they have successfully achieved the objective" (ibid., 19). Instruction librarians working with instructional design models may be at an advantage, as these models all have as a hallmark the determination and articulation of learning outcomes for learners. Gagne et al. (1992, 39) explore the concept of learning goals and expectations in depth, and suggest that the instructional goals are critical for student learning. Sharing instructional goals early and often with classroom faculty can also enhance the learning experience, especially when there is a synthesis and inclusion of the information literacy-related goals in the syllabus and lesson plan for the course.

The concept of contiguity should be part of a sound instructional strategy (Friedman and Fisher, 1998). According to Mayer (2001), the principle of contiguity says that students learn best when related materials, such as words and pictures, are presented together, as opposed to in succession. Contiguity also applies to the sequence of instruction as well as to the material itself. Friedman and Fisher suggest that "student task performance should follow instruction as soon as possible; evaluation of student task performance should occur during or immediately after student task performance; feedback to students on the correctness of their task performance should occur immediately, or very soon, after evaluation" (1998, 53). Librarians integrating instructional design into their teaching should consider contiguity a guiding principle for presenting material to users, making sure to tightly connect words and images. An example might be a verbal explanation of what a database is, while simultaneously showing a database to the class on a computer screen. Librarians also need to pay attention to the sequence of

instruction and subsequent evaluation. An online tutorial on identifying a search topic for a research paper might have a short quiz that students would take after completing the tutorial.

The use of repetition is also important. This concept should be included as a step within the instructional design framework for librarians when they are creating the actual learning activities and identifying the media to be used in class. Friedman and Fisher state that there are specific tactics that should be considered if repetition is to "enhance" learning (1998, 68). To-be-learned information is repeatedly presented to students; to-be-learned tasks are repeated or practiced by students; repetition is frequent; there is variation in repetitions so as to avoid boredom; and repeatedly testing students on to-be-learned information enhances their learning of information (ibid.). This idea may be a challenging one for librarians to implement in many cases, as bibliographic instruction classes are often one-shot deals with perhaps one or two sessions, and infusing repetition over time is not practical. Librarians may consider ways to reinforce what they have taught in the classroom by placing links and reminders on the course syllabus or on the course management page (Blackboard, Sakai, Moodle). These reminders can be linked to research assignments and designed to trigger learning that has taken place earlier (such as how to find and use a certain database). Transfer of learning instruction is defined as "the application of prior learning to enable the performance of new tasks" (Friedman and Fisher, 1998, 130). The researchers also state that "the challenge to education is to facilitate the transfer of learning that is necessary for the achievement of learning objectives. Any sequence of tasks students are to perform to achieve a learning objective must be formulated so that the performance of earlier tasks in the sequence enables the performance of subsequent tasks" (ibid.). How can librarians

use instructional design to support transfer for learning instruction? The first step would be having transfer of learning as an objective within the instructional design plan. Librarians would make sequencing of instruction clear, and highlight the fact that in order for students to progress to using a certain database effectively for their research, they must first understand how to formulate a good search strategy.

Friedman and Fisher address the importance of learning readiness in terms of transfer of learning, urging educators to "ensure that students possess the readiness characteristics necessary to perform assigned tasks. Students cannot transfer skills they do not possess" (1998, 131). A more difficult challenge for librarians may be determining which prior skills/learning are critical to the understanding of new knowledge and the performance of new tasks, and then communicating this to learners (ibid., 130). This is an area where librarians could use instructional design models to link old and new skills, again by way of a carefully crafted instructional design plan. A deliberate effort to sequence bibliographic instruction in this manner is a luxury many librarians do not have.

Finally, the researchers discuss the role of subject matter unifiers. When content within a certain subject area is presented, relationships between the different parts should be highlighted. This allows students to make connections and facilitates transfer of learning. A unifier may be some kind of diagram or scheme that illustrates these relationships, for instance. Friedman and Fisher list four unifiers: textual summaries, hierarchical tree diagrams, pictorial representations and subject matter outlines (1998, 115). For instance, librarians could incorporate the use of unifiers into plans for a virtual tutorial, or think about the role of unifiers in the instructional design of assessment tools for information literacy skills.

Using instructional design models to craft an information literacy lesson

Information literacy education has long been discussed as a key role for librarians within higher education. The current focus is on collaboration, and on ways that librarians can work together with teaching faculty to design instruction to meet subject-specific or general information literacy needs. Guiding these efforts is a heightened sense that information literacy is far more complex than just a set of standards. Simmons suggests that "the voluminous published literature about information literacy tends to focus narrowly on the acquisition of skills instead of more broadly on the learning of discursive practices within the context of an academic discipline" (Simmons, 2005, 299). The author further states that "while this is a useful definition to guide information literacy instruction programs, it lacks a critical element in which assumptions about information are called into question. When information literacy is explained in terms of a set of skills, it can easily be reduced to 'a neutral, technological skill that is seen as merely functional or performative'" (ibid., 299). The author states further that "helping students to examine and question the social, economic, and political context for the production and consumption of information is a vital corollary to teaching the skills of information literacy. Additionally, facilitating students' understanding that they can be participants in scholarly conversations encourages them to think of research not as a task of collecting information but instead as a task of constructing meaning" (ibid.). Certainly, the complexities born of research and scholarship are a part of the process, which includes the integration of information literacy. Simmons urges educators to consider pushing past the standards and guidelines and working to make sure that

students also have a chance to grow as critical thinkers, capable of performing complex research activities.

As we have already read, there are many instructional design models. They all share common components and any one of them could be used in a library setting to help librarians better conceptualize connections between library instruction and instructional design. The Morrison Ross Kemp (MRK) model was used earlier in the chapter and mapped to the ACRL Standards for Proficiencies for Instruction Librarians and Coordinators (2004) to illustrate where instructional design and library instruction naturally intersect. What would application of another instructional design model – in this case, the framework commonly known as ADDIE (analyze, design, development, implementation, evaluation) – look like at the lesson level?

For this scenario, let us assume that a teaching faculty member contacts a librarian for a bibliographic instruction/library research instruction session, which would mean that the model would be used at the lesson level (the librarian would be preparing for just one or perhaps two short sessions with the students). The instructor requires that the students are able to use library resources to develop and refine a thesis statement for an upcoming research paper. Gagne et al. refer to this initial articulation of the objective as what learners will be "able to do after the instruction, that they couldn't (didn't) do before" (1992, 125). This particular objective maps to Standard 1, Outcome B of the ACRL Information Literacy Competency Standards for Higher Education (2000), which states that the information literate student is able to "develop a thesis statement and formulate questions based on the information need."

Once contact has been made by the departmental faculty member, the instructional design activities related to the first ADDIE phase, *analysis*, will begin. This phase of the

instructional design process is an in-depth analysis of learning needs, goals and readiness of the audience, and precedes the development of the instructional objectives. In this case, the learning objective has already been described by the faculty member. The analysis phase will include the librarian gathering information from the faculty member about the class, the context, the time frame for the lesson, any pending assignments and the audience. Analyzing the make-up of the target audience is particularly important. The librarian may want to determine needs by assessing gaps in what students already know in relation to what they need to know, as well as the students' current knowledge base. Some key questions may be: Are the students familiar or unfamiliar with the library? Are the students familiar with online searching? Are they familiar with the research process and the writing of research papers? Skills such as language and writing capabilities should be taken into account if that information is available. Next, the librarian needs to think about how success will be defined. In a nutshell, the analysis phase consists of a lot of information gathering and communication with the course instructor, as well as a review of student profiles and class make-up.

For the *design* stage, the librarian begins to identify relevant activities and tasks that will take place during the lesson and to sequence and organize the information so that learning will be optimal for the students. A fair amount of literature is available on the sequencing of instruction, and instructional design librarians need to familiarize themselves with these recommendations if possible. The librarian should then think about and plan for the delivery of the content and give thought to delivery format, and be sure to document the guidelines for assessment. The *development* phase involves the librarian in compiling a prototype, developing a pilot or sample lesson plan and sharing these with the faculty member and perhaps

other librarians for feedback and refinement. Normally during this stage, a pilot will take place, so that, for instance, a prototype for a new virtual tutorial might be shared. This step may not be so relevant for a one-shot lesson. The *implementation* phase is fairly straightforward and includes delivery of the instruction to the students. The librarian will also deal with teaching logistics, notify the course instructor and students of the time and location, take care of space, computer and other support needs, and prepare any needed documents for class distribution. The last stage, *evaluation*, requires the librarian to measure whether the objectives have been met and to revise the lesson as necessary so as to improve the content for future sessions.

Much of the librarian's time will be spent on the first stage – analysis – as it is this stage that outlines the needs of the learner and produces all the important learning objectives for the lesson. This illustration is fairly simplistic – most applications of instructional design at the institutional, course, and unit levels are much more in depth and can take quite a long time to prepare. In this case, the learning objective was provided by the instructor and further articulated by ACRL Information Literacy Competency Standard 1.

Internationally, there are numerous information literacy standards and guidelines to which librarians refer and, as with the ACRL standards and guidelines, these lend themselves to integration with various instructional design efforts. The International Society for Technology in Education (ISTE) has developed educational technology standards for students, international guidelines that include information literacy. The standards can be broadly applied, and certainly facilitate the use of instructional design in a number of areas:

- Creativity and innovation
- Communication and collaboration

- Research and information literacy
- Critical thinking
- Problem solving and decision making
- Digital citizenship
- Technology operations and concepts. (ISTE, 2007)

The Council of Australian University Librarians (CAUL) (2004) developed a set of standards based on the ACRL Information Literacy Competency Standards. The CAUL standards focus on the ability of an individual to determine need, locate, evaluate and use information resources – competencies the teaching of which could be enhanced by the use of instructional design models. The CAUL standards are as follows:

- **Standard One** – The information literate person recognises the need for information and determines the nature and extent of the information needed.
- **Standard Two** – The information literate person finds needed information effectively and efficiently.
- **Standard Three** – The information literate person critically evaluates information and the information seeking process.
- **Standard Four** – The information literate person manages information collected or generated.
- **Standard Five** – The information literate person applies prior and new information to construct new concepts or create new understandings.
- **Standard Six** – The information literate person uses information with understanding and acknowledges cultural, ethical, economic, legal, and social issues surrounding the use of information. (CAUL, 2004)

The UK-based Society of College, National and University Libraries (SCONUL) published a "seven pillar" model for Information Skills in Higher Education in 1999, which bears resemblance to the standards and guidelines listed above. No matter which set of standards is being applied, the use of instructional design can only enhance the learning experience for the user.

For librarians, many of the steps involved in the instructional design process are already taken when preparing lessons for information literacy. Instructional design guidelines may further help new librarians and librarians with more experience to formalize and better document their teaching effort.

The next chapter will synthesize the theoretical and practical discussions from Chapters 5 and 6 with real-world efforts by presenting a case study of the instructional design and development process of a virtual library-based information literacy project, courtesy of the interactive multimedia design firm, Kognito Interactive, in New York City.

References

Adamich, T. (2003). The Big Three: Instructional Design, Information Literacy, and Information Power. *Knowledge Quest*, vol. 32, no. 1, p. 26.

ACRL (Association of College and Research Libraries) (2000). The ACRL Information Literacy Competency Standards for Higher Education, available from www.ala.org/ala/acrl/acrlstandards/informationliteracycompetency.cfm (accessed 30 June 2008).

ACRL (2004). Standards for Proficiencies for Instruction Librarians and Coordinators, available from www.ala.org/ala/acrl/acrlstandards/profstandards.cfm (accessed 30 June 2008).

Allen, M. (2008). Promoting Critical Thinking Skills in Online Information Literacy Instruction Using a Constructivist Approach. *College & Undergraduate Libraries*, vol. 15, no. 1–2, pp. 21–38.

Bloom, B. et al. (1956). *Taxonomy of Educational Objectives: The Classification of Educational Goals*, *Handbook I: Cognitive Domain*, New York: David McKay Company, Inc.

Bourdeau, J. and Bates, A. (1997). Instructional Design for Distance Learning. In S. Dijkstra, N. Seel, F. Schott, and R. Tennyson (eds), *Instructional Design: International Perspectives Vol. 2: Solving Instructional Design Problems*, Mahwah, NJ: Lawrence Erlbaum and Associates.

Cain, M. (1998). Academic Librarians: Who Are We? *Journal of Academic Librarianship*, vol. 14, pp. 292–6.

Cooperstein, S. and Kocevar-Weidinger, E. (2004). Beyond Active Learning: A Constructivist Approach to Learning. *Reference Services Review*, vol. 32, no. 2, pp. 141–8.

CAUL (Council of Australian University Librarians) (2004), available from www.caul.edu.au/info-literacy/InfoLiteracy Framework.pdf (accessed 5 May 2008).

Dewald, N., Scholz-Crane, A., Booth, A. and Levine, C. (2000). Information Literacy at a Distance: Instructional Design Issues. *Journal of Academic Librarianship*, vol. 26, no. 1, pp. 33–44.

Friedman, M. and Fisher, S. (1998). *Handbook of Effective Instructional Strategies: Evidence for Decision-making*, Columbia, SC: The Institute for Evidence-based Decision Making in Education, Inc.

Gagne, R. et al. (1992). *Principles of Instructional Design*, Fort Worth, TX: Harcourt Brace Jovanovich College Publishers.

ISTE (International Society for Technology in Education) (2007). Standards available from www.iste.org/Content/NavigationMenu/NETS/ForStudents/2007Standards/NETS_for_Students_2007.htm (accessed 17 July 2008).

Jonassen, D. (1999). Designing Constructivist Learning Environments. In C. Reigeluth (ed.), *Instructional Design Theories and Models: A New Paradigm of instructional Theory, Volume II*, Mahwah, NJ: Lawrence Erlbaum and Associates.

Jonassen, D. (2000). Toward a Design Theory of Problem Solving. *Educational Technology Research and Development*, vol. 48, pp. 63–85.

Jonassen, D. et al. (2007). Certainty, Determinism, and Predictability in Theories of Instruction Design: Lessons from Science. *Educational Technology*, vol. 37, pp. 27–34.

Julien, H. (2005). Education for Information Literacy Instruction: A Global Perspective. *Journal of Education for Library and Information Science*, vol. 46, no. 3, pp. 210–16.

Lynch, B. and Smith, K. (2001). The Changing Nature of Work in Academic Libraries. *College and Research Libraries*, vol. 62, no. 5, pp. 407–20.

Mandernack, S. (1986). An Assessment of Education and Training Needs for Bibliographic Instruction Librarians. *Journal of Education for Library and Information Science*, vol. 30, pp. 193–201.

Mayer, R. (2001). *Multimedia Learning,* Cambridge, UK: Cambridge University Press.

Powell, R. (1988). Sources of Professional Knowledge for Academic Librarians. *College & Research Libraries*, vol. 49, pp. 332–40.

Shonrock, D. and Mulder, C. (1993). Instruction Librarians: Acquiring the Proficiencies Critical to Their Work. *College & Research Libraries*, vol. 54, no. 2, pp. 137–48.

Simmons, M. (2005) Librarians as Disciplinary Discourse Mediators: Using Genre Theory to Move Toward Critical Information Literacy. *portal: Libraries and the Academy*, vol. 5, no. 3, pp. 297–311.

Smith, B. (1982). Background Characteristics and Education Needs of a Group of Instruction Librarians in Pennsylvania. *College & Research Libraries*, vol. 43, pp. 199–207.

Society of College, National and University Libraries (SCONUL) (1999). Information Skills in Higher Education: A SCONUL Position Paper, available from www.sconul.ac.uk (accessed 15 May 2008).

Walter, S. (2008). Librarians as Teachers: A Qualitative Inquiry into Professional Identity. *College & Research Libraries*, vol. 69, no. 1, pp. 51–71.

7

The instructional design process in action: highlights from Kognito Interactive

By guest contributor Ralph Vacca

This book has covered the theoretical and pedagogical foundations of instructional design and presented several scenarios highlighting its use within the academic library. This chapter presents something of a case study – data, artifacts and examples from Kognito Interactive, a New York City-based design firm that specializes in the creation and development of highly interactive multimedia e-learning solutions. The company uses the expertise of staff with backgrounds in education, cognitive psychology, interactive technology and instructional design to develop customized solutions to learning problems and challenges. Many of Kognito's products are simulations, but it also creates products that integrate gaming, Web 2.0 technology and experiential learning strategies. Kognito Interactive creates these solutions from scratch and also works with existing content to make it more engaging and effective. The company serves a wide clientele including local and state governmental agencies, higher education, corporations and non-profit agencies. It focuses on learning products in the areas of management, leadership, health and safety, and also information literacy and library instruction.

This chapter will provide an overview of the design and development processes involved in the creation of interactive products and will review in detail the development of a virtual interactive tutorial for an academic library. Internal and working documents from real projects are provided. The goals of the chapter are to illustrate the complexity of the instructional design process at the professional level and to show the relevance of this type of instructional design to the academic library. Moreover, the chapter will provide an example of how an external group might work with academic libraries and librarians on instructional design projects.

Kognito's design and development process

Every instructional design project has a series of steps that must be undertaken if the process is to run smoothly and the outcome meet the standards of the creators and the learning objectives for the students. The process that Kognito Interactive uses for many of its projects entails seven phases, each requiring effective communication both internally and with the client group, attention to administrative and managerial details such as cost and staffing, and detailed needs analysis to clarify learner characteristics, motivations and requirements. The seven phases are listed below, as described by Kognito.

Phase 1: The preliminary proposal

Many clients contact Kognito with a specific training need. To work out the best way to address their need using a simulation, Kognito undertakes a short needs analysis for

free. In this phase Kognito learns more about the needs and the learners, and then creates a preliminary vision of how the simulation should work and look. At the end of this process, Kognito puts together a preliminary proposal covering the concept for the simulation and its cost.

Phase 2: Finalizing the proposal and signing an agreement

Following further discussions with the client, Kognito finalizes the proposal and signs an agreement. In some cases it offers to share the cost of development in return for the right to share modified versions of the simulation with other clients.

Phase 3: Kick-off meeting

Kognito then holds a kick-off meeting where it finalizes the objectives of the project, the project team and the schedule. The details of this phase are:

1. Meet with client team to gather information for Management Plan
   a. Assign project team and role for each member
   b. Goals of the project
   c. Plan for project administration and communication
   d. Assessment of project risks
   e. Description of deliverables
   f. Means for handling change of deliverables
2. Set up project administration system and communication protocols
3. Write and deliver the Management Plan Report
4. Client review and approval of report.

Phase 4: Needs analysis

Kognito then conducts a thorough needs analysis to define clearly the content and behaviors to be encapsulated in the simulation, the impact to be expected and the assessment protocol to be integrated. This is achieved through meetings with the client team and sample end users.

1. Meet with client team to gather information for Needs Analysis
   a. In-depth analysis of goal statement
   b. Establish all stakeholder objectives
   c. Learning environment
      i. Context in which training is to be delivered
      ii. Hardware, software, and management structures for encouraging and monitoring completion of training delivery
   d. Task and content analysis
      i. Tasks that comprise competent performance
      ii. Current deficiencies regarding those tasks
      iii. Knowledge and skills that should result from instruction
      iv. Measures for determining whether desired learning has occurred
   e. Learner analysis
      i. Motivational profile
      ii. Useful in achieving desired performance/result
      iii Provides feedback from learners about what would make the final product useful for them
2. Conduct any necessary interviews with end users
3. Write and deliver the Needs Analysis Report
4. Client review and approval of report.

Phase 5: Instructional design plan/game design

In this phase, Kognito develops the theme, narrative style and the general user interface design for the resource. The concept is reviewed with focus groups and the client and is refined as needed.

1. Analysis
    a. Modularize the section and develop a rough sequential outline of content and tasks for each module within the section
    b. Decide on any customized role-based learning paths
2. Synthesis
    a. Develop functional and visual prototypes for each of the modules
        i. Navigation options
        ii. Menu structures
        iii. Presentation methods
        iv. Style of interactions and feedback
        v. Metaphor, color, style and layout
    b. Develop content prototypes (e.g. scenarios to be used and characters included)
        i. Sequence
        ii. Length
        iii Content outline (script in bullet format)
3. Evaluation
    a. Concept testing on group of end users
    b. Client review and possible approval
    c. If not approved, return to key points in the cycle based on module

4. Once all modules have been finalized and approved
   a. Revisit the timeline for adjustments
   b. Additional human resources that may be required
   c. Write and deliver the Instructional Design Report
      i. Course structure (scope and sequence)
      ii. Selected instructional methods
      iii. Assessment and tracking techniques
   d. Client review and approval of the report
   e. Revision of the translation plan.

Phase 6: Production

In this phase the instructional design plan is used to create the learning product or simulation. During production Kognito continuously seeks client feedback and conducts user testing sessions to refine the design and ensure quality assurance.

Pre-production

1. Write a rough draft of content
2. Build and test the navigation shell
3. Identify areas for replication (routines, interactions, etc.)
4. Finalize the graphical user interface
   a. Color, design, layout, theme, etc.
   b. All navigational elements (button states, sound effects, etc.)
5. Communicate and agree on standards for text, graphics, audio, video and animation elements, and file naming/ asset management procedures

6. Establish structures and procedures for language translation within models
7. Review and approval of final graphical user interface, visual prototypes and functional prototypes.

Production (by module)

1. Prepare final content (written script)
2. Prepare final multimedia (video, audio, placeholders)
3. Finalize the section for review
4. User testing and feedback documentation
5. Client review and provide revisions
6. Revision implementation
7. Final client review
8. Final revision implementation
9. Final approval.

Testing

1. Upload course to test site and test communication with library management system (LMS)
2. Any revisions to ensure LMS functioning
3. Approval from client that course is fully functioning within the client's LMS.

Phase 7: Final delivery

Once all changes resulting from the final focus group and client feedback are integrated, a product tailored specifically to the client is delivered. Kognito's technical support team is available to assist the client's IT department in uploading the course to its web server.

Managing the instructional design process

What kinds of tasks, decisions, activities and communication accompany the instructional design process? An interactive multimedia project that Kognito Interactive developed for Hunter College Library ("Formulating a Search Strategy") is used here to illlustrate the instructional design process in action.

How does Kognito assign a designer to the project?

We use the following criteria to decide on which instructional designer will be assigned to the project:

- Client relationship experience
- Experience with the skill being targeted
- Existing workload and availability
- Personal interest.

What kinds of internal conversations are held once the project is commissioned, regarding process, workflow, timeline, development?

- Management plan: We discuss the human resources likely to be required and general organizational resource constraints.
- Challenges: Any notable project risks and challenges in terms of management, design, and production.
- Workflow/timeline and other design/production discussions do not take place until the needs analysis and instructional design documents have been generated and discussed collaboratively with the client.

Are there any aids (handouts, guidelines) that Kognito uses to help with the initial organization of the project?

- We adhere to a particular format for our management plans, needs analysis and instructional documents. They contain specific information that needs to be collected and acknowledged by all the involved parties – information such as a learner analysis, technical requirements, performance objectives, etc.
- Guidelines are generally focused on the context and the targeted end-state of performance in a given situation.

What types of questions are asked of the client, in this case the Hunter College librarians/subject matter experts?

- Learner: We ask the client to provide demographic and contextual information about the learner to help understand any factors that will influence their perception, motivation, preferences on use, etc.
- Problem: What are the skills gaps and their resulting impact?
- Current solutions: What current solutions are being implemented to tackle the problem?
- Thoughts on solutions: Are there potential solutions already in mind?
- Motivation: What mechanisms are being used to provide extrinsic motivation?
- Use of program: How will the resource be used and fit into the overall solution?
- Behavioral change expected: If the resource is effective, what behavioral change is expected to occur?

What is the typical staffing configuration for a project?

- One instructional designer, and one advising instructional designer to discuss things with.
- One lead interactive designer.

A developer is also assigned to work on the technological aspects of the project. How do the designer and the developer communicate?

- The instructional designer and interactive designer generate functional and design specifications for the product and then prototype the design. This removes much miscommunication between the developer and the designer, since they collaboratively lay down the design and functional criteria before fully producing the entire tutorial.
- In addition, every week a progress meeting is held where the project is discussed with the entire Kognito company.

Who determines what the finished product will look like?

- A combination of the end user, client, instructional designer and interactive designer. While the instructional designer makes the ultimate design decisions, options are often provided by the interactive designer and vetted with the client and end user before reaching any decisions.

What type of testing is done during the development phase?

- Informal review by sample end users for content, interaction and look/feel
- Client review and feedback
- Quality assurance, iteratively woven into the production process.

What types of support are put in place for after the tutorial is delivered?

- An online survey may be linked to the tutorial so that learners can provide feedback. The feedback elicits satisfaction and utility ratings on the tutorial.

The next section is a storyboard document used by Kognito Interactive to develop the content for a multimedia e-learning project.

Development of the Hunter College "Formulating a Search Strategy" learning module: content outline, media selection and content script

User scenario/content outline

The user is a 25-year-old Masters in Education student who has just received an assignment from her professor to research a particular topic, using ERIC (Education Resources Information Center) as the library database for conducting the research. The professor has also provided the student a link to the "Formulating a Search Strategy" learning module.

While working at home on the assignment, the student accesses the module via her computer's web browser. The learning module asks her to pretend that she been given an assignment to research the "impact of class size on academic achievement."

While walking the user through the research process for the fictional class assignment, the learning module presents the student with the following sections:

- Introduction/context
  - Communicate the importance/utility in formulating a search strategy
  - Provide brief background on the fictional class assignment, "impact of class size on academic achievement"
- Breaking your topic into concepts
  - Communicate the importance of this step in narrowing the search results
  - Ask students to ask themselves, "What do you want articles to talk about?"
  - Use the fictional class assignment to show the student how to break the topic into concepts
  - Provide additional examples for breaking a topic into concepts
- Identify similar or related keywords
  - Communicate the importance of this step in improving search results
  - Use the fictional class assignment to devise additional keywords within the concepts defined in the previous step
  - Mention the database thesaurus as a useful tool
- Conducting the search
  - Communicate that this step is about creating relationships between concepts
  - Use the fictional class assignment to cover Boolean operators AND/OR, and parentheses. In addition, we will explain truncation (wildcard) and mention that only some databases support this feature
  - Provide test questions asking the student to deconstruct Boolean search queries

- Conclusion
  - "Ask a Librarian" OR go and talk to a reference librarian
  - HTML summary page
  - Worksheet for printing.

Media overview

The module opens up with a traditional introductory screen, which most likely will include a picture of a student and the title of the module "Formulating a Search Strategy" (illustrated here is an example from another tutorial).	
After asking the student to pretend she has been given a class assignment to research "class size on academic achievement", we switch to a desk environment, which has a computer on it, along with a notebook or memo pad.	
When we discuss elements that require a database screen to be shown, we zoom in on the computer monitor sitting on the desk.	
When we discuss elements that will require non-image-based animations, such as animating Venn diagrams, drawing tables, bulleting main points, etc., we zoom in on the notebook/memo pad sitting on the desk.	

Content script

1 Introduction

Script	Media examples
Hi there! This four-minute module is designed to help you in formulating a search strategy for your academic research.	This is the introductory screen mentioned in the media overview
Database searching is different from searching the web with Google or Yahoo. But once you learn how to do it, you'll find better sources and maybe even write better papers.	The focus turns to the student's laptop on her desk On the laptop screen is a Google page and on the subject line she sees someone typing: "how to clean carpet stains" You can hear the typing sound Then the query is deleted
Let's pretend that we've been given an assignment to research the impact of class size on academic achievement.	A memo pad sits on the student's desk A new piece of paper comes up with the assignment to write a paper on "impact of class size on academic achievement"
While our first instinct may be to type in: "impact of class size on academic achievement," a different kind of search strategy will often give us much better search results and drastically reduce the time we have to spend looking through tons of irrelevant citations.	Turns back to laptop with ERIC database on the screen and types in "impact of class size on academic achievement" Then deletes it with the sound of the keys
Formulating a search strategy actually involves a lot of common sense. First, we need to define what we want the articles we find to be about. Then list all the relevant keywords. And finally organize how the keywords will be entered.	In the memo pad someone writes in the header "My search strategy" and underlines it The three steps get written onto the page so that you see them in bullet format

2 Breaking your topic into concepts

Script	Media examples
The first step we'll take in formulating our search strategy is defining what we want the articles we find to be about. We do this by breaking our topic into concepts. Let's look at our topic, "impact of class size on academic achievement" and answer the question, what do we want the articles that we find to talk about?	New memo page flips Write "Step 1 of 3: Break your topic into concepts" Write "Topic: Impact of class size on academic achievement"
Well, we want the articles that we find to talk about class size.	A table is created with one column reading "Concept 1" and the row below it "class size"
And we also want these articles to talk about academic achievement.	Another column is added to the table with the word "Concept 2" and the row below containing "academic achievement"
Although we may want to connect small class size to better academic achievement, using "**small**" and "**better**" as part of our keywords would leave out articles discussing large class size and poor performance, which might also be helpful for us.	Add the words small and better, cross them out and have them disappear
So, now our topic is broken into two concepts: "class size" and "academic achievement".	Highlight the right table column when referred to in the narration
Take a minute to review some examples of breaking a topic into concepts.	

3 Identify similar or related keywords

<table>
<tr><th>Script</th><th>Media examples</th></tr>
<tr><td>The second step we will take is to list all of the relevant keywords. This means we need to identify similar or related keywords or keyword phrases that are connected to our defined concepts. Remember, the better the keywords, the better the search results.</td><td>New memo page flips

Write “Step 2 of 3: Identify similar or related keywords”</td></tr>
<tr><td>So, looking at how we broke our topic into two concepts …</td><td>Display the table with Concept 1 and Concept 2

<table><tr><td>Concept 1</td><td>Concept 2</td></tr><tr><td>class size</td><td>academic achievement</td></tr></table></td></tr>
<tr><td>We can see that under concept 2, we can add a similar keyword phrase, “student performance”.</td><td>Add to column 2 the phrase ‘student performance’

<table><tr><td>Concept 1</td><td>Concept 2</td></tr><tr><td>class size</td><td>academic achievement, student performance</td></tr></table></td></tr>
<tr><td>If we’re not sure what keywords might be appropriate, we can see if the database has a thesaurus. The thesaurus contains a searchable list of terms that are used in a database.</td><td></td></tr>
</table>

4 Conducting the search

<table>
<tr><th>Script</th><th>Media examples</th></tr>
<tr><td>The last step is to organize how we will enter our keywords.</td><td>New memo page flips

Write “Step 2 of 3: Identify similar or related keywords”</td></tr>
<tr><td>The key to this is establishing the right relationships between our concepts using search operators “AND” and “OR”.</td><td>Display “Search operators: AND/OR”</td></tr>
<tr><td>For example, since we want to find articles that talk about class size AND academic achievement, our search would need to look like this:</td><td>Have the following table appear

<table><tr><td>Concept 1</td><td></td><td>Concept 2</td></tr><tr><td>class size</td><td>AND</td><td>academic achievement</td></tr></table></td></tr>
<tr><td>Let’s consider what this means. If this “class size” circle represents all the search results we would get if we searched for “class size” by itself, and if this “academic achievement” circle represented all the search results we would get if we searched for “academic achievement” by itself, our “class size AND academic achievement” search would return only those articles that talk about both class size AND academic achievement.</td><td>Venn diagram of two circles that animate to overlap. One circle is titled “class size” and another titled “academic achievement”. They come together and the overlap of the two circles is highlighted in color.</td></tr>
</table>

<table>
<tr><th>Script</th><th>Media examples</th></tr>
<tr><td>Now earlier, we had identified a similar keyword for academic achievement: “student performance”. We can add that to our search using the operator OR, and using parentheses, which help to group keywords together. So our search will look like this:</td><td>Have the following table appear
<table><tr><td>Concept 1</td><td></td><td>Concept 2</td></tr><tr><td>class size</td><td>AND</td><td>(academic achievement OR student performance)</td></tr></table></td></tr>
<tr><td>Now our search will return articles that talk about class size AND (academic achievement OR student performance).</td><td>Venn diagram creates another circle, called “student performance”, that overlaps with “class size” but does not overlap with “academic achievement”.</td></tr>
<tr><td>To pick up possible variations in spelling or word endings, we use truncation.</td><td>Display: “To pick up possible variations in spelling or word endings, you can use truncation”</td></tr>
<tr><td>The most common truncation symbol is the asterisk “*”. For example, using the asterisk at the end of perform* would pick up variations such as: performing or performance, as well as perform.</td><td>Display: The two variations and color the varying endings</td></tr>
<tr><td>So we’re done formulating our search strategy. Our final search entry would be: class size AND (academic achievement OR student performance). This would yield significantly better results than just typing in “impact of class size on academic achievement”.</td><td>Return to the initial ERIC database screen and enter in the search query and display the results</td></tr>
<tr><td>Take a minute to do the following exercises to test your understanding of search operators and truncation.</td><td>Link to a flash activity where the student answers questions</td></tr>
</table>

5 Conclusion

Script	Media examples
To assist you in formulating a search strategy, a worksheet and a summary of this tutorial are provided and can be printed. For additional assistance in formulating a search strategy, contact a librarian by clicking on the “Ask a Librarian” link or visit the library and personally talk to one of our reference librarians. Thanks and good luck!	Provide links to the HTML summary and worksheet Provide link to “Ask a Librarian”

8

Administrative and professional challenges to the use of instructional design in the academic library

We have read so far that instructional design is a powerful tool with great relevance for academic libraries. The need for information literacy, embedded library instruction and curricular integration are all strong indicators of this. That being said, it is also clear that instructional design has not had quite the success one would expect, especially in an environment where online and e-learning are on the increase. There are a number of challenges to the implementation of instructional design, some of which were discussed in Chapter 4. What kinds of practical, administrative and managerial challenges might academic libraries face when using instructional design? Implementing instructional design has a number of advantages for those involved in crafting instructional programs but these must be weighed within the context of human, financial and virtual resources. Piskurich (2000) reminds us that the use of instructional design can help teachers and others to create instruction that meets defined learning objectives, and do so in a way that is cost-effective, thus eliminating ineffective and redundant instructional programs. Piskurich also suggests that the use of instructional design can save time and increase the

learning effectiveness of the learner and, in corporate or business settings, can increase competitiveness, internal training consistency, and lead to overall better business integration (ibid., 7). On the flip side, the proper use and implementation of instructional design can be very time consuming and intense. It requires far greater attention on the part of the developer/teacher than just creating instructional products on the fly. Resources and expertise are also a part of this equation and must be taken into consideration (ibid., 10).

Practical considerations for hiring instructional design librarians

Branson (1999) suggests that there are several types of work and levels of service for instructional designers. The first level of service includes teaching and delivery of training; second-level service includes training instructors or other trainers; third-level service includes designing instructional models, and fourth-level service includes the creation of basic knowledge to support the design of instructional models. Libraries seeking to hire instructional designers face a challenge: instructional designers are often better paid in business and industry than in academia, and since they can work in a variety of settings – the military, K-12 education, higher education, vocational education, healthcare, consulting, technology – any library positions must be very attractive for potential candidates.

Instructional designers and instructional design librarians may have more of a role in today's academic settings because of a change in focus by curriculum and faculty (Davidson-Shivers, 2002). Pedagogical changes mean that teaching is focused less on faculty and more on the learner, for instance.

Rutherford and Grana (1995) suggest that the lecture is no longer the primary mode of instruction, which may in turn mean that faculty are looking for ways to supplement the traditional lecture, or new ways to teach effectively. Instructional designers could be called upon to assist faculty with integrating learner-centered technology more widely into their teaching plans. This is also tied to the development of technological competencies for faculty (Davidson-Shivers, 2002), another role for instructional designers and instructional design librarians.

The challenge for modern libraries using instructional design will be finding ways to articulate, create, support and fund new instructional design roles for librarians and professional staff. Finding highly qualified persons with the ability to work in an academic library environment, work with faculty and apply the theoretical underpinnings of instructional design is difficult at best. One strategy might be to build internal expertise slowly, over time, by exposing current staff to professional development and educational opportunities. Academic librarians need to be able to discern different learning styles, to determine which type of learning materials might work best, and how to reach target audiences. Starr (2003) observes that "jobs utilizing new and more persuasive technologies have appeared, representing a kind of professional transformation." This transformation includes the appearance of roles such as instructional design librarian and instructional technology development librarian. Bell and Shank (2004) refer to the "blended librarian" – "an academic librarian who combines the traditional skill set of librarianship with the hardware/software skills of information technologists, and the instructional or educational designer's ability to apply technology appropriately in the teaching–learning process" (ibid., 374). These librarians should have "a more

sophisticated knowledge of pedagogy" and the ability to "utilize technologies in designing instructional materials" (Shank, 2006, 517). The descriptions of these librarians and the associated job titles are relatively new and, as a result, there is no standard description for instructional design librarians. There are also broader implications for librarians working in instructional design, discussed in the next section.

Social and cultural implications for instructional design within the educational context

What about powerful social influences on technology integration and instructional design? To a certain extent, librarians are presented daily with social factors that affect their interactions with the public, by the mere fact of the diverse audiences they serve. Librarians must always be prepared to respond to differing levels of comfort with technology, different learning styles, different cultures, and be able to serve populations in disparate environments. Surry and Farquhar (1996) allude to the idea that technology and the wider society are inseparable and that technology and related materials all function within a broader context that impacts the use of any number of products, services and technologies.

> Technology and society interact and influence each other, sometimes benignly, other times violently. Technology impacts, shapes, and defines society and, in turn, a variety of social factors affect the development, implementation, and spread of technology. As with all other technologies, society and the technology of instruction are irrevocably intertwined. Many instructional design theories, however,

> neglect or ignore the social context in which instructional products are intended to be used. (Ibid., 1)

If this is the case, how can librarians proactively assess and deal with the impact of social factors that may affect how students learn, within the instructional design context? The authors argue that overlooking social factors "often result[s] in the development of instructional products that are not widely adopted even though the products may be technically sophisticated and instructionally sound" (ibid., 2). More important for those librarians interested in the use of instructional design is the recognition that "none of the most widely used product development models include[s] an analysis of the social context as an important part of the development process" (ibid., 4). The authors offer several strategies for consideration. First, they urge those designing instruction to conduct an "adoption analysis" (Farquhar and Surry, 1994) – a tool that allows educators to determine the rate at which a product or tool may be adopted by the target population. A review might include an analysis of the organization, the individuals who will design the product/instruction, the target adoptees (users) and their perceptions and characteristics, and the technical systems in place to support the product/instruction (Surry and Farquhar, 1996, 5). A user-centered design process, as advocated by Burkman (1987), presents five tasks that might be considered and that mesh nicely with certain instructional design elements:

- identify the potential adopter
- measure relevant potential adopter perceptions
- design and develop a user-friendly product
- inform the potential adopter (of the user-friendly attributes)
- provide post-adoption support.

An environmental analysis (Tessmer, 1990) is another tool that might be used to assess the environmental context in which the instruction will be provided.

In addition to issues related to social factors and instructional design, librarians should also consider the connections between learner differences and instructional design. Consideration of differences in culture with regard to learners and learning tools is a powerful idea that is often overlooked during the instructional design phase. It is perhaps one of the more challenging concepts to integrate, but instructional designers should at least be aware of implications in this area. Cifuentes and Ozel discuss the importance of "culturally responsive" instructional design (2006, 15). They remind us that learners have differing values, backgrounds and belief systems which all have the power to impact how they learn. They further require librarians to act on this knowledge by urging them to get to know their learners better "through processes of learner analysis, the systematic identification of the traits and characteristics of learners, as described in the instructional design literature" (ibid.). Pliner and Johnson talk about the connection between instructional design and multicultural education, which represents a way to "engage all students in the learning process by placing students at the core of educational planning" (2004, 108). The authors stress the importance of inclusion, making the case that inclusive education, designed to be respectful of cultural differences, leads to a "more socially just world that is inclusive of our social and individual diversity" (ibid.).

How do librarians incorporate these social, cultural and ability concerns into instructional design practices? It seems a daunting task – and far beyond what most academic librarians have the time to do when preparing simple instruction for a class. Yet, understanding the pitfalls of *not*

doing so is critical. According to Cifuentes and Ozel "when librarians develop instructional activities that attend to, for instance, specific interests, prior knowledge, reading abilities, and capabilities of learners, then learners will be more motivated and attentive to that activity" (2006, 16). That is not to say that all learning tools must be mapped only within the context of difference and cultural background, or that learners should be placed in narrowly defined categories; rather, this type of consideration should be a part any instructional design process. At the very least, highlighting these issues can sensitize librarians and act as a gentle reminder not to forget their importance. The key is awareness and greater understanding of where our learners are coming from, of challenges they may face in learning, and of ways to support their learning more effectively. A number of researchers, such as Gribbons (1997), have discussed ways to design consumer products and information to better meet the needs of a global market. One is hard pressed to find such directives within the library literature, however. The US Localization Industry Standards Association advocates "taking a product and making it linguistically and culturally appropriate to the target locale" (Esselink, 2000, 3). Librarians who "localize" their instruction should carefully consider some key cultural and linguistic elements if what they are designing is truly going to meet a diverse array of user needs. Smith and Ragan (2005, 7) state that "a careful consideration of the general characteristics of the target audience may be what elevates a mundane segment of instruction into compelling, imaginative, and memorable instruction."

Access is another area that librarians should consider when using instructional design. Universal Instructional Design (UID) is an approach that addresses the specialized needs of students who are differently abled as well as

students who are not (Pliner and Johnson, 2004). The concept is based on the architectural and structural idea of universal design, which promotes equal access to physical spaces for all users. Although there is somewhat more focus on students who are differently abled, UID provides an ideal opportunity to promote better learning environments for all students (Berger and Van Thanh, 2004). Statistics from the National Center for Education Statistics indicate that nearly 6 percent of all undergraduates in the US are differently abled. Yet, the higher education systems in the US and elsewhere in the world have been very slow to adopt educational practices to meet the needs of all students. There are nine key principles related to UID:

1. Equitable use
2. Flexibility in use
3. Simple and intuitive
4. Perceptible information
5. Tolerance for error
6. Low physical effort
7. Size and space for approach and use
8. A community of learners
9. Highly participatory instructional climate. (Scott, McGuire and Shaw, 2003, 375)

Pliner and Johnson state that even though there is often no deliberate exclusion of students who require different levels of support, "we often exclude by the ways we structure our curricular practices" (2004, 107). The use of instructional design or UID provides educators with an opportunity to address these issues as the instruction is being crafted. Curricular integration and adoption at the institutional level are also key, and librarians cannot be expected to tackle

such important issues alone. Library partnerships to develop instruction with campus administrative offices that provide support for students need to be part of ongoing campus collaborations – and not seen as special projects or targeted outreach. Berger and Van Thanh (2004) suggest that institutions that embrace the adoption of UID as a common practice will provide much-needed leadership in this area. Their multidimensional model of organizational behavior provides a framework for wide-scale implementation of UID and includes five dimensions: the bureaucratic, the collegial, the political, the symbolic, and the systematic. The implications of UID must be considered within the context of each dimension.

The blended librarian concept

One recent professional development that is connected to librarians and the use of user-centered instructional design is the concept of the "blended librarian." This unique idea is discussed here because it offers both an explanation and a vision for the role of many modern-day academic librarians, and provides a way for librarians to express what they do, how they use instructional design, and the future of this type of librarianship. The term, first coined by Bell (2003), is defined as "the academic professional who offers the best combination of skills and services to help faculty apply technology for enhanced teaching and learning." The blended librarian "retains the traditional values of academic librarianship but brings new tools – instructional design and technology skills – into the mix" (Bell and Shank, 2007, 3). The authors propose that this is critical to the profession. The Blended Librarian community includes a popular

website (http://blendedlibrarian.org) and a manifesto. The manifesto is as follows:

> It is imperative and no exaggeration to claim that the future of academic librarianship depends on our collective ability to integrate services and practices into the teaching and learning process. While the evolution of information literacy is a positive sign, the academic librarian is still largely tangential to what happens in or beyond the classroom. Strategies, techniques and skills are needed that can allow all academic librarians, from every sector of the library organization, to proactively advance their integration into the teaching and learning process. The framework envisioned depends largely upon the ability to collaborate with faculty, but also other campus information and instructional technologists. This framework is best expressed as the "blended librarian". (Bell and Shank, 2007, 8)

There are six principles associated with blended librarianship:

1. Taking a leadership position as campus innovators and change agents to successfully deliver library services in today's "information society."
2. Committing to developing campus-wide information literacy initiatives on our campuses to facilitate our ongoing involvement in the teaching and learning process.
3. Designing instructional and educational programs and classes to assist patrons in using library services and learning information literacy that are absolutely essential to gaining the necessary skills (trade) and knowledge (profession) for lifelong success.

4. Collaborating and engaging in dialogue with instructional technologists and designers, which is vital to the development of programs, services, and resources needed to facilitate the instructional mission of academic libraries.
5. Implementing adaptive, creative, proactive, and innovative change in library instruction, which can be enhanced by communicating and collaborating with newly created instructional technology/design librarians and existing instructional designers and technologists.
6. Transforming our relationship with faculty to emphasize our ability to assist them with integrating information technology and library resources into courses, but adding to that traditional role a new capacity to collaborate on enhancing student learning and outcome assessment in the area of information access, retrieval, and integration. (Bell and Shank, 2007)

Creating new roles for instructional designers within the library

One of the major challenges in defining the role of instructional design within the library revolves around how relevant jobs are described. Descriptions are varied and often no more than reference librarian descriptions, with mention of technology thrown in for good measure. More recently, instructional design librarian positions have begun to require authentic instructional design training and experience, as well as indicate the importance of some of the basic tenets of instructional design – needs analysis, prototyping and assessment, for instance. Although there is still a fair amount

of emphasis on the infusion of digital technologies into the curriculum, and not so much on instructional design as an educational and pedagogical construct, job descriptions are becoming more granular and focused on the design of instruction. Some examples of recent instructional design librarian job descriptions are as follows:

> The Instructional Technology Development Librarian will provide leadership for planning, designing, and implementing standard and innovative applications of technology to support the instructional programs of the Libraries. The librarian will work closely and collaboratively with students, faculty, librarians, and library staff to participate in and/or lead the design, development, maintenance, and evaluation of web-deliverable interactive, self-paced lessons, tutorials, and learning objects that will enhance learning for students and other users. Leadership and pedagogical requirements include: comprehensive knowledge of current instructional theories and principles applicable to various types of online instruction or e-learning, preferably in a higher education context; proven ability to scope and manage instructional technology projects and relationships and to make desired progress on multiple projects simultaneously; high level of expertise with facilitating the design of instruction (use of instructional design models; familiarity with learning theories; design and assessment of instructional goals and outcomes; use of tools such as storyboards and flow charts); and demonstrated interpersonal and communication skills to work with experts in multiple disciplines. Technical skill and ability requirements include: demonstrated experience in the application of computer technologies in the academic environment,

particularly in the instructional applications of technology; experience with a variety of multimedia applications in a multi-platform environment. Preferred skills include experience with instructional systems design, course management systems, digital video, and web design. (Rutgers University Libraries. Job Announcement Position 179, Instructional Technology Development Librarian)

The Instructional Design Librarian provides the knowledge, skills, and coordination essential to create and maintain web-deliverable interactive, self-paced lessons, tutorials, and learning objects that extend effective library education to health sciences students, faculty, and staff in home, clinic, and office settings. The development and maintenance of relevant and timely on-demand tutorials supports digital library objectives for students, instructors, research and clinical staff, as well as complements and enhances library-based classes by delivering prerequisite, equivalent, or advanced learning topics 24/7 to any location. (Yale University Library Job Opportunities, available from www.library.yale.edu/lhr/jobs/ads/inst.html (accessed 12 November 2008))

Seeking an experienced, technologically savvy, and innovative individual for a position that will facilitate effective use of information resources and research strategies through teaching and learning. The eLearning & Instructional Design Librarian is an active participant in the Library's Information Literacy Program, collaborating with library staff, campus staff, and faculty on the creation and use of Library instructional materials, methods, and services, and advising faculty on finding and sharing instructional

> materials for their own teaching. Special emphasis will be placed on developing, revising, and adapting online resources that support undergraduate education, and on the effective use of repositories of instructional content. (University of California Los Angeles Library Job Posting, available from www2.library.ucla.edu/pdf/ucla%20library_elearning%20librarian_full%20version.pdf (accessed 25 November 2008))
>
> The Instructional Design Librarian fosters and develops tools for the effective use of instructional technologies in web page development, information literacy instruction, instructional publications and tutorials in various formats and assessment for library users. The successful candidate will also collaborate with library staff, campus instructional technology staff and others as appropriate. Other responsibilities include but are not limited to: Providing reference services, library instruction and collection development, plan, develop and conduct faculty development workshops in the support of library instructional design, appropriate software and other tools. (Chinese American Librarians Association website. Hunter College Library Job Posting, available from www.cala-web.org/node/490 (accessed 14 November 2008))

We have talked here about administrative and managerial constraints which impact the use of instructional design in libraries. One lesson is clear: the benefits to the user greatly outweigh the challenges in most cases. Munro reminds us to keep the ultimate goal in mind: "Librarians must create simple, flexible and scalable lesson plans that take into account our students' immediate research needs, and that give them an active role in tackling the real work of research" (2006, 54). Despite the challenges, librarians have

the opportunity to take a more active role in modeling instruction by using instructional design.

The next section of this book features a chapter by Steven Bell on "design thinking" and its relevance to instructional design in the academic library.

References

Bell, S. (2003). A Passion for Academic Librarianship: Find It, Keep It, Sustain It – A Reflective Inquiry. *portal: Libraries and the Academy*, vol. 3 no. 4, pp. 633–42

Bell, S. and Shank, J. (2004). The Blended Librarian: A Blueprint for Redefining the Teaching and Learning Role of Academic Librarians. *College & Research Libraries News,* vol. 65, no. 7, pp. 372–5.

Bell, S., and Shank, J. (2007). *Academic Librarianship by Design: A Blended Librarian's Guide to the Tools and Techniques*, Chicago, IL: American Library Association.

Berger, J. and Van Thanh, D. (2004). Leading Organizations for Universal Design. *Equity & Excellence in Education*, vol. 37, pp. 124–34.

Branson, R. (1999). *Using the Workmatrix to Make Career Choices*, Tallahassee, FL: Branson Professional Associates.

Burkman, E. (1987). Factors Affecting Utilization. In R. Gagnu (ed.), *Instructional Technology: Foundations*, Hillsdale, NJ: Lawrence Erlbaum.

Cifuentes, L. and Ozel, S. (2006). Resources for Attending to the Needs of Multicultural Learners. *Knowledge Quest*, vol. 35, no. 2, pp. 14–21.

Davidson-Shivers, G. (2002). Instructional Technology in Higher Education. In R. Reiser and J. Dempsey (eds),

Instructional Design and Technology, Upper Saddle River, NJ: Pearson Education, Inc.

Esselink, B. (2000). *A Practical Guide to Localization*, Philadelphia, PA: John Benjamins Publishing.

Farquhar, J. and Surry, D. (1994). Adoption Analysis: An Additional Tool for Instructional Developers. *Education and Training Technology International*, vol. 31, no. 1, pp. 19–25.

Gribbons, W. (1997). Designing for the Global Community. *Proceedings of IEEE International Professional Communication Conference, Salt Lake City Utah*, Salt Lake City, Utah: IEEE International, pp. 261–73.

Munro, K. (2006). Modified Problem-based Library Instruction: A Simple Reusable Instruction Design. *College and Undergraduate Libraries*, vol. 13, no. 3, pp. 53–61.

National Center for Education Statistics (1999). *The National Postsecondary Student Aid Study*, Washington, DC: National Center for Education Statistics.

Piskurich, G. (2000). *Rapid Instructional Design*, San Francisco, CA: Jossey-Bass Pfeiffer.

Pliner, S. and Johnson, J. (2004). Historical, Theoretical and Foundational Principles of Universal Instructional Design in Higher Education. *Equity & Excellence in Education*, vol. 37, pp. 105–13.

Rutherford, L. and Grana, S. (1995). Retrofitting Academe: Adapting Faculty Attitudes and Practices to Technology. *T H E Journal*, vol. 23, no. 2, p. 82.

Scott, S., McGuire, J. and Shaw, S. (2003). Universal Design for Instruction: A New Paradigm for Adult Instruction in Postsecondary Education. *Remedial and Special Education*, vol. 24, no. 6, pp. 369–79.

Shank, J. (2006). The Blended Librarian: A Job Announcement Analysis of the Newly Emerging Position

of Instructional Design Librarians. *College & Research Libraries*, vol. 67, no. 6, pp. 515–24.

Smith, P. and Ragan, T. (2005). *Instructional Design* (3rd edition), Hoboken, NJ: John Wiley & Sons.

Starr, J. (2003). A Measure of Change: Comparing Library Job Advertisements of 1983 and 2003. *Library and Information Science Research Electronic Journal*, available from http://libres.curtin.edu.au/libres14n2/Starr_final.htm (accessed 2 August 2008).

Surry, D. and Farquhar, J. (1996). Incorporating Social Factors into Instructional Design Theory. *Instructional Technology Research Online*, available from www2.gsu.edu/~wwwitr/docs/social/index.html (accessed 12 August 2008).

Tessmer, M. (1990). Environmental Analysis: A Neglected Stage of Instructional Design. *Educational Technology Research and Development*, vol. 38, pp. 55–64.

9

Keeping the user in mind: using design thinking to connect libraries and instructional design

By guest contributor Steven Bell

When librarians hear the term "design thinking" their first reaction is "tell me more." After they learn more, their follow-up question is "how are librarians using design thinking to improve their libraries?" Librarianship, by its nature, is a highly practical profession. The real challenges of the profession are found where the rubber meets the road – in the library and in day-to-day interactions with the people who use libraries both virtually and physically. Design thinking is a new concept to librarianship. For that reason it is difficult to present good examples of how libraries are applying design thinking in their routine work. But as more librarians grasp design thinking, the profession will begin to hear more anecdotes and stories of how it is shifting from idea to practice. Keep in mind that one does not *see* design thinking. Design thinking is a process that librarians can use to identify problems and attach the best solutions to them. So we may see innovative changes in libraries that have resulted from design thinking, but it would hardly be immediately obvious to the casual observer.

In 2008, Tim Brown published an article in *Harvard Business Review* simply titled "Design Thinking." The article by Brown, the CEO of IDEO Corporation, was hardly the first thing he had written on design thinking. But this was quite possibly the first time such a clearly structured and lucid piece on the topic had appeared in one of the most prominent business publications. If anyone previously thought design thinking was but a passing management fad, this article elevated it to a respected level along with well-recognized management methods such as MBO (management by objectives), TQM (total quality management), and Six Sigma. In his article, Brown (2008) defines design thinking as follows:

> Design thinking can be described as a discipline that uses the designer's sensibility and methods to match people's needs with what is technologically feasible and what a viable business strategy can convert into customer value and market opportunity.

This definition provides a preview of this chapter and its purpose in this book. Design thinking is at the root of the process that all designers use, including instructional designers, to accomplish their work. In addition to exploring why we should care about design and what design thinking can offer librarians, we want to understand the relationship between design thinking and fields such as instructional design. Certainly Brown's definition has a business focus; after all, he was writing this for *Harvard Business Review*. In this chapter we will shift the focus to librarianship. In doing so, the objective is to engage the reader in better understanding exactly what design thinking is, how it relates to instructional design, its connection to developing better library user experiences and its strategic appeal as a guiding principle for the turbulent, yet exciting times that lie ahead.

Why design?

Design matters. Virtually everything with which we come into contact on a daily basis is the product of design. Be it your office chair, the suit you put on this morning, the car you drive or your computer's interface, the influence of design surrounds us. But ask librarians what design means to them, and you will likely get a more limited response. For librarians, design is primarily about buildings. In our literature and our professional programs, virtually any discussion of design will refer to new or renovated building architecture and interiors. Certainly interior and exterior design are crucial to the delivery of outstanding library services, but design has the potential to influence our professional practice in many more ways beyond the layout, look and feel of our facilities. Design can and should influence how we think and act in identifying problems and developing the appropriate solutions. Put simply, we should be design thinkers.

Professions outside of traditional design fields now recognize the value in understanding how designers think and work, and then applying design methods and strategies to their own work environments. This movement is particularly prevalent in business. The interest in and exploration of design thinking may be traced back to the publication of the book *The Art of Innovation* (Kelley and Littman, 2001). Author Tom Kelley, then general manager of the Silicon Valley-based IDEO, provided unique insights into the world of product design. IDEO is one of the world's leading design firms, and is perhaps best known for designing the Apple mouse and the Palm handheld, along with hundreds of other cutting-edge products and services. Business readily grasped Kelley's book because of its messages about fostering cultures and processes for

continuous improvement and innovation. The Apple mouse is a good example. IDEO did not invent it, it simply created an innovative, next-generation version. The question everyone had was "how do they do it?" The answer: design thinking.

Can design thinking help librarians? That is one question this chapter seeks to answer. It is not unlike the larger issue this book presents, about instructional design: Why we should care, and how instructional design can ultimately help the frontline librarian in his or her practice. As a profession that mediates information from source to end user – not unlike newspapers and travel agents – our near-term challenge is avoiding marginalization and establishing our relevance to our user communities. We must determine how we fit into a world that defines an exceptional user experience as memorable, unique and exquisitely simple. I would argue that identifying appropriate solutions will, to some extent, depend on our ability to adapt the IDEO method of design thinking into creating another emerging, for us at least, concept: the library user experience. This chapter's answer to the "why bother" question is that it may ultimately allow us to do something simple yet critical: give the information seeker a reason to use the library. Think about it. When people can acquire information from so many different sources in so many different ways – many of them faster, simpler, easier and more convenient than our own – why should they want to use the services and resources offered by us and our library? If you have no good answer to that question this chapter and book may be far more important than you realize. Simply to answer it with "well, libraries are better and offer more quality" is to greatly misunderstand the challenges this profession faces. As we have often been told, convenience trumps quality every time. The answer, I think, is that librarians must

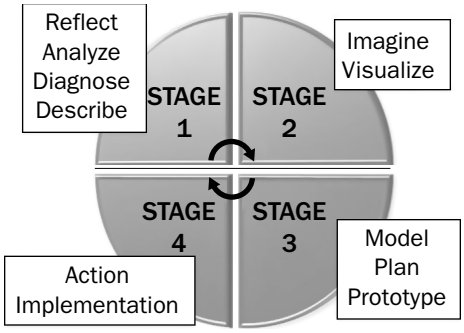
thoughtfully design solutions that give information seekers much better experiences than they get elsewhere.

What is design thinking?

The Rotman School of Business at the University of Toronto is a leading center for transforming the core of business education from management to design. Leading that process is Roger Martin, the school's dean. He provides what might be the simplest yet most robust definition of design thinking when he writes that it is a way of "approaching business problems as designers approach design problems" (Dunne and Martin, 2006, 512). At the heart of design thinking is the designer's unique work process, one that begins by fully understanding the problem before thinking about possible solutions (Figure 9.1). One way to examine that process is through a closer look at the five parts of "The IDEO Method" (Kelley and Littman, 2001). They are:

- Understand – Get to know the needs and challenges of your user population, and how they perceive your products and services.
- Observe – Watch real people in real-life situations to find out how they work, what confuses them, what they like and dislike, and where their needs can be better served.
- Visualize – Think about new ideas and concepts and how the people who use your library will use them. Kelley dedicates an entire chapter to IDEO's brainstorming process for visualizing new designs.
- Evaluate and refine – IDEO invests heavily in the prototyping process in order to test ideas and then improve them. Prototyping is also an important part of the instructional design process, as is formative evaluation.

Figure 9.1 The different stages of the design thinking process



- Implement – Often the longest and most difficult part of the process, but this is how any new product or service goes public for user consumption.

Reading this book, you have no doubt become more familiar with instructional design, a field of design that uses similar constructs to create instructional products. Those familiar with instructional design will likely realize that the IDEO method has more than a few commonalities with ADDIE, discussed in Chapter 3. What both ADDIE and the IDEO method share is their emphasis on first understanding users and their problems, and then developing thoughtful and creative solutions that are capable of being evaluated. Compare this to the process used in your library to solve problems. In Figure 9.2 you will see a summary of the IDEO method.

Compare that with Figure 9.3, which summarizes the key phases of ADDIE. These graphics remind us that all designers share common traits and methods. As one designer put it, designers are not problem solvers but rather are problem finders.

Figure 9.2 The IDEO method

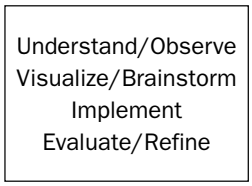


Figure 9.3 The ADDIE phases

That is why so many design processes, including design thinking, begin with an effort to fully diagnose and understand the problem. Again, think about your library. How many times has an individual or the organization latched on to a technology that is trendy, only to then struggle to attach the solution to a problem that may or may not exist? Why does the library need a Facebook profile? Why would Facebook users want to be fans of the library? What specific problem will it solve for the library and its users? This is not to say that a Facebook profile is a waste of time. Rather, if we begin our process by first understanding the users, and the problems the library has in communicating with them and creating resource awareness, the Facebook profile may be the right technology solution.

Whether it is owing to a lack of time, a desire to quickly implement new technologies, or allowing a bandwagon mentality to rule, rarely do most of us allow sufficient time to carefully design a strategy for technology innovation. Not only do we very likely fail to conduct an analysis to first determine the feasibility of a new technology application, but we also rarely take the time to adequately determine whether our users would value the new service. In a nutshell, our approach is to identify a solution before we fully understand the problem. We can do better. That is the potential of design thinking for librarians. It can provide a new way of thinking about, acting on and implementing our

resources and services, with a more thoughtful and creative approach that is focused on the design of the best possible library user experience.

Here is an example from the world of business as reported in *BusinessWeek* magazine (Greene, 2007). The Shimano Corporation is a global manufacturer of bicycle components. Shimano had a problem. Sales were dropping as a result of declining bicycle sales and there was no obvious solution in sight. In considering its options Shimano initially planned to use high technology to create even more sophisticated bicycle components. Then it decided to hire IDEO as consultants to help it identify a range of solutions. Using its design thinking process, IDEO set out to learn what the problem was before designing solutions. It discovered that many people no longer viewed cycling as a fun activity. The perception was that those who cycled wore Spandex and were focused on speed. To reach a larger segment of the population, Shimano worked with bicycle manufacturers to create a simple, less technologically sophisticated bicycle. That was what many people desired. The result was a comfortable, easy-to-ride bicycle with a self-shifting gear mechanism. When Shimano focused on people rather than on technology, and applied design thinking to their problems, a workable solution was discovered.

Applying design thinking in your library

My first encounter with the application of design thinking in a library setting was the Maya Design reconceptualization of the main branch of the Carnegie Library in Pittsburgh. Maya served as a consultant to the project architect. Maya's approach was to begin learning about the library users and

their work processes before making any attempt at rethinking the building. For example, Maya would shadow users to see what they did in the library, or use direct observation as they made use of the electronic resources. One of the things it discovered was the "environmental complexity" (information overload of sights, sounds and signs) of the library and how it confused and intimidated users. Trying to understand the user is an important concept in design thinking, and one way to do this is to engage in empathic thinking, or putting yourself in the place of the user.

My second encounter further developed my knowledge of ethnographic research as I learned about work-practice studies being conducted at the University of Rochester Library. Its work-practice studies are designed to reveal the practices of users as they conduct their work (Foster and Gibbons, 2007). The goal is not to identify ways to improve user satisfaction, but rather to help users to accomplish their work by removing barriers or inefficiencies in the workflow. Visits to students' dorm rooms yield information on their research practices and their electronic devices. Students use single-use cameras to record different aspects of their daily life at the university. Researchers observe students doing research and conduct interviews to further delve into the students' thought processes as they conduct their research.

The difficult part of these research projects is the analysis stage. It can take hundreds of hours to review transcripts and notes and then turn the trends that emerge into something tangible that can help the library to develop a better user experience. But librarians can still make use of design thinking in re-engineering how users navigate the library and its electronic resources. In a 2007 presentation for the Library Association for the City University of New York, Nancy Fried Foster, the lead anthropologist for the University of Rochester study, encouraged attendees to take

steps to implement the work-practice study in their own libraries, to whatever degree possible. Even with limited resources (after all, how many of our libraries have an anthropologist on the staff?), there are ways to gather useful information about library users. By either observing users' research practices or engaging users in discussion about the library and how they use it, any librarian can take the first step in the design thinking practice: identifying the problem.

All too often, library workers are focused on the solution. Whether it is the introduction of a new technology, a shift in the organizational structure or a new promotional campaign, we may be too quick to formulate the solution without adequately understanding the problem. That is not how designers think. If the problems are well understood the solutions will present themselves from the available possibilities. Perhaps the best way to understand this thought process is to get to know a designer, be it an architect or an instructional design specialist. You will notice that he or she spends a great deal of time at the beginning of any project simply talking to people and attempting to recognize patterns. The designer's effort to assess the gap between what exists and what needs to change helps to inform the process of targeting the appropriate solution. Design thinkers take a very deliberate and thoughtful approach to problem resolution; they rarely jump on bandwagons.

Designing better library user experiences

The importance of creating better user experiences was also discussed in Chapter 5 of this book. The idea of a "user experience" may strike some librarians as somewhat

superficial in that it may imply an effort to deliver style over substance. Yes, a library may need to work at developing an experience for its users, but the goal is to engage the people who use our libraries and to connect with them in a personal and memorable way. That is why certain food and beverage outlets, theme entertainment companies and even information providers create highly sustainable services. To emulate such practices, for a start, as a profession we need to move beyond thinking of our primary product as just a commodity to which we offer access.

In the book *The Experience Economy* authors Pine and Gilmore identify the four stages of the user experience. It is similar to a hierarchy, with the goal being to achieve the highest level of user interaction – the experience. At the lowest level is the commodity. For example, a coffee bean is a commodity. A cup of coffee requires about 5 cents' worth of coffee beans, but making the coffee requires the user to do all the work. At the next level is a good. A cup of coffee is the good that comes from the commodity. Making a cup of coffee from a package of ground coffee purchased in a store costs about 25 cents a cup. It's more convenient than starting with beans, so there's an added cost. The next level is service. Buy a cup of coffee at an average restaurant or coffee outlet and you save time and, hopefully, get a better good, but it costs more. At the top of the hierarchy is the experience. All of these other modes resulted in a cup of coffee, but none of them is truly memorable. Now go to a highly evolved and specialized coffee outlet where you can socialize, connect to the internet, purchase gourmet beverages and food and, of course, pay perhaps 100 percent more for a cup of coffee. But people will pay the premium because they want the experience. And they will come back again and again because they like and desire the experience.

Libraries are tremendously challenged to provide memorable user experiences. For a start, we tend to focus on the commodity. Our commodity is information, and when we allow ourselves to be identified primarily as an outlet for books and e-content we condemn ourselves to the lower rungs of the user experience. One way in which we can do better is to improve the quality of service by encouraging all staff to perform at high levels and do all they can to give users more than content. We know our library users can obtain content from other outlets, and will even pay to do so if they perceive value in the convenience and cachet of those other sources.

But what can librarians do to create experiences that are memorable? That is where design thinking may help, by providing a framework for identifying the barriers that prevent the delivery of great user experiences. There is no need for libraries to provide the Disney World or Las Vegas Strip experience. But consider the Pike's Fish Market in Seattle. If they can turn buying fish into an experience, then surely there must be some hope that librarians can create a memorable experience for information seeking and retrieval? Why is Pike's such a celebrated fish market? Think about it. We can buy fish anywhere – a supermarket, a corner grocery store or perhaps a neighborhood market. Chances are, we may buy our fish at all of these places. We have no loyalty to any one in particular because there are no significant differences between them. As a result, the fish sellers may or may not get our business. But people in Seattle will go out of their way to buy fish at Pike's because it is different and memorable.

The formula for creating a better user experience in a library may be as simple as fixing things that are broken, identifying procedures that create barriers for users and eliminating them, developing treasured social and cultural

programs or establishing community recognition for technology leadership and support. Whatever the solutions are, they should be focused on delivering on two levels. First, they should differentiate the library from all the other information providers. We all want our end users to be able to clearly understand how and why a specialized subject library database differs from an internet search engine; yet, it is likely that most cannot articulate that difference. Second, they should deliver meaning to library users. Meaning can be difficult to define. For some end users meaning can be expressed in terms of a feeling of accomplishment. For others it may be feeling connected to a community. The important thing is that meaning is usually derived from personal relationships. So, in designing better library user experiences, librarians should consider ways in which they can build better relationships with those who use their libraries. Observing the best practices of libraries that are creating committed users who return again and again may help in this endeavor. It must begin by taking the slower, more thoughtful path of studying the work practices of users and understanding a great library user experience from their perspective.

Instructional design: more alike than different

As Figures 9.1 and 9.2 illustrated, there are commonalities between design thinking and instructional design. Since the mid 2000s it has become more common to find instructional designers and instructional technologists working in academic libraries. These specialists are sought after to develop instruction products that can be used in information literacy programs, to build better assessment methods, and

to help librarians improve their pedagogical skills. There is one significant difference between instructional design and design thinking. Instructional design is one of the many design professions, while design thinking is a set of strategies and tools that all designers may use in their work. Most librarians will never become instructional designers, but they may be able to become design thinkers.

Additionally, instructional design can involve a significant amount of time and labor. Many librarians are familiar with Project TILT (http://tilt.lib.utsystem.edu), the information literacy tutorial from the University of Texas. TILT is certainly an impressive instruction product, but it was also the result of many hundreds of hours of instructional design activity. Few librarians have that sort of time and it would be unrealistic for anyone to expect librarians to do the exact same work as instructional designers. But, as this book advocates, adapting some of the skills of instructional designers may help librarians to be both better instructors and developers of instruction products. Both instructional design and design thinking promote the use of a process to approach problems, understand people and their learning gaps, and develop appropriate solutions. In this respect the two are more alike than they are different.

So you want to be a design thinker

This chapter has identified some of the basics of design thinking and how design thinkers work. There are a few logical steps in terms of applying design thinking in library settings. A good start is to begin with some basic reading about design thinking in order to better grasp its core principles. Books and articles by and about design thinkers, such as the *The Art of Innovation* (Kelley and Littman, 2001),

can provide greater detail and more concrete examples of how design thinking is applied to the creation of products and services. Prominent design thinker Tim Brown, mentioned earlier in this chapter, is a good source of insight into how it works. Be sure to read his *Harvard Business Review* article on design thinking (Brown, 2008).

What about design thinking in libraries? Is there anything specific about its application in our profession? As with other non-design fields that are beginning to examine design thinking more closely, the migration of these ideas to new territory is as yet too new to yield much that is specific in nature. But there are two ways in which librarians can begin to learn more about design thinking in library settings. First, join the Blended Librarians Online Learning Community. Blended librarianship is the integration of instructional design and technology skills into the practice of librarianship. The Blended Librarians Online Learning Community (http://blendedlibrarian.org) is a free community, open to all, that is just beginning to explore ways in which design thinking can be applied to further collaboration with community partners and help students achieve academic success. Those interested in design thinking may wish to participate in future programs, discussions, and information exchange supported by the Blended Librarians community.

Second, consider becoming a regular reader of Designing Better Libraries, a relatively new blog dedicated to exploring how design thinking can be applied to improving library user experiences (http://dbl.lishost.org). This blog regularly reports and discusses new sources for learning about design thinking, user experiences, and other aspects of how to better apply creativity and innovation in libraries. The writers are all librarians who share their thoughts on how design thinking can be applied in library environments. Typical posts cover ethnographic research methods, the

design and assessment of user experiences, and new ideas for generating innovation in organizations.

All of the above may help librarians to better understand and appreciate the value of design thinking. The essential question to ask in undertaking any new endeavor is "what's in it for me?" As a librarian, why should you invest the time in learning about design thinking? Perhaps this quote from Aradhana Goel, a design consultant who was a member of the Maya Design firm's Carnegie Public Library project may help to convince you:

> The physical changes brought about by architectural renovations have been matched and enhanced by a complementary overhaul of how the library serves its customers. Changed perceptions have attracted new customers who would have otherwise avoided the library. Existing customers find it easier to accomplish their goals and, along the way, discover new things that they might otherwise have missed. Librarians and library staff devote more time to high-value, high-reward efforts. Administrators can now make long-term plans based on a flexible and well-structured framework. (Bell and Shank, 2007, 35)

That sounds like the type of library where many of us would wish to find ourselves working. Those who decide that there is little to gain from these new ideas may find that even some exposure to design thinking concepts and practices can help librarians to imagine new ways to identify solutions to vexing problems or to improve their users' library experiences. For those that choose to explore further, consider that this is a field of exploration that is still quite new. Librarians who wish to learn more about design

thinking can work together as they journey along the path to becoming design thinkers.

References

Bell, S., and Shank, J. (2007). *Academic Librarianship by Design: A Blended Librarian's Guide to the Tools and Techniques*. Chicago, IL: American Library Association.

Blended Librarians Online Learning Community. Available from http://blendedlibrarian.org (accessed 22 September 2008).

Brown, T. (2008). Design Thinking. *Harvard Business Review*, vol. 86, no. 6, pp. 85–92.

Designing Better Libraries. Available from http://dbl.lishost.org (accessed 20 September 2008).

Dunne, D. and Martin, R. (2006). Design Thinking and How it Will Change Management Education. *Academy of Management Learning & Education*, vol. 5, no. 4, pp. 512–23.

Foster, N. and Gibbons, S. (2007). *Studying Students: The Undergraduate Research Project at the University of Rochester*. PDF book available from http://docushare.lib.rochester.edu/docushare/dsweb/View/Collection-4436 (accessed 11 October 2008)

Greene, J. (2007). Return of the Easy Rider. *BusinessWeek*. Available from www.businessweek.com/magazine/content/07_38/b4050078.htm (accessed 11 October 2008).

Kelley, T. and Littman, J. (2001). *The Art of Innovation: Lessons in Creativity from IDEO, America's Leading Design Firm*, New York: Currency Books.

Pine, B.J. and Gilmore, J. (1999). *The Experience Economy*. Boston, MA: Harvard Business School Press.

Project TILT. Available from http://tilt.lib.utsystem.edu (accessed 11 October 2008).

Further reading

Bell, S. (2008). Design Thinking. *American Libraries*, vol. 39, no. 1, pp. 44–9.

Brown, T. (2005). Strategy by Design. *Fast Company*, vol. 95, pp. 52–4. Available from http://www.fastcompany.com/magazine/95/design-strategy.html (accessed 19 September 2008).

Design for Service: Research, Patterns, Observation. A blog of insight and observation about Service Design. Available from http://designforservice.wordpress.com/ (accessed 11 October 2008).

Diller, S., Shedroff, N. and Rhea, D. (2006). *Making Meaning: How Successful Businesses Deliver Meaningful Customer Experiences*, Berkeley, CA: New Riders Press.

Nussbaum, B. Nussbaum on Design. A blog from BusinessWeek's in-house expert on design and innovation. Available from www.businessweek.com/innovate/NussbaumOnDesign/

Pink, D. (2006). *A Whole New Mind: Why Right-Brainers Will Rule the Future*, New York: Riverhead Trade.

Scanlon, J. (2007). Wanted: VPs of Design. *BusinessWeek*. Available from www.businessweek.com/innovate/content/aug2007/id20070829_407662.htm (accessed 11 October 2008).

10

A glimpse of the future: the semantic web and library instructional design

This very short chapter will take a brief look at a much-anticipated future web development, the semantic web, and provide some thoughts about the link to instructional design within libraries.

The semantic web is described as "an evolving extension of the World Wide Web in which the semantics of information and services on the web is defined, making it possible for the web to understand and satisfy the requests of people and machines to use the web content. It derives from W3C director Tim Berners-Lee's vision of the web as a universal medium for data, information and knowledge exchange. At its core, the semantic web comprises a set of design principles, collaborative working groups, and a variety of enabling technologies. Some elements of the semantic web are expressed as prospective future possibilities that are yet to be implemented or realized. Other elements of the semantic web are expressed in formal specifications. Some of these include RDF, a variety of data interchange formats, and notations such as RDFS and the Web Ontology Language (OWL), all of which are intended to provide a formal description of concepts, terms and relationships within a given domain" (Wikipedia, 2008). The W3C consortium, one of the leading

authorities on the development of the semantic web and related technologies adds that "the Semantic Web is about two things. It is about common formats for integration and combination of data drawn from diverse sources, whereas the original Web mainly concentrated on the interchange of documents. It is also about language for recording how the data relates to real world objects. That allows a person, or a machine, to start off in one database, and then move through an unending set of databases which are connected not by wires but by being about the same thing" (W3C, 2008). According to Koper, "the basic idea of the semantic web is relatively straightforward: to create a layer on the existing web that enables advanced automatic processing of the web content so that data can be shared and processed by both humans and software" (2004, 2).

The semantic web has been discussed for many years within the library world, with much of the discussion focused on metadata creation and the language and technology necessary to bring the concept to life. What about the relevance of the semantic web within libraries and, more broadly, education? Koper asks: "Is the semantic web a tool with realistic educational application? Is it going to change future learning and teaching, and what are the possible directions of this future change?" (2004, 2). Wendy Pradtt Lougee discusses the semantic web and digital libraries in her report "Diffuse Libraries: Emergent Roles for the Research Library in the Digital Age," where she describes it as "a second example of new dimensions of access" (scholarly communities and collaboratories being the first example) (Lougee, 2002, 17). The author goes on to describe the role of librarians: "designing the Semantic Web will require a mix of skills, and librarians have the potential to contribute significantly to this effort. One area in which they may become involved is metadata creation, where

librarians' expertise in descriptive techniques has obvious relevance. The more complex arena of ontologies – defining relationships between entities such as classes and subclasses or properties and subproperties – is one in which librarians have latent experience in areas such as thesaurus development" (ibid., 18). Beyond these connections, is there any more practical relevance for those working with library/research instruction, and instructional design?

Mohan and Brooks (2003) suggest a number of areas where there is a clear relationship between library/research instruction and the semantic web. Some of the ideas they discuss include the impact of the semantic web on e-learning, the role of agent technology and the use of learning objects. The authors write: "consider an instructor or course designer developing a course. The instructor should be able to map out a set of concepts in the domain and the set of learning outcomes that are desired. The instructor should then be able to give this information to a learning object search agent that searches the web and returns a pool of learning objects that would be appropriate, with alternatives where necessary for imparting concepts in the domain" (ibid., 2). Learning objects are most useful when semantically described, according to Koper (2004); this allows for a certain level of richness that can aid both teachers and students and enhance instructional activities. Devedžić (2006) defines several implications for education and teaching (some of which are relevant for library/research instruction) related to the semantic web and the use and definition of learning objects, including:

- Educational content, represented as learning objects of different granularity, stored in different digital libraries, learning object repositories, and on different educational servers;

- Educational ontologies of different kinds (domain, pedagogical, communication, task-related, and so forth), used for annotation of learning resources, education Web services, and interoperation between the services and applications;
- Intelligent pedagogical agents that reduce the manual efforts of end users by performing intelligent search and retrieval of LOs (learning objects), locating, invocation, and composition of educational Web services, and otherwise acting on behalf of end users.

Assisting library users in searching for and using meaningful information is another area where a semantic framework would be material. Koper (2004) asks: "wouldn't it be nice if computers were able to 'understand' web pages so that they can help users to better search for relevant information, make inferences and calculations from the information and combine information in new ways to support knowledge-based tasks such as authoring, planning, navigation, cultural exchange, and research" (ibid., 2). Software agents, often mentioned within this context as search helpers, might thus be engaged to "support the filtering of the appropriate resources to be used during the performance of an activity" (ibid., 8). Koper suggests that a semantic web environment that supported the use of software agents could "evaluate the effectiveness of learning design patterns in practice," then "formalize learning design patterns in such a way that they can serve as building blocks in new designs" (ibid., 7), and he articulates two specific areas for further query: "a) software agents that interpret the semantic structure of units of learning to decrease teacher workload and b) software agents that interpret the structure of distributed, self-organized, self-directed learning networks for lifelong learning to help persons to perform their tasks in this

context. Examples of these tasks are: finding appropriate units of learning, creating and adapting units of learning, creating and adapting learning resources, navigating through the network (creating effective, efficient and sensible learning routes), access the current position in the network and provide help with support tasks (e.g. providing feedback on performance; organizing and replying to email)" (ibid., 12). The emphasis on the decrease of the support task workload for librarians and other educators is an important concept, as it would mean more time for actual teaching.

The idea of the semantic web represents a number of possibilities for transforming library/research instruction and its design. The concept has a long way to go before we see a robust semantic framework for the web, but librarians are strategically poised to participate in the development of descriptive schemas and specifications, and the application of annotative data. We recognize that machines are not capable of the same sophistication of descriptive language as humans, and do not have the ability on their own to make meaningful connections between questions, concepts, ideas, data and human experiences. Thus, efforts to increase the richness and value of descriptive data and objects found on the web and to describe and clarify the relationships between them within any given domain are critical to the realization of the semantic web. This is also good news for library instructional design, as the semantic web has the potential to enhance instructional efforts by making it easier to find, classify, and use the best educational content available on the web. The semantic web would not replace the knowledge, experience and guidance of educators in the educational setting, but rather, supplement and complement these strengths, perhaps for the greater benefit of the learner.

References

Devedžić, V. (2006). The Setting for Semantic Web-Based Education. In *The Semantic Web and Education*, New York, NY: Springer-Verlag.

Koper, R. (2004). Use of the Semantic Web to Solve Some Basic Problems in Education: Increase Flexible, Distributed Lifelong Learning, Decrease Teacher's Workload. *Journal of Interactive Media in Education*, vol. 6, available from http://dspace.ou.nl/bitstream/1820/34/2/educational-semantic-web.pdf (accessed 29 October 2008).

Lougee, W. (2002). Diffuse Libraries: Emergent Roles for the Research Library in the Digital Age, available from www.clir.org/pubs/reports/pub108/contents.html (accessed 29 October 2008).

Mohan, P. and Brooks, C. (2003). Learning Objects on the Semantic Web. *Proceedings of International Conference on Advanced Learning Technologies, July 7–14, 2003*, Athens, Greece, available from www.win.tue.nl/SW-EL/2005/swel05-aied05/proceedings/14-mohammed-final-poster.pdf (accessed 29 October 2008).

W3C (2008). W3C Semantic Web Activity, available from www.w3.org/2001/sw/ (accessed 20 September 2008).

Wikipedia (2008). Semantic Web, available from http://en.wikipedia.org/wiki/Semantic_Web (accessed 22 September 2008).

Conclusion

I hope you have enjoyed this book and learned something new about the relationship between instructional design, libraries, and our learners. There is a lot more to be said about the topic, which is rich with possibility, but the most important thing is to continue to think about instructional design as a key concept for the design of library and information literacy instruction. Librarians have always taught in some form or fashion, but are not always afforded the luxury of enough time to prepare, research and conceptualize the best ways to reach their library users. Instructional design provides a framework which can be used across many disciplines to support the development of library instruction in a more measured and structured fashion. That is not to say there is no room for creativity, or for every librarian who teaches to put his or her own stamp on their work. Paying attention to the main tenets of instructional design – analysis, design, development, implementation and evaluation – can only serve to make what we teach more effective, no matter what our teaching styles are and regardless of how basic or complex the content.

Library and research instruction will continue to shift as higher education faces certain challenges over the next decade. Increasing numbers of new students, fewer faculty, aging physical structures and shrinking budgets will all impact how higher education does business. Many of these impacts are already being felt, and librarians everywhere are wrestling with how to provide much-needed instruction to

larger groups of students, with fewer human resources. E-learning and distance learning will continue to grow, as will degree-granting programs that exist only virtually. The idea of the library will also become more diffuse, with growing expectations on the part of users of having both a physical library space and, more important, a virtual library space that provides *exactly* the same services, including instruction. It will become increasingly difficult for librarians to create instruction in a vacuum, to craft new sessions for each and every class, to start from zero and try to locate the best teaching materials each time there is a request to teach students. Evaluating what students have actually learned is often ignored, simply because in many cases we do not have the time or the expertise to proceed. Instructional design can, at the very least, address some of these challenges by providing a structure around which to build content. It is certainly worth additional thought and discussion by any librarian who sees teaching and instruction as a part of his or her professional mission.

Index

access, 147, 149
  – *see also* universal instructional design
active learning, 26–7
  – *see also* experiential learning
Adamich, T., 94
ADDIE model, 40–2, 76–9, 112–14, 164
  five phases, 41–2
adoption analysis, 145
agent technology, 179–81
ARCS model, 46–8, 79–80
  four phases, 46
  Keller, J., 46–7
  motivation, 46–7
The Art of Innovation, 161, 172
  – *see also* Kelley, Tom
Association of College and Research Libraries (ACRL), 100–4
  ACRL Information Literacy Competency Standards for Higher Education, 112
  ACRL Standards for Proficiencies for Instruction Librarians and Coordinators, 98–100
ASSURE model, 44–5
  six phases, 45
The Behavior of Organisms, 20
  – *see also* Skinner, B.F.
behaviorism, 18
  eight teaching guidelines, 21–2
  Pavlov, I., 19
  Skinner, B. F., 5, 20
  Thorndike, E.L., 20–1
  Watson, J., 19–20
Bell, S., 42–3, 149, 159–76
Bell, S. and Shank, J., 143
Berners-Lee, Tim, 177
BLAAM model, 42–3
  Bell, S. and Shank, J., 42
  five phases, 42–3
blended librarians, 143, 149–51
  definition, 149
  manifesto, 150
  online community, 173
  six principles, 150–1
Bloom, B., 5–6
  Taxonomy of Educational Objectives, Handbook 1: Cognitive Domain, 6
  affective domain, 6
  cognitive domain, 6
  librarians' use of, 93
  psychomotor domain, 6
Branch, R. and Gustafson, K., 35–7, 48–50
Brown, Tim, 161–2

Carlile, O. and Jordan, A., 21–3 25
Carnegie Library, Pittsburgh, PA, 166–7, 174
Centre for Teaching and Educational Technologies (CTET), 66
framework for addressing online course quality, 66
Cifuente, L. and Ozel, S., 146–7
cognitivism, 22–5
Ausubel, D., 24–5
Bruner, J., 24
guidelines related to instructional design, 23
Piaget, J., 23–4
CogSim Educational Consulting, 57
The Conditions of Learning and the Theory of Instruction, 7
constructivism, 10, 25–7
instructional principles, 11
librarians' use of, 95
nine parameters for instructional design, 25–6
contiguity, 108
Council of Australian University Librarians (CAUL), 115

design thinking:
connection to instructional design, 171–2
definition, 159–61
use in library settings, 162
Designing Better Libraries website, 173
Dick and Carey model, 37–9
ten components of, 38
Dick, W., 3
Diffuse Libraries: Emergent Roles for the Research Library in the Digital Age, 178–9
– *see also* Lougee, Wendy Pradtt
distance learning, 104
instructional design elements of, 105

EDUCAUSE, 64–5
ten academic technology issues, 65
e-learning, 56–7, 179
environmental analysis, 146
The Experience Economy, 169
– *see also* Pine, J. and Gilmore, J.
experiential learning, 26–7
– *see also* active learning

Friedman, M. and Fisher, S., 106–10

Gagne, R., 7, 93, 107–8, 112
basic learning principles, 9
The Conditions of Learning and the Theory of Instruction, 7
nine events of learning, 7–8
principles of instructional design, 8
Glaser, R., 6
assessment, 7
criterion-referenced measures, 7, 10
Goleman, D., 27
emotional intelligence, 27
Gribbons, W., 87, 147
Gustafson, K. and Branch, R., 35–7, 48–50

higher education and instructional design, 53–4, 142–4
Hunter College, New York City, 132, 154
"Formulating a Search Strategy" learning module, 131–9
instructional design librarian job posting, 154

IDEO corporation, 160–2
IDEO method, 163
Shimano corporation, 166
impact of cultural factors on instructional design, 146
impact of societal factors on technology, 144–5
information literacy:
relationship to instructional design, 100–4, 110–16
Institute of Electrical and Electronics Engineers (IEEE), 82, 85
instructional design, 1
adoption of, 58
challenges to adoption of, 57–9
challenges for use within the academic library, 141–57
connection to design thinking, 171–2
definition, xx
international development, 12–13
origins, 2–4
role of psychologists, 5–9
semantic web, 181
skills for librarians, 101–4, 142–4
use of for design of a learning module, 125
instructional design 2.0, 75–80
instructional design models:
classification of, 48–50
examples of, 37–48
taxonomy, 48, 49
classroom orientation category, 48
product orientation category, 49
systems orientation category, 49
instructional designers:
agency, 55–6
librarians as, 56, 95–6, 142–4
role within academia, 54, 142
instructional development, 2–3
instructional goals, 41
instructional mashup, 71
instructional systems design, 2–3, 7
– *see also* instructional systems development
instructional systems development (ISD), 4, 40
– *see also* instructional systems design
instructional technology design, 2
International Society for Technology in Education (ISTE), 114–15

Jonassen, D., 95
Jordan, A. and Carlile, O., 21–3, 25

Kelley, Tom, 161
The Art of Innovation, 161, 172

Kognito Interactive, 121–39
  design and development, 122–7
  "Formulating a Search Strategy" learning module, 131–9
  instructional design plan, 125
  needs analysis, 124
  subject matter experts, 129

learner-centered instruction, 30, 37, 95, 142–3
learner differences, 26, 146
  adult learners, 26
  child learners, 26
learning environments, 30
learning goals, 7, 38
learning objectives, 5–6, 21, 36, 38, 42–5, 106–7, 124
learning objects, 82–7, 179–80
learning outcomes, 21, 38
learning theory, 1, 17
  learning-conscious learning, 18
  task-conscious learning, 18
librarians:
  instructional design qualifications, 143
  instructional design skills, 101–4
  job descriptions for instructional design librarians, 144
    examples, 151–4
  role as educators, 56, 94–9
  role as instructional designers, 56, 95–6, 142–4
  "teacher identity", 97
  teaching proficiency, 95, 98–101
  use of instructional strategies, 93–5, 104–10
Library 2.0, 71–4
  concepts, 72
  progression from Library 1.0, 73–4
library instruction, 93–4
  relationship to instructional design, 93
  semantic web, 181
localization, 147
Lougee, Wendy Pradtt, 178–9
  Diffuse Libraries: Emergent Roles for the Research Library in the Digital Age, 178–9

mashup, 71–3
MAYA Design Firm, 166–7, 174
MERLOT, 87
Merrill, M., 11
Metros, S., 83–4, 86
Miller, P., 73
Molenda, M., 4, 40
Morrison, Ross and Kemp model, 43–4
  integration with ACRL instructional guidelines, 102–4
  nine elements, 44
Morville, P., 87
Mulder, C., and Shonrock, D., 98
multidisciplinary work, 62
Myers-Briggs inventory, 26

National Research Council, 28, 30–1
new media, 80–2
norm-referenced measures, 10

online learning, 28
– *see also* e-learning
online library instruction, 28
Ozel, S. and Cifuentes, L., 146–7

Pavlov, I., 19
Piaget, J., 23–4
Theory of Development, 23
Pike's Fish Market, Seattle, Washington, 170
Pine, J. and Gilmore, J., 169
– *see also The Experience Economy*
Project TILT, University of Texas, 172

Reiser, R., 3, 40
repetition, 109–10
Rotman School of Business, University of Toronto, 163

The Science of Learning and the Art of Teaching, 5
semantic web:
definition, 177–8
instructional design, 181
library instruction, 181
relationship to digital libraries, 178
Shank, J., 42–3, 85, 144
Shank, J. and Bell, S., 143, 149–51
Shonrock, D., and Mulder, C., 98
Simmons, M., 96, 111
Skinner, B.F., 5
The Behavior of Organisms, 20
behavioral learning theory, 20
The Science of learning and the Art of Teaching, 5
Skinner Box, 20
The Teaching Machine, 20
social networking tools, 76, 78–80
Society of College, National and University Libraries (SCONUL), 115–16
Spellings Report, 63–4
Surry and Farquhar, 144–5
systems engineering, 4

Taxonomy of Educational Objectives, Handbook 1: Cognitive Domain, 6
Thorndike, E. L., 20–1
Law of Effect, 20
Law of Exercise, 20
Law of Readiness, 20
transfer of information, 2
types of general instruction, 36

United States Air Force, 4
universal instructional design (UID), 147–9
key principles, 148
– *see also* access
University of Rochester
Foster, Nancy, 167–8
work-practice studies, 167–8
user experience (UX), 87–9, 166, 168–71
relationship to instructional design, 88
use within academic libraries, 88, 162, 168–71

UX – *see* user experience

Vacca, R., 121–39

Walter, S., 97
Watson, J., 19
  Little Albert experiment, 20
Web 2.0, 71–4
  concepts, 72
  use within the academic library, 74–80
Wiley, D., 84–5
Wisconsin Online Resource Center, 87
World War II, 3