Librarians’ Use of Instructional Design Methods in Creating Information Literacy Instruction

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Librarians’ Use of Instructional Design Methods in Creating Information Literacy Instruction

by

Michael W. Wilson

An Applied Dissertation Submitted to the Abraham S. Fischler College of Education in Partial Fulfillment of the Requirements for the Degree of Doctor of Education

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Approval Page

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Acknowledgments

In my innocent pre-dissertation days, I naïvely assumed that I would conduct this study largely on my own. Experience has disabused me of this notion; I now know that the efforts of many individuals are required to conceptualize and carry out a study of this magnitude, and I would like to thank those who made it possible.

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I dedicate this dissertation to three individuals who have loved and nurtured me in more ways than I can count: My mother, Dr. Carol Young Wilson, whose adventures in higher education inspired many of my own, and my two grandmothers, Jean M. Young (1919–2000) and Blanche K. Wilson (1896–1973).
Abstract


The purpose of this sequential explanatory mixed methods study was to determine whether instruction librarians in the United States and Canada were using instructional design (ID) methods, and to identify potential explanations for their adoption or rejection of those methods. The theory of planned behavior (Ajzen, 1985) served as the theoretical framework for the study. Research questions examined the relationship between respondents’ reported use of ID methods and the following factors: (a) behavioral, normative, and control beliefs, (b) demographic factors, and (c) professional identity as teachers.

A survey adapted from Ajjan and Hartshorne (2008) and from Julien and Genuis (2011) was distributed to members of the American Library Association’s Information Literacy Instruction Discussion List. Quantitative data from 101 subjects were analyzed using \( \chi^2 \) and \( t \) tests for independent sample means. Qualitative data from seven volunteers were compared to the quantitative data to identify areas of validation or disconnect.

Pearson correlations between use scores and behavioral, normative, and control beliefs revealed that control construct scores \((r = .59)\) had the strongest correlation with ID use, followed by behavioral \((r = .56)\) and normative \((r = .53)\) scores. Qualitative data supported the conclusion that there was a strong relationship between ID use and both behavioral and normative scores, but not between ID use and control scores. Chi-square analysis found no relationship between subjects’ use of ID methods and the length of time they had worked in libraries \((\chi^2 = 5.14)\). A significant relationship was found between ID use and the length of time subjects had taught information literacy \((\chi^2 = 7.91)\) and reported type of training in ID \((\chi^2 = 24.59)\). Subjects who identified primarily as teachers used ID more than those who did not \((t = 2.61)\).
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Chapter 1: Introduction

Statement of the Problem

In 1876, Melvil Dewey, who is widely acknowledged as the “father of modern librarianship” (Birdsall, 2009, p. 2), penned the following words for the inaugural issue of *American Library Journal*, the official publication of the American Library Association (ALA):

The time *was* when a library was very like a museum, and a librarian was a mouser in musty books, and visitors looked with curious eyes at ancient tomes and manuscripts. The time *is* when a library is a school, and the librarian is in the highest sense a teacher, and the visitor is a reader among the books as a workman among his tools. (Dewey, 1876, p. 5)

In this essay, Dewey made the first definitive statement about the role of instruction in the newly emerging profession. The teaching component, in Dewey’s opinion, was one of the things that distinguished the future of librarianship from its past (Roffman, 2007).

The concept of the librarian as teacher predates Dewey, however. As early as the 17th century, German institutions were providing library instruction for their students (Ewert, 1986). In the United States, librarians at Harvard College were carrying out instructional activities as far back as the 1820s (Weiss, 2003). Although the first wave of instructional efforts in academic libraries began toward the end of the 19th century, it was not until the early 1960s that the modern library instruction movement was born (Gibson, 2008; Grassian & Kaplowitz, 2009; Lorenzen, 2001). The antecedents of the modern discipline of instructional design (ID) have even more ancient roots; consideration of instructional methods began with the Elder Sophists in the late fifth century BCE (Saettler, 2004). ID as we know it today, however, did not emerge until after the Second World War, driven by the need for training large numbers of soldiers quickly and efficiently (Booth, 2011; Willis, 2011a).
ID and library instruction, then, have coexisted for approximately fifty years, but they seem to have done so without having intersected meaningfully until the first decade of the 21st century. This may be attributable to the speed at which library instruction changed and matured over that period (Gibson, 2008; Grassian & Kaplowitz, 2009), to the differences in professional cultures of designers and librarians (Rose, 2002), or to some other factor. Lately, many studies have investigated the relationship between library instruction and ID, but none has yet been undertaken to determine the extent to which librarians actually use ID theories or models to create library instruction.

The Research Problem

Changes both inside and outside the library profession have driven the need for instructional services in libraries. Technological growth and evolving concepts of information literacy (IL) are two trends in librarianship that have necessitated the expansion of librarians’ skills to include designing and delivering instruction (Shank & Dewald, 2012). Librarians traditionally have had neither the training nor the support infrastructure for course design and delivery that other disciplines have enjoyed; without these factors, the quality of IL instruction may suffer. The problem is that the extent to which librarians have adopted ID methods to create IL instruction is unknown. Without this fundamental knowledge, it is difficult to determine the efficacy of librarians’ instructional efforts in higher education.

Background and Justification

IL is an essential set of skills for navigating the academic library, and thus ultimately has an impact on students’ overall academic success; learning these skills is particularly important for undergraduate students, who typically score low on objective
measures of IL while at the same time overestimating their abilities in this area (Gross & Latham, 2012). According to Eisenberg (2008), IL is important not only in the academic environment, but also in work, public service, and even recreational settings as well. In all of these situations, individuals must be able to find accurate information and to use it to solve problems in the environment. Far beyond the academy, then, IL is a foundational skill for functioning in an information-intensive society. To what extent, however, is IL instruction informed by ID? While recent literature reflects a lively interest in ID themes, does this suggest that most instruction librarians do indeed make use of ID? Further, do instruction librarians themselves embrace their teaching role, and if not, does this have an impact on whether or not they bother to use ID? Julien and Genuis (2011) surveyed a national sample of 788 Canadian librarians and found that “the majority of respondents identify instructional work as integral to their professional identity, but nearly one-third see this work as a duty or expectation, and a small proportion view it as an imposition” (p. 103), an observation which casts doubt on the quality of a large percentage of the IL instruction currently being conducted.

For much of its history, the library instruction movement has seemed relatively untroubled by considerations of design, and perhaps the reason for this lies in its origins: bibliographic instruction, which was oriented to training users in basic research techniques, was an informal, ad hoc practice that rarely inspired its adherents to consider its possible theoretical underpinnings (Gibson, 2008; Grassian & Kaplowitz, 2009). When the movement came to embrace IL, which is process oriented and concerned with developing critical thinking skills, librarians began to understand the necessity of using models to create instruction and of connecting that instruction to learning theories
The rise of information literacy. In 1974, Paul G. Zurkowski introduced the term *information literacy* to the instruction librarian’s lexicon. According to Zurkowski, information literate individuals were those who could apply information gleaned from a variety of sources to problems in their personal lives and in the workplace (Badke, 2010; Gibson, 2008; Grassian & Kaplowitz, 2009). During the 1980s and 1990s, numerous authors prominent in the library instruction movement refined and expanded upon Zurkowski’s concept (Grassian & Kaplowitz, 2009). There were common themes that emerged in these authors’ definitions of information literate individuals: The information literate person recognizes when information is needed (Bjorner, 1991; Doyle, 1996), is skilled at using specific information resources and tools (Breivik, 1985; Bruce, 1997; Doyle, 1996), and carefully evaluates the information found (Breivik, 1985; Bruce, 1997; Kuhlthau, 1989, 1990). He or she is persistent in searching for information, is capable of focusing on details (Breivik, 1985; Kuhlthau, 1989, 1990), and has good problem-solving abilities (Breivik, 1985; Doyle, 1996). The information literate person also recognizes that the research process is nonlinear and iterative (Kuhlthau, 1989, 1990), accurately gauges the time and effort required to retrieve information (Kuhlthau, 1989, 1990), and is able to adapt his or her search strategies to new information environments (Rader, 1991).

The ALA (1989), in its *Presidential Committee on Information Literacy: Final Report*, codified the definition of IL:

To be information literate, a person must be able to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information. . . . Ultimately, information literate people are those who have learned how to learn. They know how to learn because they know how knowledge is organized, how to find information, and how to use information in such a way that others can learn from them. They are people prepared for lifelong learning,
because they can always find the information needed for any task or decision at hand. (para. 3)

As IL replaced bibliographic instruction as the dominant paradigm, librarians began thinking more about how their instruction sessions could encourage students to develop the critical thinking skills required to be information literate (Grassian & Kaplowitz, 2009). The literature reflected increasing concern with ID beginning in the late 1970s and continuing through the 2010s, as revealed by a search of the Library and Information Science Abstracts database. Two early works (Adams, 1976/1977; Bantly & Freedman, 1979) were published during the decade in which librarians first took notice of ID; 30 years hence, that number had mushroomed, as the literature review will show.

**The profession’s response.** Library educators were slow to respond to this trend. The last three decades of the 20th century saw increasing emphasis placed on user instruction in academic libraries without a corresponding emphasis on andragogy in library school curricula (Colborn, 2011; Hensley, 2015; Saunders, 2015; Sproles, Johnson, & Farison, 2008). As Colborn (2011) wrote, “many roles in libraries require that librarians teach, lead workshops, or give instruction to patrons in some way, but most librarians are not adequately prepared for teaching as part of their formal education” (p. 15). Even though many librarians may lack formal instruction in andragogy, they increasingly must satisfy the demands of their institutions to provide IL instruction, because in the majority of cases this instruction is mistakenly seen as the exclusive purview of the library (Association of College and Research Libraries [ACRL], 2001; Gibson, 2008). They must also answer to the requirements of various accrediting bodies, such as the Southern Association of Colleges and Schools and the National Council for Accreditation of Teacher Education, to provide adequate instruction in library use.
Library schools have recently attempted to respond to these changing needs. Although there were 154 courses in library user education offered in the 55 library schools accredited by the ALA as of December, 2012 (ACRL, 2012), the impact of these courses on the abilities of newly minted librarians to design and deliver IL instruction remains to be seen. In fact, there is some indication that this new curriculum is having little effect: A recent survey of library administrators (Click & Walker, 2010) revealed that 86% believed that library schools inadequately prepared new library and information science graduates for instructional duties, while 47% identified “preparing a lesson” as “the biggest area needing improvement” (p. 5). In any case, the recency of these curricular changes has left a large number of librarians who were trained earlier without essential teaching skills (Polger & Okamoto, 2010).

Many librarians, then, may not possess the ability to create well designed IL instruction. Instruction that lacks a coherent design has the potential to fail in a number of ways: Lessons may be generally disorganized and confusing, they may not meet their objectives, their content may be too simple or too complex for the target audience, and the evaluation may not match what was taught (Piskurich, 2006). Further, poorly designed instruction places students at risk for failure to develop IL skills, the teaching of which is one of the main objectives of the modern academic library (ACRL, Information Literacy Best Practices Committee, 2012). Clearly, librarians must have knowledge of instructional techniques if they are to teach effectively. Before interventions can be designed to remedy a lack of knowledge in this area, the extent of the problem must be
determined.

**Deficiencies in the Evidence**

A preliminary review of the literature failed to yield any research on the question of whether or to what extent librarians use ID to create IL instruction. Despite the fact that traditions of ID and library instruction have coexisted in American higher education for many years (Hardesty, Schmitt, & Tucker, 1986; Rose, 2002; Saettler, 2004), there seem to have been no empirical studies performed to date that specifically investigate whether instruction librarians actually use ID as a basis for instruction.

While the number of published works devoted to the use of ID methods in creating IL instruction may give the impression that the practice of designing instruction systematically is prevalent among academic librarians, there is some indication in the literature that this is not so. As previously mentioned, Click and Walker’s (2010) study revealed that 86% of library administrators had little confidence in the ability of library schools to prepare their graduates to teach. In one recent study, librarians’ lack of training in ID was identified as a problem to be remedied by professional development (Starkey, 2010). Additionally, the ACRL’s Instruction Section identified design and implementation of library instruction as an area in need of further research (ACRL, Instruction Section Research and Scholarship Committee, 2013).

**Rationale for Utilizing a Mixed Methods Design**

Social science research is inherently complex; most research questions are multifaceted, and a single approach is rarely sufficient to explore them in detail (Creswell, 2009). As Creswell put it, “there is more insight to be gained from the combination of both qualitative and quantitative research than either form by itself. Their
combined use provides an expanded understanding of research problems” (p. 203). The present study, specifically, required a mixed methods design because it sought not only to gather numeric data on the number of instruction librarians using ID methods, but also to understand their reasons for choosing to use or not to use those methods.

**Audience**

Instruction librarians, library administrators, and others who are directly involved in teaching library skills and IL competencies will benefit from this study, as will instructional designers, faculty members, and others who may interface with librarians in designing IL instruction. Library educators may use the results of the study to determine future curricula, and library school students may benefit from their decisions in that regard. Students at both the graduate and undergraduate levels may also benefit indirectly from improvements in IL instruction brought about by others more directly affected by the study.

**Purpose Statement**

The purpose of this sequential explanatory mixed methods study was to determine whether instruction librarians in the United States and Canada were using ID methods, and to identify potential explanations for their adoption or rejection of those methods. The theory of planned behavior (TPB; Ajzen, 1985) guided the inquiry at both the quantitative and qualitative levels. A survey was used to collect information about respondents’ behavioral, normative, and control beliefs, their intention to adopt ID methods, and their subsequent adoption or rejection of those methods of those methods. The reasons for respondents’ adoption or rejection of ID methods in creating IL instruction were explored using qualitative interviews. Both quantitative and qualitative
data were collected and converged in an attempt to gain a broader understanding of the problem than either type of data alone could provide.

**Definition of Terms**

This section provides definitions for various terms used in the study.

**Behavioral beliefs.** According to the TPB, behavioral beliefs, defined as the perception of the consequences of a behavior, are one of three factors (along with normative and control beliefs) that determine one’s intention to perform a behavior (Ajzen, 2006; Ajzen, 2012).

**Bibliographic instruction.** The teaching of library practices and procedures to users. This may include instruction in the use of library catalogs, periodical indexes, reference works, electronic resources, and various finding aids. The practice of IL instruction has largely superseded that of bibliographic instruction.

**Control beliefs.** According to the TPB, control beliefs, defined as “the perceived presence of factors that may facilitate or impede performance of a behavior” (Ajzen, 2006, Control Beliefs section, para. 1), are one of three factors (along with behavioral and normative beliefs) that determine one’s intention to perform a behavior (Ajzen, 2012).

**Course management system (CMS).** A software based virtual classroom environment that provides interaction between and among faculty and students. It allows students to access various communication tools such as email, discussion boards, wikis, gradebooks, blogs, and video and audio conferencing.

**Digital learning object (DLO).** The definition provided by Mestre et al. (2011) of digital learning objects as “reusable instructional resource[s], usually digital and Web-based, developed to support learning,” will be adopted for this study.
**Information literacy (IL).** The ability to “recognize when information is needed and . . . to locate, evaluate, and use effectively the needed information” (American Library Association, 1989). Unlike bibliographic instruction, which is skills-focused, IL addresses the process of finding, interpreting, evaluating, and using information (Koneru, 2010).

**Information literacy instruction.** Any formal instructional activity related specifically to IL, as defined above.

**Instruction librarian.** Any librarian who has responsibility for teaching IL in a classroom setting. This may include individuals who have instruction as their primary job responsibility, or those with only occasional teaching duties.

**Instructional design (ID).** A systematic process for the analysis and improvement of problems in learning and performance, characterized by the identification, selection, implementation, evaluation, and management of solutions to those problems. This process may involve the use of strategies, models, methods, or principles that are based on one or more design theories and used to organize instruction (Reiser & Dempsey, 2011; Richey, Klein, & Tracey, 2010; Rothwell & Kazanas, 2011).

**Instructional design model.** The study will adopt Gustafson and Branch’s (2002) definition of ID models “as conceptual, management, and communication tools for analyzing, designing, creating, and evaluating guided learning, ranging from broad educational environments to narrow training applications” (p. xv).

**Instructional design theory.** The study will use Reigeluth’s (1999) definition of ID theories as those “that [offer] explicit guidance on how to better help people learn and develop. The kinds of learning and development may include cognitive, emotional,
social, physical, and spiritual” (p. 5).

**Library instruction.** An umbrella term that will be used to refer to all formal instructional activities in libraries, including IL instruction or bibliographic instruction. The term will not be used to refer to point-of-use instruction, such as that received at a library reference desk.

**Normative beliefs.** According to the TPB, normative beliefs, defined as the perception of others’ approval or disapproval of a behavior, are one of three factors (along with behavioral and control beliefs) that determine one’s intention to perform a behavior (Ajzen, 2006; Ajzen, 2012).

**Summary**

American academic librarians have been teaching library skills to users for nearly 200 years. In the 20th century, the practice of bibliographic instruction, which emphasized teaching practical research techniques to users, was gradually replaced with IL instruction, which focused not only on locating information but applying it to solve problems. Whereas bibliographic instruction had often been conducted on an informal, ad hoc basis, librarians found that IL instruction, which is more process oriented and seeks to develop critical thinking skills, required an approach informed by relevant learning theories.

ID theories prescribe specific ways to design effective instructional interventions, and seem an obvious choice of tools for librarians who endeavor to create IL instruction. Nevertheless, no empirical studies have yet been undertaken to determine whether librarians use ID methods. This study attempted to determine whether or not ID methods were actually being used to create IL instruction. A mixed methods approach was used to
investigate the problem, since it combines the strength of both quantitative and qualitative methods. The study should be of interest to anyone involved in providing IL instruction to students in higher education settings. The purpose of this sequential explanatory mixed methods study, which was to determine whether instruction librarians in the United States and Canada were using ID methods and to identify potential explanations for their adoption or rejection of those methods, was described and elaborated. Terms used in the study were defined and clarified.
Chapter 2: Literature Review

Chapter 1 presented the research problem to be addressed in this study. Chapter 2 examines literature related to the topic. The chapter is divided into six sections. The first section presents the theoretical framework that will guide the inquiry. Subsequent sections describe how instruction librarians have used ID theories and models; explore the ways in which instruction librarians have collaborated with instructional designers, faculty members, and others to achieve well designed instruction; describe how ID has been used in IL instruction; discuss prior research and how it relates to the present study; and define the research questions.

Theoretical Framework

The TPB (Ajzen, 1985) served as the theoretical framework for this study. The TPB, an extension of the theory of reasoned action (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975), was designed to improve upon the ability of the theory of reasoned action to predict behavioral intention. According to Ajzen (2012), the theory of reasoned action held that one’s intention to perform a behavior is determined by two factors: behavioral beliefs, or the perception of the consequences of the behavior, and normative beliefs, the perception of others’ approval or disapproval of the behavior. The TPB extended this framework by adding the dimension of control beliefs, “the perceived presence of factors that may facilitate or impede performance of a behavior” (Ajzen, 2006, Control Beliefs section, para. 1).

According to the TPB, behavioral beliefs are the basis for one’s attitude about a behavior. Attitude is defined as “the degree to which performance of the behavior is positively or negatively valued” (Ajzen, 2006, Attitude Toward the Behavior section,
Normative beliefs give rise to an individual’s concept of a subjective norm, which is “the perceived social pressure to engage or not to engage in a behavior” (Ajzen, 2006, Subjective Norm section, para. 1). Perceived behavioral control, or a person’s beliefs about his or her ability to succeed at a behavior, is based upon control beliefs. Together, these factors determine one’s intention to perform a behavior. Intention is considered to be a strong predictor of behavior, but only to the extent that one is actually able to perform the specific behavior in question (Ajzen, 1991). The figure below graphically illustrates this process of the formation of behavioral intention and ultimate performance of the behavior.


The theory is an appropriate framework for the present study because its power to predict intention and behavior furthers the study’s purpose of exploring the reasons that instruction librarians adopt or reject ID methods in creating IL instruction. Sutton’s (2007) overview of seven meta-analyses of observational studies of the TPB (Ajzen, 1991; Albarracín, Johnson, Fishbein, & Muellerleile, 2001; Armitage & Conner, 2001; Godin & Kok, 1996; Hagger, Chatzisarantis, & Biddle, 2002; Sheeran & Taylor, 1999;
Trafimow, Sheeran, Conner, & Finlay, 2002) confirmed that the theory was effective in predicting both intention and behavior; multiple correlations for the former ranged from 0.59 to 0.71, and from 0.51 to 0.59 for the latter. This would explain between 35% and 50% of the variance for intention, and between 26% and 35% of the variance for behavior.

One of the strengths of the TPB lies in the fact that it is a general theory that can be applied in numerous situations without modification (Sutton, 2007). Indeed, the theory has been used to predict behavior in such diverse arenas as health practices, energy consumption, and use of public transportation (Ajzen, 2012), leisure choice (Ajzen & Driver, 1992), consumer adoption of electronic commerce (Pavlou & Fygenson, 2006), and honesty (Beck & Ajzen, 1991). Nevertheless, further extensions of the TPB have been proposed; it has been suggested that the dimension of self-identity, among others (Conner & Armitage, 1998; Masser, Bednall, White, & Terry, 2012; Rise, Sheeran, & Hukkelberg, 2010), be added to the model to increase its predictive power. One aspect of self-identity, that of professional identity, is of interest to this study; it is therefore tempting to modify the theory for the purposes of the study to include the construct of self-identity, as some researchers have done (Masser et al., 2012). However, rather than modifying the theory by adding a further construct as a predictor of intention and behavior, self-identity will be subsumed under attitude, as suggested by Rise et al. (2010); doing so preserves the parsimony and the theoretical coherence of the TPB (Sutton, 2007).

**Instruction Librarians’ Use of Instructional Design Theories and Models**

Many benefits are to be derived from instruction that is designed systematically.
ID takes learners’ needs into account and imparts goals to instruction, thereby encouraging learner engagement and improving classroom performance (A. L. Davis, 2013). Still, many librarians lack training and experience in ID (Colborn, 2011; A. L. Davis, 2013; Hensley, 2015; Summey & Valenti, 2013), and despite the fact that professional organizations have called for ID training (ACRL, Instruction Section Research and Scholarship Committee, 2013; ACRL, 2008), many library directors fail to perceive its importance. For instance, Shank and Dewald (2012) described a study in which library directors rated the importance of four sets of instructional skills. Two of these—teaching and presentation—were more traditional, while the other two—educational technology and ID—were considered less so. The directors rated each skill set on a 4-point scale, from 1 (least important) to 4 (most important). Over 50% of the respondents rated teaching as the most important skill; the mean score for this item was 3.19. Presentation skills were rated second in importance ($M = 2.84$), followed by educational technology ($M = 2.25$) and ID ($M = 1.98$). Perhaps it is not surprising, then, that so few librarians have training in ID methods. Nevertheless, the literature does reflect an attempt on the part of librarians to use ID theories and models to structure lessons. The following subsections will describe how they have gone about doing so.

**Theories.** ID theories differ from other types of theories in some very important ways. In contrast to formal scientific theories, which are descriptive and predictive (Hawking & Mlodinow, 2008), ID theories are prescriptive; that is, they prescribe the best way to achieve instructional goals in different situations, rather than describing or predicting how learning will occur (Morrison, Ross, Kemp, & Kalman, 2012). As Reigeluth and Carr-Chellman (2009) put it, an ID theory “assists in the creation of
something, while descriptive theory seeks to describe what already exists” (p. 7). For instance, Hawking and Mlodinow (2008) cited Newton’s general theory of gravitation as an example of a formal scientific theory. This theory, based on the three laws of motion, allowed Newton to describe and to predict the movement of heavenly bodies, the tides, and other phenomena (Hawking & Mlodinow, 2008; “Newton, Sir Isaac (1642–1727),” 2002). A design theory, on the other hand, is “intended to provide direct guidance to practitioners about what methods to use to attain different goals” (Reigeluth, 1999, p. 8) rather than describing or predicting phenomena. Learning theories are classified as descriptive theories, rather than design theories; although the latter are in many ways more useful than the former in designing instruction, only one recent article (Rand, 2013) discussed the use of ID theories in any depth. Learning theories, however, earned mention in several articles (Blummer, Kenton, & Song, 2010; Bobish, 2011; Stiwinter, 2013).

Even though constructivism has replaced behaviorism as the dominant learning theory (Ertmer & Newby, 2013), many instructors still used the techniques of the latter in their lessons (Blummer et al., 2010; Bobish, 2011; Stiwinter, 2013). Behavioral theory is characterized by an emphasis on providing a stimulus to a learner to elicit a response; learning is considered to have occurred when the appropriate response follows a particular stimulus (Colborn, 2011; Ertmer & Newby, 2013). The relationship of learners to the environment is seen as reactive rather than active; that is, they are thought to react to elements in the environment instead of actively engaging and discovering it (Ertmer & Newby, 2013; Willis, 2011a). Table 1 lists certain assumptions and principles of behaviorist theory in the first column, followed by possible ID applications of that
assumption or principle in the second column.

Table 1

*Possible ID Applications of Behaviorist Theory*

<table>
<thead>
<tr>
<th>Assumptions or principles</th>
<th>Possible ID applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>An emphasis on producing observable and measurable outcomes in students</td>
<td>Behavioral objectives, task analysis, criterion-referenced assessment</td>
</tr>
<tr>
<td>Pre-assessment of students to determine where instruction should begin</td>
<td>Learner analysis</td>
</tr>
<tr>
<td>Emphasis on mastering early steps before progressing to more complex levels of performance</td>
<td>Sequencing of instructional presentation, mastery learning</td>
</tr>
<tr>
<td>Use of reinforcement to impact performance</td>
<td>Tangible rewards, informative feedback</td>
</tr>
<tr>
<td>Use of cues, shaping and practice to ensure a strong stimulus–response association</td>
<td>Simple to complex sequencing of practice, use of prompts</td>
</tr>
</tbody>
</table>


Blummer et al. (2010) used various behaviorist interventions in a face-to-face instruction session with graduate students in education. They relied on the use of behavioral objectives, steps, practice, and informative feedback to encourage the development of IL skills. For example, in one exercise students were given the objective of obtaining a book through ILLiad, the interlibrary loan system. They were provided with the steps required to create an ILLiad account and to order materials, and given an opportunity to practice doing so. Stiwinter’s (2013) online tutorial used software simulations to teach students how to navigate various web sites and database interfaces; this was seen as an application of both behaviorist and cognitive theories, since students were afforded the opportunity to experiment and practice but also had to “use cognitive
theory to look at the screen, analyze possible solutions to the task, and then act” (p. 23). Both Blummer et al. (2010) and Bobish (2011) emphasized that behavioral techniques could be used to reinforce learning outcomes related to the ACRL’s *Information Literacy Competency Standards for Higher Education* (ACRL, 2000). Bobish pointed out that the outcomes of the *Standards* “provide instructors with an array of measurable behaviors which can be reinforced as appropriate” (p. 55). Bobish then gave the example of Standard 2, Indicator 5, Outcome (d): “Records all pertinent citation information for future reference” (ACRL, 2000, p. 11), which could be measured by examining students’ citations and reinforced with a grade.

Constructivism, too, is often invoked when designing IL instruction (Blummer et al., 2010; Bobish, 2011; Colborn, 2011; Koneru, 2010; Rand, 2013; Willis, 2011b). Blummer et al. (2010) explained that “constructivists view learning as constructed by the learner through a reconciliation of present experience with prior knowledge” (p. 231). In distinguishing cognitivists from constructivists, Ertmer and Newby (2013) stated that for the former, the mind was something of a “reference tool to the real world,” (p. 55), while for the latter, it was more like an instrument that receives and filters sense impressions and constructs a map of reality from them. Ertmer and Newby go on to say that “learners do not transfer knowledge from the external world into their memories; rather they build personal interpretations of the world based on individual experiences and interactions” (p. 55).

Given the typical characteristics of adult learners—a tendency to be self-directed, possession of prior experience, a desire to apply knowledge in authentic contexts, and the wish to learn practical problem solving skills—constructivist learning theory is
particularly well suited to adult education (Blummer et al., 2010). As Koneru (2010) stated, “constructivist learning enables the learner [to] co-construct meaning by exploring an environment, solving a problem, or applying information to a new situation that he/she helps to define” (p. 26). Table 2 lists certain assumptions and principles of constructivist theory in the first column, followed by possible ID applications of that assumption or principle in the second column.

**Table 2**

**Possible ID Applications of Constructivist Theory**

<table>
<thead>
<tr>
<th>Assumptions or principles</th>
<th>Possible ID applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>An emphasis on the identification of the context in which the skills will be learned and subsequently applied</td>
<td>Anchoring learning in meaningful contexts</td>
</tr>
<tr>
<td>An emphasis on learner control and the capability of the learner to manipulate information</td>
<td>Actively using what is learned</td>
</tr>
<tr>
<td>The need for information to be presented in a variety of different ways</td>
<td>Revisiting content at different times, in rearranged contexts, for different purposes, and from different conceptual perspectives</td>
</tr>
<tr>
<td>Supporting the use of problem solving skills that allow learners to go “beyond the information given”</td>
<td>Developing pattern-recognition skills, presenting alternative ways of representing problems</td>
</tr>
<tr>
<td>Assessment focused on transfer of knowledge and skills</td>
<td>Presenting new problems and situations that differ from the conditions of the initial instruction</td>
</tr>
</tbody>
</table>


In the literature on IL, constructivism is often discussed in the context of the uses of Web 2.0 technologies. Magnuson (2013) named several characteristics of these technologies that make them particularly useful in furthering processes central to
constructivist pedagogy. In Web 2.0 applications, users are both producers and consumers of the product, a dynamic which drives the “participatory culture” (p. 244) associated with them. Also, the technologies lend themselves well to “harnessing the collective intelligence” (p. 244) of their participants. Finally, the nature of the technologies encourages users to reuse, and possibly to transform, artifacts contributed by others.

Bobish (2011) described how social media can further the learning outcomes of the ACRL’s *Information Literacy Competency Standards for Higher Education* (ACRL, 2000). Bobish contended that these media support constructivist learning environments mainly because they enable collaboration. Further, a successful constructivist learning intervention requires the following elements: “complex and challenging learning environments, social negotiation and shared responsibility, multiple representations of content, the understanding that knowledge is constructed, [and] student-centered instruction” (p.55). According to Bobish, the fact that Web 2.0 technologies bring together content created by multiple users renders them inherently complex and challenging. Social negotiation abilities are required for cooperation on wiki-based assignments, and such tools as YouTube and Flickr provide multiple representations of content that users must learn how to use ethically and effectively for academic purposes. Wikis are also an ideal vehicle for demonstrating that knowledge is socially constructed, since they bring users together to construct, literally, an artifact of knowledge. The notion of social construction is further enhanced by other technologies, such as blogs; “by viewing a blog posting on a topic and the ensuing stream of comments, students can examine how a final consensus was or was not reached on [a] question” (p. 56). Finally,
Bobish notes, “the very fact that students can participate in the construction of knowledge in their subject area rather than simply receiving accepted knowledge from the instructor is student-centered” (p. 56).

Not all Web 2.0 technologies were found to enhance participation in constructivist learning environments, however. Magnuson (2012) found that the applications she examined could, depending on the situation, either help or hinder students in this regard. To the extent that they assisted students in collaborating and harnessing their collective intelligence, these tools were found to further the ends of constructivist instruction. For example, students created a wiki in PBworks (an online collaboration tool) with very little input from the instructor. Magnuson (2012) noted that this was “an example of the progression from knowledge being something that was previously held by the specialist (me, the instructor) to a knowledge space where everyone must learn and contribute” (p. 139). On the other hand, the fact that each application was separate and did not interconnect with the others made it difficult for students to see others’ contributions as a whole; this served as a hindrance to collaboration. Magnuson (2012) also noted that the cognitive load placed on participants by the use of so many different technologies became too much for many of them at some point, and that learning how to use the tools took away from other class activities.

An example of an initiative whose design draws upon several different learning theories is Stiwinter’s (2013) interactive online library tutorial, which was created to impart basic information about the research process to students in multiple sections of an introductory English course ($N = 485$). The author used various theories of learning to inform the design of the tutorial, which integrated behavioral, cognitive, and humanistic
approaches. Interactive software simulations of such tools as periodical databases, the online public access catalog, and the library web site formed a large part of the tutorial. These simulations shared both the behavioral emphasis on structured kinesthetic learning, and the value that cognitive learning theory places on analysis, the search for solutions, and action. The interactive nature of the tutorial forced students to stay engaged in the learning process, since the simulations would not move forward without feedback from the participant. Consistent with humanistic theory, the author also strove to “make the tutorial an extension of the friendly and unintimidating help they receive from library staff” (Stiwinter, 2013, p. 23) by building in responsiveness to student input and providing an informal narrative tone.

Various modules of Stiwinter’s (2013) tutorial were created as Adobe Captivate videos, Prezi presentations, or static web pages. The decision about which media to use was based on the complexity of the module, the most basic modules using the static web pages and the most complex using Captivate. This allowed the researcher to study the effectiveness of these platforms for teaching. The tutorial was incorporated into the class as a graded assignment, worth 5% of the final course grade. Three slightly different versions of the tutorial were created to discourage cheating.

Two main outcomes were assessed in Stiwinter’s (2013) quasi-experimental study: the extent to which (a) the tutorial was self-sufficient (that is, able to be completed without staff intervention), and (b) student scores improved from pretest to posttest. The first outcome was assessed by a voluntary student feedback survey and analysis of usage statistics, and the second by an examination of pretest and posttest results. Of the 39 students (8%) who returned the student feedback survey, 82% indicated that they found
the tutorial easy to understand. An analysis of usage statistics revealed that 465 students (96%) were able to complete both the pretest and the posttest without staff intervention. Thus, according to Stiwinter (2013), “the goal for self-sufficiency was effective, which the author attributed to the careful design of the tutorial” (p. 31).

Participants scored an average of 21 points better on the posttest than on the pretest, indicating a high level of student learning. The author noted that the questions covering modules created using Captivate showed the most improvement, while those constructed with Prezi were somewhat less improved. The author attributed this difference to the fact that the Captivate modules required much more interaction than the Prezi modules, and that it was the interactivity in the design that increased student learning. Posttest questions involving the modules created as static web pages, which provided less interactivity than either the Captivate or Prezi modules, showed even less improvement.

One module, which consisted of a Cooperative Library Instruction Project video, fared worst of all in posttest evaluation. The module had initially taken the form of a static web page, and pilot participants scored poorly on the evaluation; the author assumed that study participants would benefit from a more detailed product. While the content of the video was much richer than that of the static web pages, the posttest scores for the study participants were just as dismal as those of the pilot participants. The author postulated that, in the absence of anything to hold participants’ attention, they might have simply skipped both versions of the module. In any case, she concluded, retention was low because neither version required participants to apply their learning in the tutorial.

At first glance, Stiwinter’s (2013) research might resemble a media comparison
study, in which case it would be tempting to dismiss it entirely. But rather than studying
the effects of the particular technologies used to create the modules, the author evaluated
the interactivity, or lack thereof, inherent in the design of each module and its effect on
the learning of the participants. Nevertheless, one wonders whether at least some of the
improvement in scores for modules that used Captivate is not at least partly attributable to
the novelty effect. The author tacitly acknowledged this when she discussed lack of
engagement as a potential reason that students apparently disregarded the video.

Stiwinter’s (2013) methodology is problematic in some respects. There were three
different versions of the tutorial, which necessitated three different posttests. As Stiwinter
pointed out, one of the versions had significantly higher scores (between 23% and 36%)
than the other two. Additionally, the same test was used as both pretest and posttest for
each group of participants, which exposed the research to threats to validity due to the
testing effect. Finally, the feedback survey was returned by a mere 8% of the students
who completed the tutorial, which was a less than adequate response rate.

Models. Ryder (2013) provided an apt description of models. According to
Ryder,

models, like myths and metaphors, help us to make sense of our world. . . . A
model offers its user a means of comprehending an otherwise incomprehensible
problem. An instructional design model gives structure and meaning to an I.D.
problem, enabling the would-be designer to negotiate her design task with a
semblance of conscious understanding. Models help us to visualize the problem,
to break it down into discrete, manageable units. (para. 1)

The ID model mentioned most frequently in the literature was ADDIE, an
acronym for its five phases: analyze, design, develop, implement, and evaluate (Booth,
2011; Chang & Siao, 2012; Colborn, 2011; A. L. Davis, 2013; B. E. Fox & Doherty,
2011; Koneru, 2010; Kumar, Ochoa, & Edwards, 2012; Stern & Kaur, 2010; Summey &
ADDIE is not a formal model of ID, but is rather a description of the structure common to many such models (Summey & Valenti, 2013). As A. L. Davis (2013) put it, ADDIE “is a strategic plan for course design and may serve as a blueprint to design IL assignments and various other instructional activities” (p. 205).

Two authors examined ADDIE in detail and offered examples of how librarians could use it to accomplish various design tasks. Koneru (2010) analyzed the phases and their associated steps, and described how the model could be used to construct what she termed “web-enabled information literacy instruction modules” (p. 23). Summey and Valenti (2013) related the phases to components of more formal models, such as those of Morrison, Ross, Kemp, and Kalman (2012), and Dick, Carey, and Carey (2009). A. L. Davis (2013) and Chang and Siao (2012) followed brief considerations of the model with accounts of using it to structure course-integrated instruction and DLOs, respectively. B. E. Fox and Doherty (2011) called ADDIE a backward design model, noting that the steps in ADDIE correspond to those of backward design. Mestre et al. (2011) mentioned Wiggins and McTighe’s (2008) understanding by design model, based on backward design, in the context of creating DLOs.

Koneru (2010), Summey and Valenti (2013), and Chang and Siao (2012) each emphasized the cyclical nature of ADDIE, which allows for continual assessment and improvement of instruction, and stressed that the model is appropriate for the creation of instruction in a variety of formats. Some of these included 50 minute sessions scheduled during regular class sessions (A. L. Davis, 2013), web tutorials (Chang & Siao, 2012; Koneru, 2010; Summey & Valenti, 2013), library guides (Summey & Valenti, 2013), and
credit-bearing courses (Summey & Valenti, 2013).

Interestingly, there exists an adaptation of ADDIE specific to libraries known as BLAAM, an acronym for blended librarian adapted ADDIE model (Bell & Shank, 2007; Booth, 2011; Summey & Valenti, 2013). This simplified model is less comprehensive than ADDIE, and was designed for librarians with few ID skills. It involves a much abbreviated process of assessing instructional needs, creating learning objectives, developing activities, delivering instruction, and measuring outcomes (Bell & Shank, 2007). In creating it, Bell and Shank (2007) hoped to extend some of the benefits of ID to libraries that did not have the resources for full ID initiatives. Another ID model designed specifically for libraries is IDEA, an acronym for interview, design, embed, and assess, the major steps in the model (Mullins, 2014). The interview stage involves analyzing the syllabus and interviewing the instructor to gain an overview of the course, followed by identification of IL goals in the design stage, then embedding IL content into the course and assessing the effectiveness of the design.

Other, more formal models received scant attention in the literature. Summey and Valenti (2013), as mentioned above, discussed the Morrison, Ross, Kemp, and Kalman (2012) and Dick, Carey, and Carey (2009) models in the context of the ADDIE phases, and recommended the ARCS model (Keller, 2010) for development of materials. Mestre et al. (2011) stated that the Dick, Carey, and Carey model was particularly suited to the development of DLOs. Colborn (2011) briefly mentioned Gagné’s (2007) nine events of instruction as a way to structure IL instruction, and discussed Merrill’s (2002) attempts to discern principles underlying ID theories. Colborn pointed out that Merrill’s first principles of instruction were consistent with constructivist notions of the ideal learning
environment. According to Colborn, Merrill’s principles were drawn largely from constructivist theory, while Gagné’s nine events represented principles underlying cognitive theory. The seven principles for good practice in undergraduate education (Chickering & Gamson, 1987) include principles that somewhat overlap those of Gagné and Merrill, but also address the affective aspects of learning, such as motivation, learning styles, and relationships between teacher and learner.

Rand (2013) based her model of ID for IL instruction in distance education on Merrill’s principles and on Reigeluth’s elaboration theory (Reigeluth, Merrill, Wilson, & Spiller, 1980). Kumar et al. (2012), in the introduction to their needs assessment of online doctoral students, simply noted that the analysis phase is the first step in several ID models, including Morrison, Ross, Kemp, and Kalman (2012), ASSURE (Smaldino, Lowther, & Russell, 2008), Dick, Carey, and Carey (2009), and ADDIE.

The needs assessment performed by Kumar et al. (2012) was the only empirical study identified that related to a particular phase of the instructional systems design process. Two cohorts of online doctoral students ($N = 49$), one entering a teacher education program (group A) and the other beginning a program in educational technology (group B) were examined. The researchers distributed a survey to both groups of students to gauge their experience with library instruction, database use, searching, evaluation of resources, citation of resources, and online instruction generally. Affective questions measured the students’ levels of anxiety and sense of confidence in the library environment.

Fifty percent of the students in group A ($n = 26$) completed the survey, as did 91% of the students in group B ($n = 23$). On examination of the results, stark differences
between the groups emerged. For instance, none of the respondents from group A rated themselves as “very experienced” in using library resources, whereas six, or 17%, of the group B respondents did; these numbers were identical for the question about the use of databases and the library catalog.

Group B was consistently more aware of the existence of various databases (six periodical databases, the library catalog, WorldCat, ProQuest Dissertations and Theses, Social Sciences Citation Index, Web of Science, Google and Google Scholar) than group A, and tended to use these databases more regularly; the only exceptions were the ERIC, Education Full Text, and JSTOR databases. Group A respondents were on average 6.6% more aware of the existence of ERIC, 37% more aware of Education Full Text, and 17.6% more aware of JSTOR than group B. Group A used ERIC 1.7% fewer times than group B respondents, but used Education Full Text 35% more, and JSTOR 23.3% more. Further, group A reported less confidence using databases and catalogs, and more anxiety when performing searches. They rated themselves nearly 50% less able to evaluate the quality of resources than group B, and only 25% as capable of citing resources correctly as their group B counterparts.

Kumar et al. (2012) concluded that the differences between the groups’ levels of IL skills as measured by the survey revealed the necessity of conducting needs assessments at the group or cohort level as a first step in creating library instruction. This is particularly important in the online environment, given the problems posed by transactional distance; specifically, the inability of the librarian to adjust instruction to fit the needs of a group or individual spontaneously, as is often done in a face-to-face setting. The findings underscored the importance of analyzing the needs of learners,
which was also articulated by Stern and Kaur (2010), Summey and Valenti (2013), and Koneru (2010).

Two methodological problems were apparent in the study conducted by Kumar et al. (2012). First, the small sample size \((N = 49)\) made it difficult to generalize the results. Second, the research relied upon respondents’ self-evaluation of skills, and such data is notoriously unreliable (Gross & Latham, 2012). The authors acknowledged these limitations, and argued in the second case that students entering a doctoral program would be more likely to understand their strengths and their limitations, and thus their self-assessments were more likely to be accurate.

**Instruction Librarians’ Collaborative Work to Design Instruction**

One of the ways in which librarians, as subject matter experts, can create an effectively designed product is by forming partnerships with experts in ID. There exist a substantial number of articles which describe and endorse such partnerships (Clapp, Johnson, Schwieder, & Craig, 2013; Lo & Dale, 2009; Shell, Crawford, & Harris, 2013; Stiwinter, 2013). In his discussion of ID in academic libraries, R. Fox (2013) underscored how important such partnerships could be to the quality of the instruction, noting that instructional designers were perhaps better equipped than librarians themselves to “assist the library in catering their pedagogical methods to the needs of the students and faculty they serve” (p. 9).

Instructional designers can interface with librarians in a number of ways. A campus ID department can assign a liaison to the library on a permanent (McMillan, 2011) or a temporary (Clapp et al., 2013; Thornes, 2012) basis. An instructional designer may be hired directly by the library to work with its librarians; in one instance, such an
individual identified both as a librarian and a designer (Lo & Dale, 2009). Also, the roles assumed by instructional designers in libraries can vary substantially. Often, librarians make full use of designers’ capabilities, allowing them to provide “creative ways of teaching the content online” (West-Pawl, 2012, p. 8). Shell et al. (2013), for example, described a scenario in which the designer was “responsible for ensuring that a sound instructional strategy based on learning theories and best practices [was] used for the design” of the product. The designer collaborated with faculty and librarians to create DLOs for an online course, met with the faculty member to formulate student learning outcomes, and ensured that the DLOs were appropriately integrated into the CMS. At other times, designers are relegated to merely technical roles; they may edit video footage (Clapp et al., 2013), provide software support (Stiwinter, 2013; Thornes, 2012), or simply implement the librarian’s own design in the technical environment (Clapp et al., 2013).

Collaboration with faculty was one factor that several authors identified as vital to the success of an instructional initiative (DaCosta, 2010; Lo & Dale, 2009; Stiwinter, 2013; Stowe, 2011; Strittmatter, 2012). Lo and Dale (2009) stated bluntly that “incorporating Information Literacy into the curriculum requires the cooperation of teaching faculty” (p. 152). Stiwinter (2013) suggested that this insistence on faculty support for IL instruction stemmed from a rather large body of literature showing that online tutorials that were graded, or were otherwise required components of courses, were more effective than those that were not. Despite the proven utility of partnerships between librarians and faculty, however, barriers to their formation often exist. Many faculty question the idea that librarians should have a teaching role, and thus may not accept them as partners in instructional endeavors; they may believe that students are
already information literate and thus fail to understand the value of IL instruction; they may also perceive that the time devoted to IL instruction could be better spent on disciplinary content (DaCosta, 2010; E. L. Davis, Lundstrom, & Martin, 2011; Oakleaf, Millet, & Kraus, 2011; Shell et al., 2013). Further, both the librarian and the faculty member may lack expertise in designing instruction.

Collaborations between librarians and faculty, like those between designers and librarians, can take several forms. Held (2010) discussed working with a faculty member to build content in a CMS. While faculty could simply have embedded preexisting DLOs into the CMS themselves, a collaborative approach was shown to result in more personalized and relevant products that enhanced student learning. Other options for providing IL instruction within CMSs included librarians setting up their own courses within the system; a fully integrated approach in which library instruction was not a separate unit but was taught concurrently with course assignments; and inclusion of a forum which was monitored by librarians (Held, 2010; Mestre et al., 2011).

The above initiatives reflect a distinct division of labor between the librarian and the faculty member, with the former firmly in charge of the IL instruction component. In other situations, faculty share some of the responsibility for IL instruction with librarians. Oakleaf et al. (2011) stressed collaborative IL instruction, with instructors as well as librarians teaching IL concepts. As part of a Quality Enhancement Plan, IL was to be infused into the curriculum of the institution where Oakleaf et al. were based. In this case, collaboration took the form of workshops for faculty on teaching IL skills in the classroom and the development of rubrics to measure students’ grasp of the associated concepts. According to Stowe (2011), faculty and librarians share responsibility for
interweaving library instruction into course content; that is, both must contribute to the
design of instruction so that it conveys both disciplinary content and the IL skills
necessary to research that content. Stowe emphasized that it was “incumbent on teaching
faculty to stress not only the importance of course-related library instruction but also to
motivate students towards maximizing their opportunities to acquire and expand their
individual library research skills” (p. 83).

In addition to the bilateral collaborations described above, many ID initiatives
take a team approach, in which faculty, librarians, designers and others work together to
create instruction; the convergence of disciplinary viewpoints is typically seen as
strengthening the design of instructional products (B. E. Fox & Doherty, 2011). Roles
that team members may take on in these situations include the following: faculty course
coordinators (Clapp et al., 2013; B. E. Fox & Doherty, 2011; Shell et al., 2013); editors
(West-Pawl, 2012); embedded librarians (Shell et al., 2013); graphic designers (B. E. Fox
&Doherty, 2011; Koneru, 2010); librarians working together in a team (B. E. Fox &
Doherty, 2011; Koneru, 2010); instructional designers (Clapp et al., 2013; B. E. Fox &
Doherty, 2011; Koneru, 2010; Shell et al., 2013; West-Pawl, 2012); instructional
technologists or technicians (Clapp et al., 2013; Koneru, 2010; Shell et al., 2013;
Thornes, 2012); multimedia producers (Koneru, 2010; Shell et al., 2013); subject matter
experts (Clapp et al., 2013; Koneru, 2010; West-Pawl, 2012); and content authors or
developers (Koneru, 2010).

Koneru (2010), in laying out specific directions for the use of ADDIE to create
library instruction, stated that the creation of materials in the development phase required
a team approach; at this stage, librarians should collaborate with “instructional
designer[s], subject matter expert[s], . . . content author[s]/developer[s], programmer[s]/developer[s], [and] graphic designer[s]/media producer[s]” (pp. 30-31). The team convened by Shell et al. (2013) combined a subject librarian with an instructional designer and a faculty member. These three individuals created DLOs that could be reused for multiple courses and easily embedded in a CMS. The DLOs proved successful in improving student learning, a result that was partly attributed to successful collaboration that led to a “synergistic process that reduce[d] barriers and increase[d] the likelihood of success” (p. 154). Not all teams, however, achieve this level of efficiency and functionality. Clapp et al. (2013) described how an IL course was designed by a team composed of three librarians and an instructional designer. Two of the librarians were subject specialists, while the third served as the instructor for the course. The librarians followed the procedure of designing the content of the course, which included “lectures, PowerPoint presentations, assignments, readings, links to Websites, discussion board questions, quizzes and exams, homework, . . . and final projects” (p. 250). This content was subsequently provided to the instructional designer, whose role it was to transfer it to the CMS. As noted earlier, this arrangement fails to take full advantage of the instructional designer’s talents, and also places an undue workload on the librarians.

The most extensive study of a design team collaboration was that conducted by B. E. Fox and Doherty (2011). An IL podcast for forestry students was created using backward design, which the authors defined as simply determining student learning outcomes, “then building the course or curriculum in ways that help the student achieve these outcomes” (p. 145). The authors took Koneru’s dictum to heart in forming their diverse, multidisciplinary team, which consisted of a group of librarians, the director of
the Master’s degree program in forestry, an instructional designer, and a graphic
designer.

The first step the team took was to meet with faculty to get a sense of the
students’ IL needs; it is not clear whether the students themselves were assessed. The
team designed the podcast by determining, based upon their combined expertise, what the
student learning outcomes should be; these outcomes were then aligned with the
Information Literacy Competency Standards for Higher Education (ACRL, 2000). A
separate online assessment was created at this point, to be used by the instructor at his or
her discretion. Six modules were developed based on the student learning outcomes. The
design team chose the podcast as the delivery method, mainly due to the fact that
instruction in this medium could be downloaded onto a variety of devices and was
compatible with the university’s CMS.

B. E. Fox and Doherty (2011) discussed the experience of working with the team
to create the podcast. On the positive side, they noted that the interdisciplinary nature of
the team enriched the final product. One unexpected result of working with the director
of the forestry program was that IL became a student learning outcome at the program
level in the Forestry Department. The authors also mentioned a few elements of the
collaboration that, in retrospect, would have worked out better if they had been done
differently. A better organized workflow would have helped the team stay on track and
complete the project in a more timely manner. Student learning outcomes, they
discovered, should be as specific as possible. Also, assessment should be integrated into
the product from the beginning so that student comprehension can be determined.
Perhaps most importantly, the authors realized that more effort should have been spent
analyzing the needs of students.

**Instructional Design in Information Literacy Instruction**

Unsurprisingly, the literature contains a wealth of articles related to IL instruction, and a few of these discuss the topic in the context of ID. A number of themes emerge when examining this body of literature; in the previous five years, researchers have concerned themselves with ID as it applies to the following four topics: the ACRL’s *Information Literacy Competency Standards for Higher Education* (ACRL, 2000), student learning styles, embedded librarianship, and the use of DLOs. The sections below will explore each of these themes in detail.

**ACRL Standards.** The ACRL’s *Information Literacy Competency Standards for Higher Education* were published in 2000 as a tool for assessing an individual’s level of IL competency. Each of the five standards is accompanied by a set of performance indicators, which in turn are associated with various outcomes (ACRL, 2000). While they were never intended to serve as a formal ID model, these standards, which draw upon both behaviorist and constructivist principles (Bobish, 2011), are widely used as a framework for creating IL instruction. Since these standards represent a broad consensus among librarians for the types of skills that information literate individuals should have, they are often used as a template for creating (Blummer et al., 2010; B. E. Fox & Doherty, 2011; Gunn & Miree, 2012; Strittmatter, 2012) or revising (Anderson & Mitchell, 2012) learning objectives. Despite this consensus, it should be noted that not everyone agrees with the practice of using standards; Roberts and Taormina (2013) cautioned that “when librarians try to follow codified IL standards, their instruction is intrinsically stagnant” (p. 48).
The *Information Literacy Competency Standards for Higher Education* (ACRL, 2000) have been used to structure face-to-face instruction (Blummer et al., 2010; Strittmatter, 2012), online tutorials (Anderson & Mitchell, 2012; Gunn & Miree, 2012), podcasts (B. E. Fox & Doherty, 2011), and courses (Clapp et al., 2013). The online, credit-bearing IL course designed by Clapp et al., for example, used the standards as a course outline, with the five course units corresponding exactly to the five IL standards.

In one significant empirical study, the standards were used both to create an online tutorial and to structure its assessment. Having noted that IL levels were not significantly different between first- and final-year business students at Oakland University in Michigan, Gunn and Miree (2012) conducted a study to explore the effect of ID on two different factors. First, they sought to determine whether a single IL tutorial would be beneficial to cohorts of students at different levels. Second, they sought to determine whether this tutorial was equally as successful in teaching each of the ACRL IL skills specified. The tutorial made use of active learning exercises and was delivered in the form of a video available online.

Gunn and Miree (2012) then developed a pretest and a posttest designed to measure six different IL skills drawn from the ACRL standards: “identifying sources of information,” “selecting methods and systems,” “constructing and implementing a keyword strategy,” “retrieving full-text materials,” “extracting and managing information,” and “evaluating sources of information” (pp. 24-26). Cohorts of first- and final-year business students (n = 130 and n = 114, respectively) were given a pretest, allowed to take the tutorial and work through the active learning exercises, then given a posttest. Analysis of scores revealed that there was no statistically significant difference
between groups in terms of scores either on the pretest or the posttest. There was, however, a statistically significant difference between pretest and posttest scores within each group: The first-year students scored an average of 19 points better on the posttest than the pretest, while the difference between pretest and posttest scores for the final-year students averaged 19.4 points. The researchers concluded from these data that the tutorial was beneficial to students at both the first- and final-year levels.

**Learning styles.** The ambivalence toward the concept of learning styles among many librarians is perhaps best reflected in the title of one recent ALA conference presentation: *Learning styles: Fiction, nonfiction, or mystery?* (Deitering, Booth, Runyon, & Mestre, 2012). Even though professional library organizations such as the ACRL Information Literacy Best Practices Committee (2012) have urged librarians to consider student learning styles when designing IL instruction (Koneru, 2010; Sanderson, 2011), learning style theory has been widely criticized for having questionable theoretical underpinnings (Dembo & Howard, 2007), and there is little evidence that commonly used learning style inventories such as Kolb’s Learning Style Inventory (Kolb, 2013), the Index of Learning Styles Questionnaire (Felder & Soloman, n. d.), or VARK (Fleming, 2001), are valid or reliable (Coffield, Moseley, Hall, & Ecclestone, 2004; Hawk & Shah, 2007; Pashler, McDaniel, Rohrer, & Bjork, 2008; Platsidou & Metallidou, 2009).

Nevertheless, many librarians still attempt to insure that their instruction appeals to students who display different learning styles (Anderson & Mitchell, 2012; Koneru, 2010; Thornes, 2012). Koneru (2010) identified learning style as a cognitive characteristic to be considered during learner analysis in the first phase of ADDIE. Anderson and Mitchell (2012) argued that tutorial “content should appeal as much as
possible to all types of learners (i.e., visual, aural, kinesthetic)” (p. 153), and to that end, tutorials should be interactive and incorporate multimedia. Thornes (2012) attempted to accommodate these different types of learners by incorporating video, drag and drop assignments, and online tests into her tutorial. Mestre et al. (2011), who studied the use of DLOs in IL instruction, reported that several respondents to their survey indicated that a DLO “must include multiple instructional options specifically designed to accommodate various learning styles to promote learning for all students, regardless of format” (p. 248).

Universal design for learning is intended to benefit not only individuals with varying learning styles, but also those with learning or physical disabilities. Zhong (2012) described universal design for learning as an initiative to “design course instruction, materials, and content to benefit people of all learning styles without adaption or retrofitting” (p. 33). Universal design for learning asserts three guiding design principles:

1. Provide multiple means of representation (providing content in different modes such as visual, graphic, or auditory);

2. Provide multiple means of action and expression (providing students with multiple opportunities to demonstrate what they have learned); and

3. Provide multiple means of engagement (providing a variety of ways to involve students in learning). (Zhong, 2012, p. 36)

Zhong (2012) gives examples of how these principles can be used to design or modify IL instruction. Instead of using simple PowerPoint slides, instructors may use more complex PowerPoint presentations that include audio, video, and notes. Doing so provides multiple means of representation that can assist those challenged by hearing, visual, or learning disabilities. Instructors may provide students with diverse means to express themselves by assigning work in a variety of formats, such as papers, oral presentations, and discussion postings within a CMS. Group activities, CMS discussion
boards, in-class assignments, and homework allow students to engage in different ways.

One study was conducted to determine the effect of learning styles on student preferences for tutorial format. Mestre (2012) sought to determine whether a culturally diverse sample of undergraduate (n = 15) and graduate (n = 6) students preferred multimodal IL tutorials (which incorporate video, sound, and text) to those that consisted simply of static web pages with screen captures. The students’ learning styles were explored using the Index of Learning Styles Questionnaire (Felder & Soloman, n. d.) and the VARK Questionnaire (Fleming, 2001) to determine whether or not they had an effect on their preferences. Mestre formed four hypotheses based upon a review of literature related to online tutorials:

1. Students, in general, will prefer going through tutorials created with screencasting tools such as Camtasia or Captivate [i.e., multimodal tutorials] than those that are static web pages with screen shots.

2. Students, in general, will be better able to recreate steps after going through screencast tutorials that were created using multiple modes (such as video, audio, text) than with only text and images.

3. Students who have a high visual or auditory learning style preference will perform better after viewing a tutorial created using screen casting software.

4. Students who have a high sequential learning preference will prefer the static web page with step-by-step instructions and screen shots. (Mestre, 2012, p. 259)

The literature review suggested that most students would favor tutorials that included video and sound as well as text, and that only those with sequential learning styles would prefer static pages. Contrary to expectations, however, Mestre (2012) found support only for the fourth hypothesis. Only three of the participants strongly preferred the multimodal tutorial over the static one; two others mildly favored the multimodal tutorial, but stated that they would probably refer to the static one if they wanted to
“figure out how to do something” (p. 270), which disproved hypothesis one. The second hypothesis fared no better: 19 of the 21 participants were able to complete a posttest that required them to recreate the research steps described in the static tutorial, while only six were able to do so with the multimodal tutorial. Eleven of the participants had high visual or auditory scores on the two inventories and were projected to perform better on posttest after the multimodal tutorial, but eight of these actually did better on the posttest after having viewed the static tutorial. This would seem to disprove the third hypothesis, but the author noted that the static tutorial did indeed include visual information, which could have had an uncontrolled positive effect on the visual learners. None of the participants scored high on sequential learning measures, leaving the fourth hypothesis difficult to test. Nevertheless, those with moderate scores on sequential learning measures performed better on the posttest after the static tutorial, and this data at least partially supported the fourth hypothesis.

Two criticisms can be made of Mestre’s (2012) study. First, the small sample size makes it unlikely that the results could be generalized to a larger population. Second, the validity and reliability of the instruments used is in question. The Index of Learning Styles Questionnaire has been criticized for its weak internal consistency reliability (Platsidou & Metallidou, 2009). Hawk and Shah (2007) pointed out that there is little evidence of the validity or reliability of VARK beyond that presented by its authors. Leite, Svinicki, and Shi (2010) provided preliminary evidence for the validity of VARK, but cautioned that their conclusions were “not sufficient to support the use of the VARK with research” (p. 336).

**Embedded librarianship.** Instructional strategy can be a major concern both in
distance education and in IL instruction. One innovation in implementing online courses is the inclusion of an embedded librarian. As the embedded journalists for whom they are named were inserted into military units (West-Pawl, 2012), embedded librarians are integrated into the classroom environment. Also known as blended, course, or lurking librarians (Shell et al., 2013), embedded librarians maintain a presence in the course, typically through the use of the CMS, so that they can serve students at their point of need (E. L. Davis et al., 2011). These librarians combine the skill sets of traditional librarians, instructional designers, and information technologists to design and deliver IL instruction online (Held, 2010; Shell et al., 2013; Summey & Valenti, 2013).

Researchers named several advantages to the embedded arrangement. Embedding a librarian in a course contributes to the creation of “a cohesive and self-contained learning environment” (Shell et al., 2013, p. 144), where all the resources needed for success in a course are available (R. Fox, 2013; Held, 2010). Taking resources and services directly to students was seen as particularly beneficial; Shell et al. (2013) pointed out that direct interaction with a librarian was vital for online students, since they “tend to not reach out beyond the course environment, even when doing so can preserve their academic success” (p. 144). Additionally, working within a virtual classroom environment was found to be conducive to the development of rapport with students (Held, 2010; Shell et al., 2013), and was even reported to increase the likelihood that those students would visit the physical library (West-Pawl, 2012).

There are several pitfalls that can derail the success of embedded librarians. While many librarians may understand the use of ID methods in more traditional contexts, they may be unaware that other considerations come into play when designing instruction for
distance learners (Shell et al., 2013). Shell et al. give the example of a librarian who underestimated the time and design requirements for creating new web-based instruction from existing paper materials. The term “shovelware” has been used to describe materials originally prepared for face-to-face instruction that have been presented online with few design changes, and librarians who lack online ID skills run the risk of creating such uninspired presentations (Mestre et al., 2011; Shell et al., 2013). By the same token, instructional designers may know little about matters that librarians take for granted, such as searching skills or database layout (Held, 2010; Shell et al., 2013), and this, too, can affect the quality of instruction.

CMSs themselves were the topic of several discussions. Held (2010) related the technology to Vygotsky’s theories of zones of proximal development and scaffolding. Held advanced the idea that the configuration of CMSs “‘scaffolds’ novices toward [Vygotsky’s] higher zones by offering self-paced instruction, peer teaching opportunities, and communication forums” (pp. 154-155). Several authors discussed the need for librarians to have instructor rights in the CMS (Held, 2010; Mestre et al., 2011; Shell et al., 2013). Shell et al. pointed out that a “librarian that is assigned a teaching role within the [CMS] can post messages, respond to student concerns, . . . e-mail resources to students, and view quiz results” (p. 144). Specific tools within the CMS that proved particularly useful to embedded librarians were librarian blogs and web conferencing programs such as Elluminate and Wimba (West-Pawl, 2012). Separate library course shells, library tabs within the CMS, and pinned discussion board topics devoted to information issues and monitored by a librarian can be effective; tutorials, tip sheets, and simple pages with librarian contact information have also been mentioned (Held, 2010;
Digital learning objects. Much attention has been paid to the creation of DLOs in the recent literature. Mestre et al. (2011) likened DLOs to LEGOs, the small plastic building blocks that can be used to create an astonishing variety of larger objects. DLOs are small blocks of discrete instruction that can be combined, taken apart, and recombined to build various learning experiences. They can be used to “introduce content, gauge prior knowledge, reinforce understanding, assess learning, save development time, and personalize curriculum” (Mestre et al., 2011, p. 238). Four ID models—ADDIE, Dick, Carey, and Carey (2009), understanding by design (Wiggins & McTighe, 2008), and knowledge building theory (Scardamalia & Bereiter, 2010)—were identified in the literature as pertinent to the design of DLOs (Chang & Siao, 2012; B. E. Fox & Doherty, 2011; Mestre et al., 2011).

DLOs are reusable, granular, independent of other objects, and durable in the sense that they do not need frequent updating (Chang & Siao, 2012). They are also interoperable, accessible, cost efficient, and time saving (Mestre, 2010). Using preexisting DLOs can significantly cut the effort and development costs involved in developing materials; both Chang and Siao (2012) and Lo and Dale (2009) used existing DLOs in creating IL instruction. Held (2010) used preexisting DLOs available through a campus based bank of learning objects, emphasizing that reuse was important because it helped defray development costs. An example of the independence and durability of a DLO was provided by B. E. Fox and Doherty (2011), who emphasized that their podcast was platform independent in that it was designed to be downloaded to several different types of devices, and it was durable in that the database modules were not interface
specific and thus did not have to be updated frequently.

DLOs can take many forms. Blogs, games, diagrams, images, animations, cartoons, modules, narrated PowerPoint slides, photographs, podcasts, quizzes, research guides, surveys, software simulations, web tutorials, and videos are common formats (Lo & Dale, 2009; Mestre, 2010; Mestre et al., 2011; Strittmatter, 2012; Sult, Mery, Blakiston, & Kline, 2013; Thornes, 2012). In their study of librarians’ use of DLOs, Mestre et al. (2011) found that 35% of the respondents had created tutorials; of these, 11% made videos, 9% each wrote quizzes and research guides, and 8% favored PowerPoint slides. Surveys scored 7% in popularity, blogs 6%, screencasts and podcasts each came in at 4%, and only 2% of the respondents used wikis.

Although many of the claims made for the effectiveness of computer games as teaching tools have been criticized (Bekebrede, Warmelink, & Mayer, 2011), games that are well designed can serve as positive learning environments that promote student engagement (Whitton, 2011). Markey, Leeder, and St. Jean (2011) described the creation and implementation of a web-based IL game which they called BiblioBouts. The game was intended to teach students how to cite sources, as well as how to judge their authority, relevance, credibility, quality, and accuracy. Markey et al. found that the game provided several benefits to players. It encouraged players to collaborate, and increased their engagement with the course. Part of the game involved a contest to see who could find the most relevant resources on a topic; citations to the resources were then submitted to a shared database, which allowed the players access to a greater number of sources than they could have located through their individual efforts. Also, the game was found to sharpen players’ ability to discern the quality of information sources. The major
drawback noted was that some aspects of the game architecture allowed players to inflate their scores artificially by gaming the system.

DLOs are typically, but not necessarily, embedded in online courses (Shell et al., 2013; Tooman & Sibthorpe, 2012). Thornes (2012), for example, reused DLOs originally developed for an online course in a face-to-face course. Several advantages of embedding DLOs were identified in the literature. DLOs that are accessible within a CMS provide students with support at their point of need (Thornes, 2012), which is important since few online students have been observed to go outside the environment of the CMS for course support (Anderson & Mitchell, 2012; Shell et al., 2013). While DLOs lack the personal quality that face-to-face contact supplies, Thornes (2012) saw this as an advantage; whereas students may be reluctant to ask an instructor to repeat a point, they can review the contents of a DLO as many times as needed for comprehension without embarrassment. Librarians, as well as students, benefit from the use of DLOs. A well designed object can save librarians time spent on instruction (Sult et al., 2013), an important consideration when reduced budgets are combined with increased enrollments. Nor should librarians feel as though they are neglecting their clientele in sharing responsibility for IL instruction with software; both Lo and Dale (2009) and Tooman and Sibthorpe (2012) found no significant statistical difference in outcomes when face-to-face instruction was compared to computer assisted instruction.

Several barriers to the creation of DLOs were noted. Lack of financial and staff resources are perennial problems in libraries; the costs of software and the time required to transfer preexisting materials to an online format are thus obvious barriers. Further, librarians may not possess the technical skills to use relevant software effectively, and
may also lack the design expertise to create effective online content (Held, 2010; Mestre et al., 2011). Thornes (2012) identified two issues related to transactional distance that may serve as barriers to teaching and learning using DLOs. Although an absence of face-to-face contact could allow shy students to interact with materials in a DLO without fear of embarrassment, this same factor makes it virtually impossible for librarians to assess those students’ instructional needs in the same way that they could in person. Also, the visual cues one picks up from the face-to-face encounter convey a large amount of information, a fact that often goes unappreciated until one is immersed in a software environment. Thornes stated that “the content on the screen is no longer just a visual aid (as the slides in a PowerPoint presentation would be), it is the place the student is getting all their meaning from” (p. 84).

Despite these barriers, many reasons to create and use DLOs were identified in the literature. Time efficiency was the most frequently mentioned rationale for the use of DLOs. “The challenge,” wrote Stiwinter (2013), “is to create more time with students without increasing the workload on librarians or faculty” (p. 15). The demands on staff time at reference desks can be intense. Sult et al. (2013) realized that they were spending an inordinate amount of time responding to a single reference question asked over and over again; this provided the impetus to create their first database tutorial. Tooman and Sibthorpe (2012) successfully introduced a DLO into a face-to-face course as a way of reducing demands on reference staff. Technology can also be used to ease administrative responsibilities such as grading assignments so that librarians have more time for instruction (Tennant, Edwards, & Miyamoto, 2012).

Librarians also use DLOs to extend the reach of their instruction (Mestre et al.,
The three full time librarians at Stiwinter’s (2013) institution reached only a fraction of the 5,000-member student body with IL instruction; the use of a DLO allowed them to reach many more students than they otherwise would have been able to do. Standardization of delivery quality was another reason for using DLOs in place of face-to-face instruction; Tooman and Sibthorpe (2012) pointed out how difficult it was to ensure that all students were being provided an equivalent experience, given that knowledge and teaching quality varied with each instructor.

Faculty acceptance was deemed essential to the success of DLOs; student use of DLOs was seen as dependent on faculty endorsement of them (Lo & Dale, 2009; Stiwinter, 2013). As Anderson and Mitchell (2012) put it, “students value what their professors value; consequently, faculty approval, encouragement, and assignment of library tutorials are essential to success” (p. 150). As mentioned earlier, DLOs that are an integral, graded part of a course are more likely to be taken seriously by students than those that are simply presented as supplemental course material (DaCosta, 2010; Held, 2010; Stiwinter, 2013; Tooman & Sibthorpe, 2012).

Sult et al.’s (2013) database tutorial represents a typical initiative to design, implement, evaluate, and redesign a DLO. The researchers originally sought to create a tutorial to supplement face-to-face library instruction sessions. Having experimented with commercial database tutorials and found them lacking, they worked with campus technical staff to create a split screen product, which presented database instruction on one side and a live database session on the other. The goals for the tutorial were to teach students how to navigate specific databases, how to distinguish research studies from other types of articles, and how to retrieve the full text of articles from a list of search
results. One important feature of the product was that it allowed students to use their own topics instead of relying on generic examples. This was accomplished by the use of a text field in the tutorial, into which students could type their chosen topics. All tutorials were corrected and scored by librarians and returned to the students.

Sult et al. (2013) conducted an assessment of the tutorial on eight sections of a course in which it was being used. The control group consisted of four sections, which were provided with traditional in-class library instruction; the other four, the experimental group, took the tutorial. Of the 92 students in the experimental group, 78 achieved the objectives on their first attempt, and 11 did so on their second attempt.

Having been deemed effective, this iteration of the tutorial was implemented; soon, Sult et al. (2013) found that the effort involved in maintaining the tutorial was not sustainable, given the demands of responding to submissions. The institution then experienced an increase in enrollment and a decline in staff, which further reduced the number of hours librarians were able to devote to the project. This prompted the researchers to explore ways to make the tutorial more self-sustaining. They decided that the design of the tutorial relied too much on feedback from librarians and not enough on active learning experiences. By this point, the librarians involved had a sense of questions typically asked about the tutorial, and had developed a repertoire of answers; they used this repertoire to develop automatic feedback for the new tutorial, which they named the Guide on the Side. This new approach had students answering questions designed to prompt reflection on the mechanics of searching, the construction of search statements, and the successful execution of searches. This called into play their critical thinking skills, and the interactive nature of the tutorial kept them engaged in learning. An
evaluation of the effectiveness of the Guide on the Side compared to other approaches was underway at the time of the publication of this article.

The redesign effort yielded a product that was both less demanding on staff time and was thought to be more effective at developing critical thinking skills. The amount of effort put forth in teaching, then, was found to be less important than appropriate ID in achieving learning outcomes. The conclusions made by Sult et al. (2013) must be regarded as tentative, however, because assessment figures were not fully reported. Presumably, statistics were compiled for the control group in the assessment described above, but none were reported. This makes it impossible to determine whether the experimental group performed better than the control group, and equally as impossible to infer the superiority of the tutorial to traditional face-to-face instruction. Also, since the evaluation of the Guide on the Side was still in progress at the time of the article’s publication, no data exist to indicate whether or not it actually enhanced critical thinking or succeeded better than other products.

Prior Research and the Present Study

Previously published works have focused extensively on the practical aspects of using ID to create IL instruction. A number of articles have been devoted to the application of various ID models, such as ADDIE (Booth, 2011; Chang & Siao, 2012; Colborn, 2011; A. L. Davis, 2013; B. E. Fox & Doherty, 2011; Koneru, 2010; Kumar et al., 2012; Stern & Kaur, 2010; Summey & Valenti, 2013; Willis, 2011a, 2011b), Morrison, Ross, Kemp, and Kalman (Summey & Valenti, 2013), and Dick, Carey, and Carey (Mestre et al., 2011) to IL instruction. Both behavioral (Blummer et al., 2010; Bobish, 2011; Stiwinter, 2013) and constructivist (Blummer et al., 2010; Bobish, 2011;
Colborn, 2011; Koneru, 2010; Magnuson, 2012; Rand, 2013; Willis, 2011b) interventions in IL instruction have been described in the literature. Various collaborative ID efforts involving librarians, faculty, and instructional designers (Clapp et al., 2013; Lo & Dale, 2009; Shell et al., 2013; Stiwiinter, 2013) have also been detailed.

Many authors (Anderson & Mitchell, 2012; B. E. Fox & Doherty, 2011; Gunn & Miree, 2012; Markey et al., 2011; Mestre et al., 2011; Stiwiinter, 2013; Sult et al., 2013; Tooman & Sibthorpe, 2012) used ID methods to create online tutorials or other DLOs. Others (Anderson & Mitchell, 2012; Blummer et al., 2010; Clapp et al., 2013; B. E. Fox & Doherty, 2011; Gunn & Miree, 2012; Strittmatter, 2012) focused on using the ACRL’s Information Literacy Competency Standards for Higher Education (ACRL, 2000) as a framework for structuring IL instruction. Despite criticisms of the validity and reliability of learning style measures (Coffield et al., 2004; Hawk & Shah, 2007; Pashler et al., 2008; Platsidou & Metallidou, 2009), some researchers (Anderson & Mitchell, 2012; Koneru, 2010; Thornes, 2012) advocated taking learning style into consideration when designing IL instruction. In several studies (E. L. Davis et al., 2011; Held, 2010; Shell et al., 2013; Summey & Valenti, 2013; West-Pawl, 2012), embedding a librarian in online courses was found to be helpful in the implementation of ID.

**Research Questions**

This study examined the following research questions:

1. What is the relationship between respondents’ behavioral, normative, and control beliefs and their reported use of ID methods when designing IL instruction?

2. How do various demographic factors, such as prior education or experience in ID, the length of professional work experience, primary job function, and educational
level relate to instruction librarians’ use of ID methods when designing IL instruction?

3. Do librarians who self-identify as teachers use ID methods to create IL instruction more than those who do not?

4. Why do instruction librarians adopt or reject ID methods to create IL instruction?

5. In what ways do the qualitative data confirm or support the quantitative data?

Summary

The purpose of this study was to determine whether instruction librarians in the United States and Canada were using ID methods, and to identify potential explanations for their adoption or rejection of those methods; since the TPB (Ajzen, 1985) has been shown to be effective in predicting intention and behavior, the study adopted it as a theoretical framework. The literature review examined the ways in which learning theories such as behaviorism and constructivism have been used in creating IL instruction, and noted the dearth of articles devoted to the use of ID theories in the library science literature. Descriptions of how various authors had used ID models, such as ADDIE; Dick, Carey, and Carey (2009); Gagné’s (2007) nine events of instruction; Merrill’s (2002) first principles of instruction; and Morrison, Ross, Kemp, and Kalman (2012), were provided.

Many authors described collaborative efforts between and among librarians, instructional designers, faculty, and others. Different models of collaboration were described in the literature, and their advantages and disadvantages were considered. The ACRL’s Information Literacy Competency Standards for Higher Education (2000), student learning styles, embedded librarians, and digital learning objects were often
discussed in the literature in relation to ID theories and models.

A series of quantitative and qualitative research questions were developed to explore the relationship between respondents’ behavioral, normative, and control beliefs and their reported use of ID methods when designing IL instruction; whether various demographic factors, such as prior education or experience in ID, the length of professional work experience, primary job function, or educational level related to instruction librarians’ use of ID methods when designing IL instruction; whether librarians who self-identified as teachers used ID methods to create IL instruction more than those who did not; and why instruction librarians adopted or rejected the use of ID methods to create IL instruction. A mixed methods research question explored the ways in which the qualitative data confirmed or supported the quantitative data.
Chapter 3: Methodology

Chapter 2 described the theoretical framework for the study, provided a review of the literature related to the topic, articulated the purpose of the study, and presented quantitative, qualitative, and mixed methods research questions. Chapter 3 discusses the participants, design, instruments, procedures, and limitations of the study. A sequential explanatory mixed methods study was employed to examine the research questions and address the purpose of the study. The purpose of the study was to determine whether instruction librarians in the United States and Canada were using ID methods, and to identify potential explanations for their adoption or rejection of those methods. The study addressed the following research questions:

1. What is the relationship between respondents’ behavioral, normative, and control beliefs and their reported use of ID methods when designing IL instruction?

2. How do various demographic factors, such as prior education or experience in ID, the length of professional work experience, primary job function, and educational level relate to instruction librarians’ use of ID methods when designing IL instruction?

3. Do librarians who self-identify as teachers use ID methods to create IL instruction more than those who do not?

4. Why do instruction librarians adopt or reject ID methods to create IL instruction?

5. In what ways do the qualitative data confirm or support the quantitative data?

Participants

This section describes the methods used to identify participants in both the quantitative and qualitative portions of the study.
**Quantitative.** The target population for the present study was defined as the set of all instruction librarians working in institutions of higher education in the United States and Canada. The sample was the membership of the ALA’s Information Literacy Instruction Discussion List, which had 5,627 subscribers as of August 6, 2014 (Driscoll, n. d.). The 101 participants for the quantitative portion of the study were recruited from this listserv. The specific procedure used to select the sample is described fully in the Quantitative Procedures section.

**Qualitative.** Survey subjects were asked to indicate their willingness to take part in a brief telephone interview intended to explore their reasons for using or not using ID methods to create IL instruction. Of the 101 individuals who submitted usable responses to the survey, 24 volunteered to be interviewed. A sample of ten of these volunteers was chosen to participate in the interviews. The specific procedure used to select the sample is described fully in the Qualitative Procedures section. Ultimately, only seven of these volunteers responded to requests to be interviewed.

**Design**

A multifaceted approach is required to explore the complex questions posed in social science research. Used in conjunction, qualitative and quantitative methods can illuminate these questions better than either method alone (Creswell, 2009). Because the purpose of this study was to determine not only whether instruction librarians use ID methods in creating IL instruction, but also why they adopted or rejected those methods, the sequential explanatory mixed methods approach was identified as the most appropriate research design. According to Creswell (2009), “a sequential explanatory design is typically used to explain and interpret quantitative results by collecting and
analyzing follow-up qualitative data” (p. 211).

The sequential explanatory mixed methods approach has three distinguishing characteristics: (a) it makes use of both quantitative and qualitative methods; (b) both quantitative and qualitative data are collected and analyzed sequentially; and (c) quantitative and qualitative data are not mixed; instead, the latter is used to confirm or disconfirm the former. As in other mixed methods approaches, quantitative and qualitative data may be weighted differently; emphasis is usually placed on the quantitative data (Creswell, 2009). Though not required, theory may inform studies based on a sequential explanatory approach, according to Creswell. In the present study, the TPB (Ajzen, 1985) served as an organizing principle; the TPB is, as Creswell put it, “reflected in the purpose or research questions of the study. It is the driving force behind all methodological choices” (p. 215).

Quantitative data were gathered for the study by means of a web-based survey adapted from instruments created by Ajjan and Hartshorne (2008) and Julien and Genuis (2011). Survey research is undertaken to determine the attitudes or behaviors of large groups of individuals by examining smaller subgroups (Czaja & Blair, 2005). Survey methodology was chosen as a means of collecting quantitative data for the present study because of its demonstrated efficiency in doing so (Creswell, 2009); as Schutt (2012) wrote, “survey data can be collected from many people at relatively low cost and, depending on the survey design, relatively quickly” (p. 160). The survey was conducted to answer Research Questions 1, 2, and 3.

Telephone interviews were used to gather qualitative data, since this was the only feasible method for the primary investigator (PI) to collect data from a nationwide
sample; as Creswell (2009) pointed out, interviews are “useful when participants cannot be directly observed” (p. 179). Survey participants who volunteered to take part in the telephone interviews answered a series of open form, qualitative questions designed to explore their reasons for adopting or rejecting ID methods to create IL instruction. Three of these questions were developed by the PI, and the other four were adapted from the instrument created by Julien and Genuis (2011). Each of these qualitative questions is detailed in Appendix B. The qualitative questions were intended to address Research Question 4.

Consistent with the procedures of the sequential explanatory mixed methods approach, quantitative and qualitative data for the study were collected sequentially; in this study, more emphasis was given to the former than the latter. Since qualitative data were gathered to provide supportive and confirmatory data for the primary, quantitative data set, the qualitative data were not integrated with the primary data (Creswell, 2009). In studies using sequential explanatory designs, according to Creswell, “weight typically is given to the quantitative data, and the mixing of the data occurs when the initial quantitative results informs the secondary qualitative data collection. Thus, the two forms of data are separate but connected” (p. 211).

Because the validity and reliability of both the quantitative and qualitative instruments may have been negatively affected by various adaptations and additions made by the PI, a pilot test was conducted for content validation by a group of three librarians who met the study’s eligibility requirements. Feedback from the pilot group was used to clarify survey and interview questions. Participants in the pilot group were excluded from participation in the study in order to maintain its integrity. Further details
about how information gathered during the pilot study was used to improve both
instruments is provided in the Quantitative Procedures and Qualitative Procedures
sections.

**Instruments**

The following section describes the development of both the quantitative and
qualitative instruments.

**Quantitative.** The Instruction Librarians’ Behavioral Intention Survey (ILBIS)
questionnaire was used to collect quantitative data. The SurveyMonkey software was
used to administer the questionnaire via the web. ILBIS consisted of two sections:
Section I collected demographic data, and Section II measured behavioral, normative, and
control beliefs regarding participants’ use of ID methods. Section I included eight
demographic questions adapted with permission (H. Julien, personal communication,
March 18, 2014) from a study by Julien and Genuis (2011) that was designed to explore
Canadian librarians’ attitudes toward teaching. The questions on the Julien and Genuis
survey, the final phase of a three-part study, were inspired by interviews the authors
conducted in the first phase. To validate these questions, the authors conducted a pilot
study that consisted of two rounds of testing by librarians, which resulted in revisions of
the wording of the questions. The adapted questions elicit information about subjects’
length of professional experience, educational background, primary job function,
professional identity as teachers, use of ID methods when creating IL instruction, and
familiarity with and use of various ID models. The questions in Section I were intended
to provide an answer for Research Question 2, which is whether various demographic
factors, such as prior education or experience in ID, the length of professional work
experience, primary job function, or educational level, relate to instruction librarians’ use of ID methods when designing IL instruction; and Research Question 3, which is whether librarians who self-identify as teachers use ID methods to create IL instruction more than those who do not.

Section II of ILBIS was adapted with permission (H. Ajjan, personal communication, March 18, 2014) from the instrument developed by Ajjan and Hartshorne (2008), which was designed to measure instructors’ behavioral intention to use Web 2.0 technologies in teaching. The authors reported Cronbach alpha values ranging from 0.67 to 0.98, which they deemed “acceptable for exploratory research” (p. 75). The authors validated the instrument by performing a pilot study with a small sample of subjects, and making modifications to questions that were unclear. In Section II, subjects indicated their degree of agreement with a series of statements on a 5-point Likert scale. The 20 questions in this section were divided into three categories. The first eight questions were designed to measure behavioral beliefs, the next six questions measured normative beliefs, and the last six questions measured control beliefs. In order to develop scores for each of the three constructs, participants’ scores for each question were averaged so that each participant had one score for behavioral beliefs, one for normative beliefs, and one for control beliefs. Section II was used for the purpose of answering Research Question 1, which sought to determine the relationship between respondents’ behavioral, normative, and control beliefs and their reported use of ID methods. The complete ILBIS survey is reproduced in Appendix A.

**Qualitative.** The qualitative instrument, which was administered by the PI over the telephone, consisted of seven open form questions, three of which were developed by
the PI and four of which were adapted with permission (H. Julien, personal communication, March 18, 2014) from the instrument created by Julien and Genuis (2011). These questions asked participants their reasons for using or not using ID methods, whether they used other models or methods when designing instruction, what they found enjoyable and challenging about instruction, whether they considered teaching part of their professional identities, and whether they had any other comments to add. All of the qualitative questions were intended to answer Research Question 4: Why do instruction librarians adopt or reject ID methods to create IL instruction? The qualitative questions are included in Appendix B.

**Quantitative Procedures**

The following section will describe procedures related to the quantitative portion of the study. Gall, Gall, and Borg (2003) set forth the major steps in survey research: defining the objectives of the research, selecting the sample to be studied, designing the testing instrument, pilot testing the instrument, contacting members of the sample prior to distribution of the instrument, composing a cover letter and administering the instrument to the sample, contacting individuals who do not respond to the instrument, and analyzing data. The following is a description of how these steps were applied in creating the ILBIS survey.

**Definition of objectives.** The objectives of the study were developed and refined by following the procedure outlined by deVaus (1992), as described by Gall et al. (2003). deVaus suggested that researchers consider the importance of the following five factors in defining research objectives: the time frame of the inquiry, any geographical restrictions pertaining to the sample, whether to focus broadly or narrowly (in terms of
subjects), the specific aspect of the topic to be studied, and the level of abstraction applied to the inquiry. These considerations were applied to the present study in the manner described below.

1. Time frame. The study entertained responses only from instruction librarians who currently have IL instruction duties. However, in responding to any of the questions on ILBIS, subjects were allowed to consider either current or past experience.

2. Geographical restrictions. The sample was limited to instruction librarians working in libraries in the United States and Canada.

3. Focus. This study was broadly focused on instruction librarians; no subgroups were compared.

4. Aspect of the topic studied. The quantitative portion of the study examined whether instruction librarians used ID methods to create IL instruction. The qualitative portion of the study, which consisted of the telephone interviews, explored subjects’ reasons for rejecting or adopting these methods.

5. Level of abstraction. The aim of this sequential explanatory mixed methods study was both to report facts and to interpret findings. Quantitative results established baseline statistics on the number of instruction librarians who used ID methods to create IL instruction; these data may allow future researchers to measure increases or decreases in ID use by this population. Qualitative results can inform efforts by library educators or others who wish to increase knowledge of ID methods among librarians; for example, by examining instruction librarians’ reasons for declining to adopt ID methods, and designing interventions to help future practitioners overcome identified objections to their use.
**Sample selection.** A nonprobability convenience sample was used for the quantitative portion of the study. While probability sampling is desirable, it would be difficult to implement this sampling procedure due to the time constraints placed on the study. As Gall et al. (2003) pointed out, “it is much more difficult to make valid inferences about a population from nonprobability sampling methods, but these methods are used in more than 95 percent of research studies in the social sciences” (p. 179). Gall et al. go on to state that the ease of selecting a nonprobability sample is undoubtedly the reason for the popularity of this method.

Gall et al. (2003) emphasized the importance of choosing the right target group for study. “If you do not have thorough knowledge of a situation,” they warn, “you might make the mistake of sending your questionnaire to a group that does not have the desired information” (p. 225). In the present study, the PI chose to approach a group likely to be made up of individuals who qualify for participation; the Information Literacy Instruction Discussion List, from which the quantitative sample was drawn, is maintained to facilitate “communication among librarians from a variety of settings and backgrounds” who wish to engage in a “thriving exchange on instruction and information literacy” (Driscoll, n. d., para. 1).

**Instrument design.** Gall et al. (2003) identified three factors—anonymity, item form, and measuring attitudes—to consider when designing survey instruments. The following is a description of how each of these factors was applied to the design of ILBIS.

1. Anonymity. According to Gall et al. (2003), anonymity is a concern when surveys are designed to elicit highly personal information. Although the questions
contained in ILBIS are innocuous, Institutional Review Board (IRB) protocols still require the protection of research participants’ anonymity. To this end, the SurveyMonkey software was chosen to administer the survey because of its ability to shield subjects’ identities from the investigators. The SurveyMonkey software was configured in such a way that participants’ names, email, and IP addresses were not displayed, thus protecting their anonymity. The software also insured that the survey was taken by each recipient only once by disallowing responses from the same email or IP. Further, the participation letter informed subjects that all information obtained in the study would be held in confidence unless disclosure was legally required, that data would be maintained in a locked filing cabinet, and that their names would not be used in any publications or conference presentations of study findings.

2. Item form. Careful consideration was given to the creation and adaptation of questions on both sections of the survey. In accordance with Gall et al.’s (2003) recommendations for writing survey questions, definitions of technical terms were provided; intelligible instructions were given for each section; survey questions were written in a succinct and clear manner; and the survey interface was designed to be both visually attractive and well organized. As mentioned earlier, ILBIS, the survey instrument used for this study, is an adaptation of two separate instruments: Sections I and II are adapted from the Julien and Genuis (2011) survey and the Ajjan and Hartshorne’s (2008) questionnaire, respectively.

The Julien and Genuis (2011) survey originally consisted of ten closed form and four open form questions; the former were adapted to form Section I of the survey, while the latter were adapted for the telephone survey instrument (adaptation of the telephone
survey will be described further in the Qualitative Procedures section). Two of the closed form questions were eliminated because they did not reflect any of the research questions in the present study. These questions asked respondents to describe the nature of their instructional work in libraries, and whether they expected to be performing instruction when they began their careers. Three questions were formulated by the PI and added to Section I. The first, ILBIS question 7, which asked subjects to what extent they used instructional design methods when designing IL instruction, was intended to answer partially Research Questions 2 and 3, as described below. The second added question, ILBIS question 8, which asked subjects what specific ID methods they used when creating IL instruction, was added to establish whether or not they actually used any formal ID methods when designing IL instruction. The third added question, ILBIS question 9, which asked subjects whether they saw themselves primarily as teachers or as librarians in their current role, was added to answer partially Research Question 3, as described below.

The Ajjan and Hartshorne (2008) questionnaire was originally created to explore teachers’ attitudes toward using Web 2.0 technologies in the classroom. The major adaptation of this questionnaire involved replacing references to Web 2.0 technologies with references to IL instruction. Of the 35 original items on the questionnaire, 16 were either eliminated outright because they were redundant, or were combined with similar questions. One question, ILBIS question 25, which asked subjects to rate their agreement with the statement, “I have been reading and hearing more about the use of instructional design methods to create information literacy instruction,” was added to gauge subjects’ awareness of the prevalence of the use of ID methods in libraries.
3. Measuring attitudes. Section II of ILBIS was designed to measure subjects’ attitudes about the use of ID methods in creating IL instruction. Gall et al. (2003) recommended that researchers who intended to measure attitudes search the literature for a suitable instrument, rather than attempting to develop one of their own. The instrument on which Section II is based (Ajjan and Hartshorne, 2008) was deemed suitable to the purposes of the present study, since it was specifically designed to measure subjects’ behavioral, normative, and control beliefs.

Gall et al. also recommended that scales be used to measure attitudes. They compared attitude scales to one-item tests, which are designed to elicit discrete pieces of information. “When questions assess attitudes, . . . the one-item test approach is questionable with respect to both validity and reliability,” they wrote. “A questionnaire that measures attitudes generally must be constructed as an attitude scale . . .” (p. 228). Consistent with these recommendations, Section II of ILBIS presented a series of statements about the use of ID methods in creating IL instruction. It used a 5-point Likert scale, with responses ranging from “strongly disagree” to “strongly agree” to gauge the degree of subjects’ agreement with each statement.

Pilot testing. Gall et al. (2003) stressed that thorough pilot testing of survey instruments is vital. ILBIS was pilot tested for content validity, readability, and ease of use by three individuals qualified to participate in the study. One tester has both a Master of Library Science degree and a PhD in instructional systems and teaches an IL course at an ALA-accredited library school. Two others hold Master of Library Science degrees and have taught IL extensively. The survey was updated to reflect their suggestions for clarification of terminology and for the addition of space for subjects to add comments.
To avoid bias, these pilot testers have agreed not to participate in the actual survey.

**Contacting the sample in advance.** A solicitation (Appendix C) for the study was sent to subscribers of the Information Literacy Instruction Discussion List. The solicitation introduced the PI, explained the reasons for the study, provided a definition of ID, and explained who was eligible to participate. A link to the survey on the SurveyMonkey web site was also provided. The listserv owners granted the PI permission to contact listserv members with this request (A. Driscoll, personal communication, December 4, 2014).

**Cover letter.** The initial page of ILBIS contained the Nova Southeastern University IRB’s participation letter, which served as the cover letter for the survey. The participation letter provided the names and contact information of the principal and co-investigators, and the phone number and email address of the IRB. The participation letter further provided a description of the study, as well as information about the following: risks and benefits to participants, cost and payments to participants, participant confidentiality, and participants’ right to withdraw from the study.

**Nonrespondent follow up.** A follow up email was sent to listserv subscribers two weeks after the initial solicitation, thanking them for their participation if they had taken the survey and reminding them that it was still available if they had not. The survey remained open for two weeks after the follow up email was sent.

**Qualitative Procedures**

Similar to their description of the major steps in survey research, Gall et al. (2003) outlined steps to be taken in preparing and conducting qualitative interviews. These steps are as follows: defining the purpose of the interview, selecting an appropriate sample,
designing the format of the interview, developing interview questions, selecting and training interviewers, pilot testing the interview questions, conducting the interview, and analyzing data. Each subsection below describes how these steps were applied to the qualitative portion of the study.

**Definition of the purpose of the interview.** Gall et al. (2003) identified three major types of research interviews: key informant interviews, which consist of interviews with experts in a particular area of knowledge; survey interviews, which are undertaken to provide supplementary data to other types of qualitative or quantitative research; and focus group interviews, in which groups of individuals with knowledge of a specific topic are interviewed. Since the purpose of the qualitative portion of the study was to provide supportive and confirmatory data for the primary, quantitative portion, the survey interview method was most appropriate in this instance.

**Sample selection.** The following procedure was used to select the sample for the qualitative portion of the study. ILBIS question 11 asked subjects to indicate their willingness to be interviewed. Of the 101 individuals who submitted usable responses to the survey, 24 volunteered to be interviewed. Ten volunteers were chosen to participate in the interviews using the following procedure:

1. The PI divided the volunteers into 5 groups. One group was created for each of the 5 responses to ILBIS question 7, which asked subjects to what extent they used ID methods when designing IL instruction; specifically, one group each was created for volunteers who (1) never used ID methods, (2) rarely used ID methods, (3) used ID methods about half the time, (4) frequently used ID methods, and who (5) always used ID methods.
2. Each of these groups was subdivided into two subgroups according to how the volunteers answered ILBIS question 2, which asked subjects what percentage of their jobs was devoted to IL instruction. The first subgroup consisted of those who indicated that up to 50% of their jobs were devoted to IL instruction. The second subgroup consisted of those who indicated that more than 50% of their jobs were devoted to IL instruction.

3. Two volunteers from each subgroup were chosen to participate in the interviews using a simple random sampling procedure. Alternate volunteers in each subgroup were identified, to be questioned if the first round of volunteers could not be contacted.

**Interview format.** Gall et al. (2003) described three interview approaches. In the structured interview, investigators pose closed form questions only and do not probe for more nuanced information. While these types of interviews elicit the same kinds of responses as questionnaires, their response rates tend to be better, since interviewers can follow up immediately with participants who do not answer all of the questions. The semistructured interview involves asking both open and closed form questions, thus allowing for greater probing. Gall et al. stated that this approach “has the advantage of providing reasonably standard data across respondents, but of greater depth than can be obtained from a structured interview” (p. 240). In the unstructured interview, there are no closed form questions; rather, the interviewer formulates questions as the interview proceeds based on responses from the interviewees. This type of interview is best suited to research projects that involve obtaining highly sensitive information. A semistructured interview format was chosen for the present study for its ability to provide nuanced
answers to research questions. The interviews were conducted by telephone, since it would not have been feasible to conduct face-to-face interviews of a nationwide sample.

**Question development.** The qualitative instrument contains seven open form questions. Four of these (interview questions 4–7) were adapted from the Julien and Genuis (2011) study, while the others (interview questions 1–3) were developed by the PI. The interview questions explored participants’ attitudes about using ID methods to create IL instruction, and about teaching IL as it relates to their professional identity as librarians.

**Selection and training of interviewers.** Since the PI was the sole interviewer, selection and training of multiple interviewers was not carried out.

**Pilot testing.** The three pilot testers for the ILBIS survey were also used to evaluate the interview questions for content validity and ease of use. Each tester found the interview questions to be adequate and made no recommendations for change.

**Conducting the interviews.** Prior to conducting interviews, the PI obtained written consent from participants by sending them an IRB approved consent form via email. All consent forms were signed electronically and returned to the PI.

The way in which researchers present themselves can have an effect on how well they establish rapport among participants (Gall et al., 2003). For instance, when interviewing librarians, researchers who are also librarians would likely be able to establish rapport because of their professional standing. The PI presented himself to participants as both a librarian and a teacher in an attempt to establish rapport (he has 15 years’ experience working in academic libraries, has taught IL sessions and credit-bearing courses at the graduate and undergraduate level, and currently teaches in a
graduate library science program).

The PI audio recorded and subsequently transcribed the interviews. As suggested by Creswell (2009), the PI took handwritten notes during the interviews in case the audio recording equipment failed.

Quantitative and Qualitative Data Analysis

After the surveys were returned, the responses were organized and input into the Microsoft Excel 2010 software package for analysis. In Chapter 4, an overarching descriptive analysis of the survey questions has been reported in both narrative and table format; separate analyses have been provided for each individual research question, as outlined below. Analysis of qualitative data consisted of examining responses to interview questions for themes that confirm or disconfirm the quantitative data.

Research Question 1. What is the relationship between respondents’ behavioral, normative, and control beliefs and their reported use of ID methods when designing IL instruction? In order to answer this question, the PI first calculated scores for each of the constructs. Pearson correlations were then calculated between respondents’ behavioral, normative, and control construct scores and their reported use of ID methods.

Each question on ILBIS Section II consists of a statement about the use of ID methods in creating IL instruction. A 5-point Likert scale allows subjects to rate the extent to which they agree with each statement. ILBIS questions 12 through 19 measure subjects’ behavioral beliefs in relation to using ID methods. ILBIS questions 20 through 25 measure their perception of subjective norms, and ILBIS questions 26 through 30 measure their control beliefs in relation to the use of ID methods. To determine the relationship between their behavioral, normative, and control beliefs and their use of ID
methods, mean scores for behavioral beliefs, subjective norms, and control beliefs were tabulated for each subject, then correlated with scores for ILBIS question 7, which asked subjects to rate the extent to which they used instructional design methods when designing information literacy instruction.

**Research Question 2.** How do various demographic factors, such as prior education or experience in ID, the length of professional work experience, primary job function, or educational level relate to instruction librarians’ use of ID methods when designing IL instruction? In order to answer this research question, the PI intended to calculate $\chi^2$ tests to compare responses to ILBIS questions 3 through 6 (which measure the length of time subjects have worked in libraries, the length of time they have taught IL, their educational attainment, and the discipline of other graduate degrees) with ILBIS questions 7, which asked subjects to rate the extent to which they used ID methods when designing IL instruction, and 10, which asked them to identify the main way in which they had been trained in using ID methods. However, the survey did not yield enough data to calculate accurate correlations between ILBIS question 7 and ILBIS questions 5 and 6. Instead, the $\chi^2$ analyses were calculated between ILBIS questions 7 and 10.

**Research Question 3.** Do librarians who self-identify as teachers use ID methods to create IL instruction more than those who do not? In order to answer this question, subjects were divided into two groups, those who identified as primarily as teachers and those who identified primarily as librarians. Mean scores for the two groups were calculated for ILBIS question 7, which asked subjects to what extent they used ID methods when designing IL instruction. A $t$ test for independent sample means was then conducted to determine if there was a significant difference between the groups.
Research Question 4. Why do instruction librarians adopt or reject ID methods to create IL instruction? In order to answer this qualitative question, responses to the interview questions were reviewed for themes related to this topic. An organized narrative outlining participants’ responses is included in Chapter 4.

Research Question 5. In what ways do the qualitative data confirm or support the quantitative data? In order to answer this question, results from the quantitative questions contained in ILBIS were compared to responses to the qualitative interview questions to identify any areas of validation or disconnect. Responses to the qualitative questions were examined for common themes that were recorded and compared to the quantitative findings.

Limitations

Selection procedures represent one limitation of this study. Creswell (2009) identified selection bias as a threat to internal validity, and suggested random selection of subjects as a strategy to overcome this threat. For the present study, a nonprobability convenience sample was drawn from the membership of a listserv that caters exclusively to the needs and interests of instruction librarians; this procedure was followed because random sampling was deemed not to be feasible. This method of selecting subjects may have introduced an element of bias into the study, since individuals who subscribe to this kind of listserv are likely to be enthusiastic about IL instruction. Further, individuals who do not use ID methods to create IL instruction may have selected themselves out of a study about the use of such methods, unaware that their responses might be valuable.

Mortality is another limitation of the study. Creswell (2009) mentioned mortality, or the tendency of participants to “drop out” (p. 163) of a study, as a further threat to
internal validity. In the present study, three (30%) of the participants in the qualitative portion dropped out. This number represents 100% of those who \emph{never} used ID methods, and 50% of those who \emph{rarely} did. “The outcomes,” as Creswell wrote, “are thus unknown for these individuals” (p. 163).

The fact that participation in the study was restricted to librarians who engage in IL instruction represents another limitation. Because of this restriction, the results of the study only apply to the creation of IL instruction by librarians, and cannot be generalized to other populations.

To ensure validity of qualitative results, Creswell (2009) recommended using “member checking to determine the accuracy of the qualitative findings through taking the final report or specific descriptions or themes back to participants and determining whether these participants feel that they are accurate.” Given the time constraints of the study, no such procedure was followed. This represents a fourth limitation of the study.

The final limitation is the fact that there were insufficient data to answer Research Question 2, and alternative analyses had to be carried out. Further, in order to analyze the relationship between use of ID methods and reported type of training in ID, Yates’s correction for continuity (Furr, 2010; Preacher, 2001) had to be applied, and this may have compromised the integrity of the results. According to the article “Yates’s correction (for continuity)” (2005), “Yates’s continuity correction is less widely used than it once was, largely because many statisticians think that it may overcorrect for the possibility of Type I error and thus increase the chances of Type II error” (p. 348).

\textbf{Summary}

Instruction librarians working in academic libraries in the United States and
Canada were contacted through the ALA’s Information Literacy Instruction Discussion List and asked to respond to a web-based survey. The survey attempted to answer Research Questions 1, 2, and 3. A subset of survey participants took part in telephone interviews, which were intended to answer Research Question 4.

In this sequential explanatory mixed methods study, the primary, quantitative data were gathered first, followed by the secondary, qualitative data. The latter was intended to provide supportive and confirmatory data for the former; therefore, the data were not mixed, but remained separate, though connected. A pilot study of both the survey and the interview questions was conducted, and where indicated the instruments were adjusted according to the advice received from the pilot group.

The procedures outlined by Gall, Gall, and Borg (2003) for conducting quantitative and qualitative research were used to create the survey and interview questions, respectively. Steps in designing quantitative research include the following: defining the objectives of the research, selecting the sample to be studied, designing the testing instrument, pilot testing the instrument, contacting members of the sample prior to distribution of the instrument, composing a cover letter and administering the instrument to the sample, contacting individuals who do not respond to the instrument, and analyzing data. Steps in designing qualitative research are as follows: defining the purpose of the interview, selecting an appropriate sample, designing the format of the interview, developing interview questions, selecting and training interviewers, pilot testing the interview questions, conducting the interview, and analyzing data. The chapter described in detail how these steps were applied to the creation of both the quantitative and qualitative instruments. Statistical tests were undertaken to determine answers to
Research Questions 1, 2, and 3. Qualitative data were examined for themes that confirmed or disconfirmed quantitative data.

Limitations of the study included selection issues, mortality, limited generalizability, lack of member checking of qualitative results, and inadequate data to answer Research Question 2.
Chapter 4: Results

Chapter 3 presented the method employed to examine the research questions of this sequential explanatory mixed methods study. Chapter 4 presents the findings. The purpose of this study was to determine whether instruction librarians in the United States and Canada were using ID methods, and to identify potential explanations for their adoption or rejection of those methods. The research questions that guided the study are as follows:

1. What is the relationship between respondents’ behavioral, normative, and control beliefs and their reported use of ID methods when designing IL instruction?

2. How do various demographic factors, such as prior education or experience in ID, the length of professional work experience, primary job function, and educational level relate to instruction librarians’ use of ID methods when designing IL instruction?

3. Do librarians who self-identify as teachers use ID methods to create IL instruction more than those who do not?

4. Why do instruction librarians adopt or reject ID methods to create IL instruction?

5. In what ways do the qualitative data confirm or support the quantitative data?

These questions are recapitulated below and serve as the organizing structure for the chapter.

In order to gather data for the quantitative portion of the study, the PI developed ILBIS, a two-part survey designed to measure subjects’ intention to use ID methods. An electronic version of ILBIS was created and placed on the SurveyMonkey server, and a link to it was posted on the ALA’s Information Literacy Instruction Discussion List for
four weeks. At the conclusion of the survey, a total of 126 individuals had responded. Of this number, five were eliminated because they did not work in academic libraries in the United States or Canada, and one was eliminated because he or she had no IL teaching responsibilities. A further 19 were eliminated because their surveys were incomplete, leaving 101 usable surveys.

Section I of ILBIS contained demographic questions adapted from an instrument used by Julien and Genuis (2011) to explore Canadian librarians’ attitudes toward teaching. Responses to questions in Section I are summarized in the Participant Demographics section of this chapter. Section II of ILBIS was adapted from Ajjan and Hartshorne’s (2008) survey. Responses to questions in Section II are organized by research question and summarized below.

In order to gather data for the qualitative portion of the project, the PI developed a series of telephone interview questions designed to explore participants’ reasons for using or not using ID methods to design IL instruction. This instrument consisted of seven open form questions, four of which were adapted from the instrument created by Julien and Genuis (2011), and three of which were developed by the PI.

**Participant Demographics**

Responses to questions on Section I of ILBIS are summarized in Tables 3 through 9. The questions in this section were intended to explore participants’ educational backgrounds, professional experience, professional identity, practices related to ID, and attitudes about the use of ID. The initial question, which asked subjects whether or not they worked in an academic library in the United States or Canada, was intended only to establish participants’ eligibility to complete the survey; thus, its results
will not be analyzed.

ILBIS question 2, which asked subjects what percentage of their jobs were
devoted to IL instruction, was included not only to determine the amount of time subjects
spent on IL instruction, but also to eliminate the surveys of those who had no teaching
responsibilities; one survey was eliminated in this fashion. A total of 29 (29%) subjects
indicated that up to 50% of their jobs were devoted to IL instruction, compared to 72
(71%) for whom IL duties comprised more than 50% of their job duties.

Professional experience was one participant characteristic explored in Section I.
The largest number of subjects, 77 (76%), had been working in libraries between two and
20 years, as shown in Table 3. Fifteen (15%) had fewer than two years’ experience
working in libraries, whereas only 9 (9%) had greater than 21 years’ experience.

Table 3

Responses to ILBIS Question 3, “How Long Have You Been Working in Libraries?”

<table>
<thead>
<tr>
<th>Time Working</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 2 years</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>2–10 years</td>
<td>23</td>
<td>23</td>
</tr>
<tr>
<td>11–20 years</td>
<td>54</td>
<td>53</td>
</tr>
<tr>
<td>21 years +</td>
<td>9</td>
<td>9</td>
</tr>
</tbody>
</table>

Sixty-eight subjects (67%) reported teaching IL in libraries between two and 20
years, as shown in Table 4. An almost identical number of subjects had worked in
libraries between 11 and 20 years (53%) as had taught IL during the same range of years
(54%). More subjects (23%) had worked in libraries between two and 10 years than had
taught IL during that same time (13%). Twenty-one subjects (21%) had taught IL for 21
years or more, while 12 (12%) had taught IL for fewer than two years.
Table 4

Responses to ILBIS Question 4, “How Long Have You Been Teaching Information Literacy in Libraries?”

<table>
<thead>
<tr>
<th>Time Teaching IL</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 2 years</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>2–10 years</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>11–20 years</td>
<td>55</td>
<td>54</td>
</tr>
<tr>
<td>21 years +</td>
<td>21</td>
<td>21</td>
</tr>
</tbody>
</table>

Another characteristic explored in Section I was that of educational background. Table 5 provides a summary of subjects’ educational attainment. As expected, all subjects held a Master of Library and Information Science or equivalent university degree, while 36 (36%) also held subject master’s degrees. Only four subjects (4%) reported having a doctorate. Responses to ILBIS question 6, which asked subjects with doctoral, specialist’s, or subject master’s degrees to indicate their discipline or major, revealed that, of those individuals who possessed a subject master’s degree (n = 36), 13 (32.5%) had degrees in the discipline of English or related fields, six (15%) in instructional

Table 5

Responses to ILBIS Question 5, “What is Your Educational Background?”

<table>
<thead>
<tr>
<th>Degree</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctorate</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Specialist’s degree</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Subject master’s</td>
<td>36</td>
<td>36</td>
</tr>
<tr>
<td>MLIS or equivalent</td>
<td>101</td>
<td>100</td>
</tr>
<tr>
<td>Library technician</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Other</td>
<td>8</td>
<td>8</td>
</tr>
</tbody>
</table>
technology or design, and a further six (15%) in education or related fields.

One of the central questions addressed by the study was the extent to which subjects used ID methods when designing IL instruction. As shown in Table 6, 48 subjects (48%) either never or rarely used ID methods when creating IL instruction, while 39 (39%) either frequently or always did so. A further 14 (14%) used these methods about half the time.

Table 6

_Responses to ILBIS Question 7, “To What Extent Do You Use Instructional Design Methods When Designing Information Literacy Instruction?”_

<table>
<thead>
<tr>
<th>Extent of Use</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never</td>
<td>21</td>
<td>21</td>
</tr>
<tr>
<td>Rarely</td>
<td>27</td>
<td>27</td>
</tr>
<tr>
<td>About half the time</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>Frequently</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Always</td>
<td>9</td>
<td>9</td>
</tr>
</tbody>
</table>

The study also sought to determine the specific ID methods used by subjects. Table 7 summarizes subjects’ reported use of various ID methods. Twenty-seven subjects (27%) reported using no ID method, and 12 (12%) indicated that they used multiple methods for creating IL instruction. The most popular methods used were Bloom’s Taxonomy (36%) and ADDIE (13%). One subject (1%) reported using the Morrison, Ross, Kemp, and Kalman (2012) model, and one other (1%) used Merrill’s (2002) first principles of instruction. None of the subjects reported using Gagné’s (2007) nine events of instruction or the Dick, Carey, and Carey (2009) model.
Table 7

Responses to ILBIS Question 8, “What Specific Instructional Design Methods Do You Use When Creating Information Literacy Instruction? Please Select All That Apply”

<table>
<thead>
<tr>
<th>Method</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>27</td>
<td>27</td>
</tr>
<tr>
<td>ADDIE</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>Dick, Carey, &amp; Carey</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Morrison, Ross, Kemp, &amp; Kalman</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Gagné’s 9 events</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Merrill’s first principles</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Bloom’s taxonomy</td>
<td>36</td>
<td>36</td>
</tr>
<tr>
<td>Other</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>Multiple</td>
<td>12</td>
<td>12</td>
</tr>
</tbody>
</table>

Subjects’ conception of their professional roles was also of interest to the study.

As shown in Table 8, 70 subjects (69%) indicated that they identified primarily as librarians in their current role, while only 31 (31%) identified primarily as teachers.

Table 8

Responses to ILBIS Question 9, “In Your Current Role, Do You See Yourself Primarily as a Teacher or as a Librarian?”

<table>
<thead>
<tr>
<th>Identity</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher</td>
<td>31</td>
<td>31</td>
</tr>
<tr>
<td>Librarian</td>
<td>70</td>
<td>69</td>
</tr>
</tbody>
</table>

Finally, the main ways in which subjects reported being trained in using ID methods are summarized in Table 9. Twenty-nine subjects (29%) had learned ID primarily through on-the-job training, 26 (26%) learned ID primarily in an academic setting, 20 (20%) listed workshops or other hands-on training as the main way in which
they learned ID, and 22 (22%) had never received training.

Table 9

*Responses to ILBIS Question 10, “What is the Main Way in Which You Have Been Trained in Using Instructional Design Methods?”*

<table>
<thead>
<tr>
<th>Type of Training</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>On-the-job training</td>
<td>29</td>
<td>29</td>
</tr>
<tr>
<td>Academic courses</td>
<td>26</td>
<td>26</td>
</tr>
<tr>
<td>Workshops/hands-on training</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>No training</td>
<td>22</td>
<td>22</td>
</tr>
</tbody>
</table>

Research Question 1

What is the relationship between respondents’ behavioral, normative, and control beliefs and their reported use of ID methods when designing IL instruction? In order to answer this question, Pearson $r$ correlations were calculated between the means of the behavioral, normative, and control construct scores and values for ILBIS question 7, which asked subjects to indicate the degree to which they used ID methods when designing IL instruction. The results of these correlations are summarized in Table 10.

Table 10

*Correlations Between Use Scores (ILBIS Question 7) and Behavioral, Normative, and Control Beliefs*

<table>
<thead>
<tr>
<th>Construct</th>
<th>ILBIS Questions</th>
<th>Use Score Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behavioral</td>
<td>12–19</td>
<td>.56*</td>
</tr>
<tr>
<td>Normative</td>
<td>20–25</td>
<td>.53*</td>
</tr>
<tr>
<td>Control</td>
<td>26–31</td>
<td>.59*</td>
</tr>
</tbody>
</table>

* $p<.0001$

Behavioral construct scores, calculated by averaging the scores from ILBIS
questions 12 through 19, measured “the degree to which performance of the behavior is positively or negatively valued” (Ajzen, 2006, Attitude Toward the Behavior section, para. 1). In this study, the behavior in question is the use of ID methods to create IL instruction. The Pearson $r = .56 \,(df = 99, \, p < .0001)$ indicated that there was a significant positive relationship between subjects’ behavioral beliefs and their reported use of ID methods when designing IL instruction. We may conclude from this that subjects who had positive attitudes toward using ID methods were more likely to use them to design IL instruction.

Normative construct scores, calculated by averaging the scores from ILBIS questions 20 through 25, measured “the perceived social pressure to engage or not to engage in a behavior” (Ajzen, 2006, Subjective Norm section, para. 1), the behavior in this case being the use of ID methods to create IL instruction. The Pearson $r = .53 \,(df = 99, \, p < .0001)$ indicated that there is also a significant positive relationship between subjects’ normative beliefs and their reported use of ID methods when designing IL instruction. Subjects who perceive social pressure to use ID methods, therefore, are more likely to use them in developing IL instruction.

Control construct scores, calculated by averaging the scores from ILBIS questions 26 through 31, measured “the perceived presence of factors that may facilitate or impede performance of a behavior” (Ajzen, 2006, Control Beliefs section, para. 1), specifically, in this study, the use of ID methods to create IL instruction. Once again, the Pearson $r = .59 \,(df = 99, \, p < .0001)$ indicated that there is a significant positive relationship between subjects’ control beliefs and their reported use of ID methods when designing IL instruction. This positive relationship suggests that subjects who believe that using ID
Research Question 2

How do various demographic factors, such as prior education or experience in ID, the length of professional work experience, primary job function, and educational level relate to instruction librarians’ use of ID methods when designing IL instruction? In order to answer this question, the PI intended to use $\chi^2$ comparisons between ILBIS questions 7 (To what extent do you use instructional design methods when designing information literacy instruction?) and 10 (What is the main way in which you have been trained in using instructional design methods?) with ILBIS questions 3 (How long have you been working in libraries?), 4 (How long have you been teaching information literacy in libraries?), 5 (What is your educational background? Please check all that apply) and 6 (If you have a doctorate, a specialist’s degree, or a subject master’s, please indicate your discipline or major below). Chi-square analyses between ILBIS question 7 and ILBIS questions 3 and 4 were performed, and have been analyzed below. The survey did not yield enough data to calculate correlations between ILBIS question 7 and ILBIS questions 5 and 6, however. Instead, the $\chi^2$ analyses were calculated between ILBIS question 7 and ILBIS question 10. The results of these calculations are summarized in Tables 11 through 13.

Because there were insufficient responses in some of the four response categories (fewer than 2 years, between 2 and 10 years, between 11 and 20 years, and 21 years or more) for ILBIS questions 3 and 4, the categories were collapsed into two groups for analysis: subjects with ten years’ experience or fewer, and subjects with 11 years’ experience or more.
**Length of time working in libraries.** The results for the $\chi^2$ calculation between ILBIS question 7, which asked subjects to rate the extent to which they used instructional design methods when designing IL instruction, and ILBIS question 3, which asked them how long they had been working in libraries, are summarized in Table 11.

Table 11

*Relationship Between Use of ID Methods and Length of Time Working in Libraries*

<table>
<thead>
<tr>
<th>Use of ID</th>
<th>≤10 years</th>
<th></th>
<th>≥11 years</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$n$</td>
<td>%</td>
<td>$n$</td>
<td>%</td>
</tr>
<tr>
<td>Never/rarely</td>
<td>13</td>
<td>13</td>
<td>35</td>
<td>35</td>
</tr>
<tr>
<td>About half the time</td>
<td>8</td>
<td>8</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Frequently/always</td>
<td>17</td>
<td>17</td>
<td>22</td>
<td>22</td>
</tr>
</tbody>
</table>

The $\chi^2 = 5.14$ ($df = 2, p = .08$) indicates that there is no significant relationship between the length of time subjects have been working in libraries and their reported use of ID methods.

**Length of time teaching IL in libraries.** The results for the $\chi^2$ calculations between ILBIS question 7, which asked subjects to rate the extent to which they used ID

Table 12

*Relationship Between Use of ID Methods and Length of Time Teaching IL in Libraries*

<table>
<thead>
<tr>
<th>Use of ID</th>
<th>≤10 years</th>
<th></th>
<th>≥11 years</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$n$</td>
<td>%</td>
<td>$n$</td>
<td>%</td>
</tr>
<tr>
<td>Never/rarely</td>
<td>6</td>
<td>6</td>
<td>42</td>
<td>42</td>
</tr>
<tr>
<td>About half the time</td>
<td>4</td>
<td>4</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Frequently/always</td>
<td>15</td>
<td>15</td>
<td>24</td>
<td>24</td>
</tr>
</tbody>
</table>
methods when designing IL instruction, and ILBIS question 4, which asked them how long they had been teaching IL in libraries, are summarized in Table 12. The $\chi^2 = 7.91 \ (df = 2, \ p = .02)$ indicates that there is a significant relationship between the length of time teaching IL in libraries and the use of ID methods.

**Reported type of training in ID.** The results for the $\chi^2$ calculations between ILBIS question 7, which asked subjects to rate the extent to which they used ID methods when designing IL instruction, and ILBIS question 10, which asked them to indicate the main way in which they had been trained in using ID methods, are summarized in Table 13.

Table 13

*Relationship Between Use of ID Methods and Reported Type of Training in ID*

<table>
<thead>
<tr>
<th>Use of ID</th>
<th>On the job</th>
<th>Courses</th>
<th>Workshops</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$n$</td>
<td>%</td>
<td>$n$</td>
<td>%</td>
</tr>
<tr>
<td>Never/rarely</td>
<td>14</td>
<td>14</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>About half the time</td>
<td>3</td>
<td>3</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Frequently/always</td>
<td>14</td>
<td>14</td>
<td>15</td>
<td>15</td>
</tr>
</tbody>
</table>

ILBIS question 10 had five response categories: *On-the-job training*, *Formal academic courses in instructional design*, *Workshops or other hands-on training*, *I have never been trained to use instructional design methods*, and *Other—please specify*. In order to calculate $\chi^2$, observations in each cell must be greater than five; since only four subjects chose the *Other* category, their responses were assigned to one of the other categories to avoid insufficient numbers in cell data. This reassignment was based on an analysis of subjects’ responses to other questions; for example, one subject who chose the
Other category had a degree in ID, and was therefore reassigned to the Formal academic courses in instructional design category.

Despite category reassignment, there remained three cells with fewer than five observations. Accordingly, Yates’s correction for continuity (Furr, 2010; Preacher, 2001) was applied. The data were calculated to include the Yates $\chi^2$ value ($24.59, p(6) = .0004$). The $\chi^2 = 24.59 (df = 6, p < .0001)$ indicates that there is a significant relationship between the use of ID and the reported type of training received.

**Research Question 3**

Do librarians who self-identify as teachers use ID methods to create IL instruction more than those who do not? To answer this question, a one-tailed $t$ test for independent sample means was calculated between mean scores of self-identified teachers and of self-identified librarians on question 7, which asked subjects to rate the extent to which they used ID methods when designing IL instruction. Table 14 summarizes the results of the $t$ test.

**Table 14**

One-Tailed $t$ Test for Independent Sample Means Between Mean Scores on ILBIS Question 7 for Those Who Do and Do Not Identify as Teachers

<table>
<thead>
<tr>
<th>Group</th>
<th>$n$</th>
<th>$M$</th>
<th>$SD$</th>
<th>$t$</th>
<th>df</th>
<th>$p^*$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify as teacher</td>
<td>31</td>
<td>3.29</td>
<td>1.29</td>
<td>2.61</td>
<td>99</td>
<td>.005</td>
</tr>
<tr>
<td>Identify as librarian</td>
<td>70</td>
<td>2.57</td>
<td>1.27</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*$p = .005$

The results of the $t$ test indicated that those who identified primarily as teachers used ID methods to create IL instruction at a significantly higher rate ($t = 2.61, p = .005, df = 99$) than those who identified primarily as librarians.
Research Question 4

Why do instruction librarians adopt or reject ID methods to create IL instruction? In order to answer this qualitative question, responses to the interview questions were reviewed for themes related to this topic.

Reasons for using ID methods. Interview participants provided a range of reasons for using ID methods when creating IL instruction. One participant who always used ID methods indicated that they were simply the most appropriate tools to design instruction. “If you had a Swiss Army knife in your toolkit,” he said, “and you needed to whittle something, why wouldn’t you take it out?” The same participant gave the opinion that using ID methods resulted in instruction that was more learner centered. “The learners become a lot more central when you start thinking about designing a class, because then it becomes about student learning, and it becomes about their experience.”

Another participant who always used ID methods reported that the teaching role of librarians was valued both in her workplace and by her supervisor. “The environment which I’m in now very much values teaching,” she said. “I have non tenure track faculty status, and my boss also is very much about the teaching.” A frequent user of ID methods said, “I use them because I want to be doing best practices in my field.” Another participant, who always used ID methods, stated simply that “I always do it because it’s the right thing to do.”

Three (43%) of the seven participants stated that they used ID methods unconsciously. For example, one participant who used ID methods about half the time said, “I think I don’t necessarily always know that I’m doing it, like it’s not necessarily a conscious thing.” In two instances, participants stated that they allowed what they had
learned of ID methods to inform their intuition and proceeded to design instruction on that basis, rather than applying ID methods in a formal way. “It’s not a laborious, theory-laden process with me,” said one librarian who always used ID methods. The other participant who intuitively applied ID methods stated, “When I read about [ID methods], I’m like, ‘Oh, I do that—that’s great!’ But I don’t always remember what it’s called, or anything like that.” She went on to say that “the names of things are not necessarily at the top of my brain.” This participant indicated that she used ID methods about half the time. The one other participant who reported unconsciously using ID stated that she always used ID methods. She said that “I realized through stumbling around for many years that I was doing instructional design; I was just unaware of it.” She went on to explain that, in library school . . . , I had one class where we learned that backward design model, and even then, I don’t think it was taught to me as being called instructional design. It was called backward design, but I didn’t realize that that was instructional design. So I guess I did kind of know about it, and I was actually educated in it, but I didn’t know that that’s what the official name was.

**Reasons for not using ID methods.** Five of the seven participants offered reasons for not using ID methods to create IL instruction. Four of the five mentioned a single factor that inhibited their creating IL instruction using ID methods: time. One participant who frequently used ID methods captured the frustration shared by several others when she mentioned that, on the occasions that she did not use them, it was “because an instructor shows up and says, ‘Oh, can you come to my class in five minutes?’” Another participant, who rarely used ID, coined the phrase, “surprise instruction” to refer to these eleventh hour requests.

Two participants stated that, when pressed for time, they depended on their experience with ID methods to inform impromptu teaching, echoing others who said they typically applied ID methods intuitively to the creation of IL instruction. “In my previous
position, sometimes you did just have to wing it because you didn’t have a chance to prep. [But] I wasn’t really winging it,” one participant who always used ID methods said of instruction for which she had little time to prepare. “It was because I’d done it so much that I was able to tailor the instruction.” A frequent user of ID methods stated that,

when I have a short amount of time, and it’s got to be done fast, I just rely on experience and what is it that I need to do, and how can I do this as quickly as possible. If it’s a bigger, longer project, then I really do try to sit down and work it out, and make sure that I am covering all my bases and I am doing it as best I can.

One participant expressed the opinion that using ID methods to design brief instruction was unnecessary. “Since I’ve been doing it for such a long time,” he said, “some of the simpler stuff doesn’t require it.” He reported using ID methods about half the time. In contrast, another participant, who rarely used ID methods, stated that “I would tend to use [them] especially when I’m pressed for time.” He went on to explain that

in a 50-minute session, I feel it’s especially critical to [use ID methods]. The cases when I don’t go through at least that kind of minimal design process . . . would usually be the surprise instruction sessions that pop up. In almost all other cases, I’ll at least scribble down some objectives.

Two of the participants, both of whom frequently used ID methods, reported that their instruction was in some instances designed by someone else. In one of these cases, a librarian at a branch campus taught an IL course that had been designed by someone at the main campus. The other participant explained that when she was teaching students to find information on a subject with which she was unfamiliar, she made use of a repository of predesigned IL lesson plans on various topics compiled by librarians at her institution, rather than designing the instruction herself.
Research Question 5

In what ways do the qualitative data confirm or support the quantitative data? In order to answer this mixed methods question, results from the quantitative questions contained in ILBIS were compared to responses to the qualitative interview questions to identify any areas of validation or disconnect. Responses to the qualitative questions were examined for common themes that confirmed or disconfirmed the conclusions of the quantitative data. Qualitative data related to Research Question 1, which sought to determine the relationship between respondents’ behavioral, normative, and control beliefs and their reported use of ID methods when designing IL instruction, were gathered during the interviews and are compared to quantitative data for that question in the paragraphs below. No qualitative data related to participants’ demographic characteristics were obtained; therefore, this section will not address Research Question 2, which sought to determine how various demographic factors, such as prior education or experience in ID, the length of professional work experience, primary job function, or educational level relate to instruction librarians’ use of ID when designing IL instruction. Because all seven participants (100%) strongly identified as teachers, comparison of quantitative and qualitative data for Research Question 3, which attempted to establish whether librarians who self-identify as teachers use ID methods to create IL instruction more than those who do not, would be meaningless, and was not attempted.

Analysis of quantitative data for Research Question 1 found that behavioral beliefs, which form the basis for one’s attitudes toward a behavior, had a significant positive relationship with subjects’ reported use of ID methods when designing IL instruction. Attitude is defined as “the degree to which performance of the behavior is
positively or negatively valued” (Ajzen, 2006, Attitude Toward the Behavior section, para. 1). In interviews, participants named eight factors that suggested they positively valued the use of ID methods: the beliefs that (a) ID methods produce better learning outcomes, (b) using ID methods results in instruction that is more learner centered, (c) using ID methods is a solution to instructional challenges, and (d) using ID methods gives structure to IL instruction. Further factors identified were having undertaken (e) courses in ID, (f) the ACRL Immersion Program (ACRL, 2015), (g) professional development in ID, and (h) an academic degree in ID. Table 15 relates the frequency of use of ID methods (i.e., rarely, about half the time, frequently, and always) with the above mentioned attitude factors.

Table 15

*Attitude Factors and Reported Frequency of Use of ID Methods*

<table>
<thead>
<tr>
<th>Attitude factors</th>
<th>Rarely</th>
<th>1/2 the time</th>
<th>Frequently</th>
<th>Always</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID gives better outcomes</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>ID is learner centered</td>
<td></td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>ID a solution to challenges</td>
<td></td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>ID gives structure</td>
<td></td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Pursued ID courses</td>
<td></td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>ACRL Immersion</td>
<td></td>
<td>2</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Professional development</td>
<td></td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Degree in ID</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>0</td>
<td>2</td>
<td>4</td>
<td>9</td>
<td>15</td>
</tr>
</tbody>
</table>

The one participant who rarely used ID methods mentioned none of the attitude factors identified. The participants who used ID methods about half the time mentioned two of the factors, those who frequently used ID methods mentioned four of the factors,
and those who always used these methods mentioned nine of the factors. Thus, the number of attitude factors present increased with the frequency of participants’ use of ID methods. These qualitative data tend to support the conclusion reached in the quantitative portion of the study that behavioral beliefs were positively correlated with subjects’ use of ID methods when designing IL instruction.

Quantitative analysis of survey data indicated that normative beliefs, defined as “the perceived social pressure to engage or not to engage in a behavior” (Ajzen, 2006, Subjective Norm section, para. 1), had a significant positive relationship with subjects’ reported use of ID methods when designing IL instruction. Only two interview participants commented on normative factors that may have played a part in their decision to use ID methods. One participant who always used ID methods stated that their use was favored by her supervisor, and that teaching was valued in her professional environment. Another participant, who used ID methods about half the time, indicated that, as the head of the instruction department, he set the norms regarding use of ID methods for other librarians. Given the paucity of qualitative data about normative beliefs, it is difficult to determine the extent to which they support the quantitative data; nevertheless, what data there are support the conclusions of the quantitative portion of the study.

Analysis of the quantitative data revealed that control beliefs, defined as “the perceived presence of factors that may facilitate or impede performance of a behavior” (Ajzen, 2006, Control Beliefs section, para. 1), also had a significant positive relationship with subjects’ reported use of ID methods when designing IL instruction. Participants, then, were found to be more likely to use ID methods to create IL instruction if they
believed that using those methods was within their control. As mentioned earlier, one of the main impediments to the implementation of ID methods identified by participants was lack of time. This factor was cited by one participant who rarely used ID methods, by one who used ID methods about half the time, by two who used ID methods frequently, and by one who always used ID methods. The fact that lack of time was mentioned by individuals at all points on the spectrum of ID use casts doubt on the conclusion that the presence of this impeding factor actually discouraged the use of ID methods.

The other factor identified by participants as inhibiting their control over whether or not they used ID methods was the fact that, in some instances, instruction was designed by others. Still, both of the individuals who reported this to be the case said that they used ID methods frequently. One of the individuals stated that her IL course was designed by others, but that she was still free to design one-shot classroom presentations. The other indicated that the use of lesson plans previously created by other librarians was an option, but not mandatory. It would appear, then, that this factor did not significantly impede these participants’ use of ID methods.

Summary

The purpose of this sequential explanatory mixed methods study was to determine whether instruction librarians in the United States and Canada were using ID methods, and to identify potential explanations for their adoption or rejection of those methods. Survey data indicated that there was a significant positive relationship between behavioral, normative, and control construct scores and the use of ID when designing IL instruction. The highest correlation was for the control construct at .59. Analysis of survey data also found that there is no significant relationship between the length of time
participants have been working in libraries and their reported use of ID methods, that there is a significant relationship between the length of time teaching IL in libraries and the use of ID methods, and that there is a significant relationship between the use of ID and the reported type of training received. Further, subjects who identified primarily as teachers used ID methods to create IL instruction at a significantly higher rate than those who identified primarily as librarians.

The qualitative portion of the study explored interview participants’ reasons for using ID methods. It was found that participants used ID methods because they were considered the most appropriate tools to design instruction, because using them results in instruction that is more learner centered, because librarians’ teaching role is valued in the workplace and by a supervisor, and because participants desired to teach according to best practices. The lack of time and the fact that instruction was sometimes designed by someone other than the librarian were reasons given for not using ID methods.

The conclusion drawn from the quantitative data that there was a significant positive relationship between behavioral and normative construct scores and the use of ID was supported by the qualitative data. Quantitative data indicated a significant positive relationship between participants’ control beliefs and their use of ID methods, but this relationship was not supported by the qualitative data.
Chapter 5: Discussion

Chapter 4 presented the findings of the study. Chapter 5 provides an overview of the study, summarizes and interprets the findings, discusses the context and implications of the findings, and suggests directions for future research.

Overview of the Study

The purpose of this sequential explanatory mixed methods study was to determine whether instruction librarians in the United States and Canada were using ID methods, and to identify potential explanations for their adoption or rejection of those methods. A survey (Appendix A) based on questions drawn from two instruments (Ajjan & Hartshorne, 2008; Julien & Genuis, 2011) was developed to obtain quantitative data, while telephone interview questions (Appendix B) partially adapted from Julien and Genuis and designed to explore participants’ reasons for adopting or rejecting the use of ID methods, was used to gather qualitative data. The TPB (Ajzen, 1985) served as the theoretical framework for the study. This theory was chosen because of its demonstrated ability to predict individuals’ behavior based on their behavioral, normative, and control beliefs.

Of the 126 individuals who returned surveys, 25 were eliminated either because they did not meet the inclusion criteria or because their surveys were incomplete, leaving 101 usable surveys. Twenty-four of the 101 survey subjects volunteered to be interviewed; of this number, ten were chosen to be interviewed based on the extent to which they reported using ID methods and the percentage of their jobs devoted to IL instruction. Although 10 potential participants and nine alternates were identified, only seven participants were ultimately surveyed. There were difficulties in recruiting subjects
who either rarely or never used ID methods to create IL instruction. The required number of participants were found for the categories always, frequently, and about half the time; of the 24 initial volunteers, four responded that they rarely used ID methods, while 3 responded that they never did. Only one individual who rarely used ID methods, and none of the three who never did, responded to requests to be interviewed.

**Summary of Findings**

This section describes participant demographics and summarizes the results of the survey and of the interviews.

**Participant demographics.** Experience working and teaching in libraries was a characteristic of subjects explored using the survey. The majority of subjects, 23 (23%), had worked in libraries between two and ten years. Fifteen subjects (15%) had fewer than two years’ experience working in libraries, 54 (53%) had between 11 and 20 years’ experience, and 9 (9%) had greater than 21 years’ experience. Twelve subjects (12%) had taught IL in libraries fewer than two years, 13 (13%) had between two and ten years’ teaching experience, 55 (54%) had between 11 and 20 years’ experience, and 21 (21%) had taught in libraries for 21 years or more. When asked what percentage of their jobs were devoted to IL instruction, 29 survey subjects (29%) reported a figure of up to 50%, and 72 (71%) indicated that more than 50% of their duties involved instruction.

Educational attainment for the sample was somewhat greater than that reported by the ALA for its members; 4 subjects (4%) in the present study possessed a doctorate, and 36 (36%) held subject master’s degrees, while the ALA reported that 4% of its members had doctorates and 26% had other master’s degrees (ALA, 2014). Thirteen (33%) of the subject master’s degrees held by individuals in the present study were in the discipline of
English or related fields, six (15%) were in instructional technology or design, and six (15%) were in education or related fields.

A surprising number of subjects, 48 (48%), *never or rarely* used ID methods when creating IL instruction. Thirty-nine (39%) *frequently or always* used them, and 14 (14%) used ID methods *about half the time*. Twenty-seven (27%) participants indicated that they did not use any ID method, and 12 (12%) reported using multiple ID methods.

The majority of subjects, 70 (69%), indicated that they identified primarily as librarians in their current role; 31 (31%) identified primarily as teachers. Twenty-nine (29%) subjects listed *on-the-job training* as the primary method by which they learned ID methods. Twenty-six (26%) learned ID primarily through *academic courses*, 20 (20%) indicated that *workshops or other hands-on training* had been their primary means of learning ID, and 22 (22%) had never received any ID training.

**Research Question 1.** What is the relationship between respondents’ behavioral, normative, and control beliefs and their reported use of ID methods when designing IL instruction? This research question attempted to determine whether subjects’ beliefs about using ID methods influenced their decision to use or not to use those methods to design IL instruction. The three beliefs examined were as follows: (a) behavioral beliefs, which are an individual’s perception of the consequences of performing a certain action; (b) normative beliefs, or the perception of others’ approval or disapproval of that action; and (c) control beliefs, which are an individual’s perception of whether there are either stumbling blocks in the way of performing the action, or factors that would help them to perform it (Ajzen, 1985). When the quantitative data were analyzed, it was found that all three of these beliefs were moderately correlated with a subject’s subsequent
performance of the action in question, which is the use of ID methods to design IL instruction. In other words, the more subjects believed that there were positive consequences associated with the action, that others approved of it, and that they could control whether or not they performed it, the more likely they were actually to perform it. Subjects’ control beliefs were more strongly correlated with whether or not they performed the action than either behavioral or normative beliefs.

**Research Question 2.** How do various demographic factors, such as prior education or experience in ID, the length of professional work experience, primary job function, or educational level relate to instruction librarians’ use of ID when designing IL instruction? Because responses to questions in part one of the survey were insufficient to answer this research question, the analyses that were originally proposed could not be carried out. Instead, alternative analyses were performed to determine whether subjects’ use of ID methods was related to (a) the length of time they had worked in libraries, (b) the length of time they had taught IL in libraries, and (c) the type of training they had received in ID. According to these analyses, there was no relationship between the length of time working in libraries and use of ID methods. There were, however, positive relationships between the use of ID and the other two factors. The longer subjects had taught in libraries, the more likely they were to use ID methods when designing IL instruction. Also, subjects used ID methods either more or less depending upon the type of ID training they had received.

**Research Question 3.** Do librarians who self-identify as teachers use ID methods to create IL instruction more than those who do not? On the survey, subjects were asked whether they identified primarily as teachers or as librarians at their current jobs, and
were divided into two groups based on their answers to this question. The subjects were also asked about the extent to which they used ID methods to create IL instruction. When the two groups were compared in terms of their answers to the latter question, it was found that the teacher-identified subjects reported using ID methods to a much greater extent than the librarian-identified subjects.

**Research Question 4.** Why do instruction librarians adopt or reject ID methods to create IL instruction? Participants in the telephone interviews were asked why they chose to use or not to use ID methods to create IL instruction. They provided the following reasons for using ID methods: (a) they are the most appropriate tools to design instruction, (b) using these methods results in learner centered instruction, (c) librarians’ teaching role is valued in the workplace, (d) teaching is valued by a supervisor, and (e) the methods are consistent with best practices. The lack of time and the fact that instruction was sometimes designed by someone other than the librarian were reasons given for not using ID methods.

**Research Question 5.** In what ways do the qualitative data confirm or support the quantitative data? This question was answered by comparing comments made by interview participants to the results of the survey to see whether the former confirmed or contradicted the latter. The content of the interviews amply supported the conclusion of the survey analysis that behavioral beliefs were directly correlated with the use of ID methods; that is, the higher one’s score on the behavioral questions of ILBIS, the greater one’s tendency to use ID methods.

The comparison weakly supported the correlation between normative beliefs and the use of ID methods. Only two participants discussed normative factors in relation to
their use of ID methods, thus there were little data to analyze. Nevertheless, the data that do exist confirm the conclusion that participants tended to use ID more often when others approved of their doing so.

The comparison did not confirm the correlation between control beliefs and the use of ID methods. Lack of control over the use of ID methods was discussed by four of the seven participants, including those who used them rarely, about half the time, frequently, and always. This suggested that instruction librarians across the board perceived impediments to their use of ID methods, contrary to the expectation that only those who rarely or never used them would cite obstacles to their use. Participants’ comments, even those who frequently or always used ID methods, about feeling constrained in their ability to use them, tended to contradict the conclusions of the quantitative data. This was significant in that the quantitative analysis showed that control beliefs were most strongly correlated with ID use.

**Interpretation of Findings**

One of the goals of this study was to ascertain whether respondents’ behavioral, normative, and control beliefs were related to their reported use of ID methods when designing IL instruction. In order to determine this relationship, Pearson correlations were calculated between values for ILBIS question 7, which asked subjects to rate the extent to which they used ID methods when designing IL instruction, and the means of the behavioral, normative, and control construct scores. Analysis of these quantitative results indicated that there was indeed a significant positive relationship between behavioral, normative, and control construct scores and the use of ID when designing IL instruction. The control construct had the highest correlation at .59. The correlation for
the behavioral construct was .56, and for the normative construct, it was .53. According to the quantitative data, then, ID use was correlated most strongly with control beliefs, followed by behavioral and normative beliefs.

These conclusions were largely supported by the qualitative data. Examination of interview transcripts suggested that a positive attitude (one of the features of the behavioral construct) toward the use of ID methods was associated with an increase in their use. This supported the conclusion reached in the quantitative analysis that behavioral beliefs influenced participants’ decision to use ID methods. Participants identified factors that suggested they positively valued the use of ID methods; the more that they used ID methods, the more of these factors they mentioned during their interviews. Quantitative data also indicated that normative beliefs had a significant positive relationship with subjects’ reported use of ID methods when designing IL instruction. Although only two interview participants mentioned normative beliefs, their commentary supported the conclusion of the quantitative data.

Analysis of the quantitative data also showed a significant positive relationship between participants’ control beliefs and their use of ID methods. Interestingly, however, when examining the interview transcripts, subjects’ control beliefs were found to have little relationship with their decision to use or not to use ID methods. The main factor cited as an impediment to participants’ control over their use of ID methods was lack of time; this factor was mentioned by participants who used ID methods rarely, *about half the time*, frequently, and always. Although it was expected that inhibiting factors would be cited mainly by those who never or rarely used ID methods, the qualitative data found that these factors were ubiquitous. These data suggested that instruction librarians across
the board perceived time as an impediment to their use of ID methods, and tended to disconfirm the conclusions of the quantitative data. This discrepancy may be explained by a possible flaw in the behavioral control construct of the TPB identified by Trafimow et al. (2002), and discussed more fully in the Implications of Findings section of this chapter. It may also be possible that perceived behavioral control may be less predictive of behavior in certain situations, as suggested by Armitage and Conner (2001), who wrote that

in situations where (for example) attitudes are strong, or where normative influences are powerful, PBC may be less predictive of intentions. Thus . . . the magnitude of the PBC-intention relationship is dependent upon the type of behaviour and the nature of the situation. Indirect evidence for this claim has been demonstrated in studies that have shown that measures of attitude strength . . . and individual differences in sociability . . . increase the relative predictive power of attitudes and subjective norms, respectively. (p. 472)

The study also sought to determine the relationship between ID use and subjects’ demographic characteristics. Since responses were insufficient to establish these relationships, the $\chi^2$ calculations designed to analyze them could not be carried out as originally proposed. Instead, alternative $\chi^2$ analyses were calculated that revealed the following: (a) there is no significant relationship between the length of time participants have been working in libraries and their reported use of ID methods, (b) there is a significant relationship between the length of time teaching IL in libraries and the use of ID methods, and (c) there is a significant relationship between the use of ID and the reported type of training received. Thus, subjects who had taught IL for longer periods of time were more likely to use ID to design IL instruction. Subjects who had had academic training in ID were the most likely to use ID methods, while those who had never had any instruction were the least likely to use them.
Why was there no significant relationship between the lengths of time subjects had worked in libraries and their use of ID? One possible answer may lie in the fact that there is such a wide variety of specialties in academic librarianship. Besides reference and instruction librarians, there are catalogers, acquisitions librarians, circulation librarians, systems librarians, special collections librarians, music librarians, law librarians, and map librarians, to name a few. It is entirely possible that many subjects spent a portion of their careers in one of these areas, in which the word instruction is barely breathed, before being thrust into an instructional role.

In order to discover whether librarians who self-identified as teachers used ID methods to create IL instruction more than those who did not, a one-tailed $t$ test for independent sample means was calculated between mean scores of self-identified teachers and of self-identified librarians on question 7, which asked subjects to rate the extent to which they used ID methods when designing IL instruction. The $t$ test revealed that the former used ID methods to create IL instruction at a significantly higher rate than the latter. As already mentioned, 100% of the interview participants identified as teachers, and all had varying rates of ID use; therefore, no conclusions can be drawn about whether the quantitative data is supported by qualitative data.

When asked why they adopt or reject ID methods to create IL instruction, interview participants gave a variety of responses. One participant stated that he used ID methods because they were the most appropriate tools to design instruction, and that using ID methods results in instruction that is more learner centered. Another participant indicated that, in her workplace, librarians’ teaching role is valued by a supervisor. The desire to teach according to best practices was given as a reason for the adoption of ID
methods by another participant. The lack of time and the fact that instruction was sometimes designed by someone other than the librarian were reasons given for not using ID methods.

**Context of Findings**

Although much has been written about ways in which librarians can use ID methods to create IL instruction, no research to date has been identified that specifically establishes whether, and the extent to which, instruction librarians actually use ID methods. Prior studies mainly focused on practical aspects of using ID models and learning theories to create IL instruction. For example, the use of models such as ADDIE (Booth, 2011; Chang & Siao, 2012; Colborn, 2011; A. L. Davis, 2013; B. E. Fox & Doherty, 2011; Koneru, 2010; Kumar et al., 2012; Stern & Kaur, 2010; Summey & Valenti, 2013; Willis, 2011a, 2011b), Morrison, Ross, Kemp, and Kalman (Summey & Valenti, 2013), and Dick, Carey, and Carey (Mestre et al., 2011) to create IL instruction have been described in the literature.

Other authors have focused on using behavioral (Blummer et al., 2010; Bobish, 2011; Stiwinter, 2013) and constructivist (Blummer et al., 2010; Bobish, 2011; Colborn, 2011; Koneru, 2010; Magnuson, 2012; Rand, 2013; Willis, 2011b) learning theories as guides to creating IL instruction. The use of ID methods to create DLOs has also been detailed (Anderson & Mitchell, 2012; B. E. Fox & Doherty, 2011; Gunn & Miree, 2012; Markey et al., 2011; Mestre et al., 2011; Stiwinter, 2013; Sult et al., 2013; Tooman & Sibthorpe, 2012). The present study extended this prior research by focusing on the fundamental question of whether, and to what extent, instruction librarians used ID methods to create IL instruction.
Implications of Findings

The findings of the study have several practical implications. Library educators may be able to use these findings to design or redesign library school curricula. The insights gained in the study could shed light on why individuals may be reluctant to use ID methods, and educators could design instruction to address impediments to using ID. Similarly, library administrators might use the findings to design professional development experiences. Future researchers will benefit from having a starting point for research into the numbers of instruction librarians using ID and their reasons for using it.

The findings also call into question whether the TPB (Ajzen, 1985), as currently conceived, accurately predicts intention and behavior. Trafimow et al. (2002) hypothesized that the construct of perceived behavioral control might more usefully be viewed as two separate constructs, those of perceived control and perceived difficulty. They distinguished between these two constructs in the following way: “Perceived control refers to the extent to which people consider the performance of a behaviour to be under their voluntary control. Perceived difficulty refers to whether people consider a behaviour to be easy or difficult to perform” (p. 101). The findings of Trafimow et al. supported separating the construct, and suggested that perceived difficulty better predicted intention and behavior than perceived control.

The discrepancy between the quantitative and qualitative data for Research Question 1, specifically the conclusion drawn from the quantitative data that the control construct was the greatest determinant of ID use and the failure of the qualitative data to confirm that conclusion, may be explained by the hypothesis put forth by Trafimow et al. (2002). Because the present study did not differentiate between perceived control and
perceived difficulty, it is impossible to determine how survey subjects or interview participants would have scored on measures of these constructs. Still, when interviewed about their control beliefs, the main impediment to using ID methods participants cited was lack of time, which would seem to refer to the perceived control construct in the scheme suggested by Trafimow et al. It is worth noting that not one participant indicated that they refrained from using ID methods because it was too difficult to do so. These observations suggest that the predictive power of the TPB (Ajzen, 1985) might be improved by splitting the control construct into two separate constructs, as described by Trafimow et al.

**Future Directions**

Future researchers might address the three major questions that were left unresolved by this study. First, the study failed to establish a relationship between respondents’ control beliefs and their use of ID methods; the quantitative and qualitative data for Research Question 1, which sought to determine the relationship between respondents’ behavioral, normative, and control beliefs and their reported use of ID methods, appear to contradict each other. While quantitative data indicated that the control construct was most strongly correlated with use of ID methods, qualitative data suggested otherwise. One explanation for this discrepancy is that the control construct of the TPB (Ajzen, 1985) may not adequately predict behavioral intention. Future researchers may wish to explore whether behavioral intention is better predicted when the control construct is split into two separate constructs, those of perceived control and perceived difficulty.

Second, Research Question 2 could not fully be answered due to lack of data. This
research question attempted to establish how various demographic factors, such as prior education or experience in ID, the length of professional work experience, primary job function, and educational level relate to instruction librarians’ use of ID methods when designing IL instruction. Because the data were inadequate, it is still unknown whether there are correlations between ID use and (a) primary job function and (b) educational level. Future research might establish correlations between ID use and these or other factors.

Third, comparison of quantitative and qualitative data for Research Question 3, which aimed to determine whether librarians who self-identify as teachers use ID methods to create IL instruction more than those who do not, was not possible due to the fact that 100% of participants identified as teachers. Future researchers might pay special attention to the recruitment of interview participants who identify primarily as librarians. Comparison of the qualitative responses of both these groups to quantitative data would strengthen the conclusions drawn in this study.

The attitude factors identified in Research Question 5 (Table 15) could be used to guide further qualitative inquiry about behavioral beliefs. Questions based on these factors could be formulated and used to predict the likelihood that subjects will use ID methods.

Finally, replicating the study using a random sampling procedure, rather than convenience sampling, would strengthen the results, as would increasing the sample size. Member checking of qualitative results would ensure their validity.

Summary

The purpose of this sequential explanatory mixed methods study was to determine
whether instruction librarians in the United States and Canada were using ID methods, and to identify potential explanations for their adoption or rejection of those methods. In this chapter, the findings of the study were summarized and discussed.

Quantitative analysis found that there was a significant relationship between behavioral, normative, and control beliefs and the use of ID methods. High control construct scores were most strongly correlated with ID use, although qualitative data did not confirm this conclusion.

No relationship was found between the length of time working in libraries and use of ID methods. Positive relationships were, however, identified between use of ID and two other factors: the length of time subjects had taught in libraries, and the type of training they had received in ID. Individuals who primarily identified as teachers were also found to be more likely to use ID methods than those who primarily identified as librarians.

When interview participants were asked why they used ID methods, they gave the following reasons: (a) they are the most appropriate tools to design instruction, (b) using these methods results in learner centered instruction, (c) librarians’ teaching role is valued in the workplace, (d) teaching is valued by a supervisor, and (e) the methods are consistent with best practices. When asked why they declined to use ID methods, they replied that they often lacked the time to do so, and also said that instruction was sometimes designed by someone else.

Interpretations of the findings were provided, and possible reasons for discrepancies between quantitative and qualitative findings were offered. Findings were examined in the context of existing literature on the topic, theoretical and practical
implications were discussed, and recommendations for future research were made.
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Appendix A

Instruction Librarians’ Behavioral Intention Survey (ILBIS)
Instruction Librarians' Behavioral Intention Survey

Consent to Participate

Title of Study: Librarians’ Use of Instructional Design Methods in Creating Information Literacy Instruction

Principal Investigator: Michael W. Wilson, MLIS, SLIS

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Office of Grants and Contracts
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IRB@nsu.nova.edu

Site Information
Information Literacy Instruction Discussion List
http://lists.ala.org/wws/infoilkI-

Description of Study: Michael W. Wilson is a doctoral student at Nova Southeastern University engaged in research for the purpose of satisfying a requirement for a Doctor of Education degree. The purpose of this study is to determine whether instruction librarians in the United States and Canada use instructional design methods to create information literacy instruction.

If you agree to participate, you will be asked to complete the attached survey. This survey will be used to measure the relationship between respondents' beliefs about instructional design methods and their subsequent use or non-use of those methods. The survey will take approximately fifteen to twenty minutes to complete.

Survey participants will be asked to volunteer to participate in qualitative interviews, which will explore the reasons for participants' adoption or rejection of instructional design methods in creating information literacy instruction. These interviews will be audio recorded using the Recorderator service (www.recordator.com). The audio recordings will be available to be heard by the principal and co-investigators and the IRB. The principal investigator will transcribe these recordings and keep the transcripts in a locked file cabinet in his office. The audio files and transcripts will be kept for 36 months and destroyed after that time using secure file shredding software. Because your voice will be potentially identifiable by anyone who hears the recording, your confidentiality for things you say on the recording cannot be guaranteed, although the researcher will try to limit access to the tape as described in this paragraph.

Risks/Benefits to the Participant: There may be minimal risk involved in participating in this study. There are no direct benefits to for agreeing to be in this study. Please understand that although you may not benefit directly from participation in this study, you have the opportunity to further scientific knowledge of the practices of those who teach information literacy. If you have any concerns about the risks/benefits of participating in this study, you can contact the investigators and/or the university's human research oversight board (the Institutional Review Board or IRB) at the numbers listed above.
Cost and Payments to the Participant: There is no cost for participation in this study. Participation is completely voluntary and no payment will be provided.

Confidentiality: Information obtained in this study is strictly confidential unless disclosure is required by law. All data will be secured in a locked filing cabinet. Your name will not be used in the reporting of information in publications or conference presentations.

Participant’s Right to Withdraw from the Study: You have the right to refuse to participate in this study and the right to withdraw from the study at any time without penalty.

I have read this letter and I fully understand the contents of this document and voluntarily consent to participate. All of my questions concerning this research have been answered. If I have any questions in the future about this study they will be answered by the investigator listed above or his/her staff.

I understand that the completion of this questionnaire implies my consent to participate.

Instruction Librarians' Behavioral Intention Survey

Directions

This survey consists of 31 questions divided into two sections. It should take approximately 15 – 20 minutes to complete. Section I (items 1 – 11) consists of questions about your current position and your educational background. Section II (items 12 – 31) presents a series of statements about your use of instructional design methods; you are asked to rate your agreement with each of these statements using a five-point scale, with choices ranging from "strongly disagree" to "strongly agree."

Definition of Instructional Design Methods

For the purposes of this study, an instructional design method is defined as a systematic process for planning and creating an instructional experience (such as a class presentation, a tutorial, an entire course, etc.). This process may involve the use of strategies, models, methods, or principles that are based on one or more design theories and used to organize instruction. Some examples of instructional design methods include ADDIE; Dick. Carey and Carey; Morrison, Ross, and Kemp; Gagné's Nine Events of Instruction; Merrill’s First Principles of Instruction; and Bloom's Taxonomy.
### Instruction Librarians’ Behavioral Intention Survey

**Section I**

* 1. Do you work in an academic library in the United States or Canada?
   - Yes
   - No

### Instruction Librarians’ Behavioral Intention Survey

**Section I (continued)**

* 2. What percentage of your job is devoted to information literacy instruction?
   - I have no responsibility for information literacy instruction
   - Up to 50% of my job is devoted to information literacy instruction
   - More than 50% of my job is devoted to information literacy instruction

### Instruction Librarians’ Behavioral Intention Survey

**Section I (continued)**

* 3. How long have you been working in libraries?
   - Fewer than 2 years
   - Between 2 and 10 years
   - Between 11 and 20 years
   - 21 years or more

* 4. How long have you been teaching information literacy in libraries?
   - Fewer than 2 years
   - Between 2 and 10 years
   - Between 11 and 20 years
   - 21 years or more
5. What is your educational background? Please check all that apply.

☐ Doctorate
☐ Specialist's degree
☐ Subject master's
☐ MLIS or equivalent university degree
☐ Library technician's training
☐ Other (please specify)

6. If you have a doctorate, a specialist's degree, or a subject master's, please indicate your discipline or major below.


7. To what extent do you use instructional design methods when you design information literacy instruction?

☐ Never
☐ Rarely
☐ About half the time
☐ Frequently
☐ Always

8. What specific instructional design methods do you use when creating information literacy instruction? Please select all that apply.

☐ I do not use instructional design methods (that's okay—please continue with the survey)
☐ ADDIE
☐ Dick, Carey and Carey
☐ Morrison, Ross, and Kemp
☐ Gagné's Nine Events of Instruction
☐ Merrill's First Principles of Instruction
☐ Bloom's Taxonomy
☐ Other (please specify)

9. In your current role, do you see yourself primarily as a teacher or as a librarian?

☐ As a teacher
☐ As a librarian
* 10. What is the main way in which you have been trained in using instructional design methods?
   - On-the-job training
   - Formal academic courses in instructional design
   - Workshops or other hands-on training
   - I have never been trained to use instructional design methods
   - Other (please specify)

* 11. Would you be willing to participate in a brief (10 to 15 minute) telephone interview about your use of instructional design methods?
   - Yes. Please enter your email address below so that we may set up a time for the interview. NOTE: Your email address is protected; no one but the researcher will see it. If you would prefer not to enter your email address here, please contact the researcher, Michael Wilson, at wilsonmi@nova.edu to schedule an interview
   - No

Your email address

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**Instruction Librarians’ Behavioral Intention Survey**

**Section II**

* 12. Instructional design methods are useful in creating information literacy instruction.

<table>
<thead>
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<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neither agree nor disagree</th>
<th>Agree</th>
<th>Strongly agree</th>
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* 13. The advantages of using instructional design methods to create information literacy instruction outweigh the disadvantages of using them.

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* 14. Using instructional design methods to create information literacy instruction is a good idea.

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* 15. I feel that using instructional design methods will help my students learn more about information literacy.

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* 16. I feel that using instructional design methods to create information literacy instruction will improve students' satisfaction with the course.

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* 17. I feel that using instructional design methods to create information literacy instruction will improve students' grades.

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* 18. I feel that using instructional design methods to create information literacy instruction will improve students' evaluation of the course or instruction.

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* 19. Designing information literacy lessons in advance, using instructional design methods, is compatible with the way I teach.

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* 20. My peers are using instructional design methods to create information literacy instruction.

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* 21. My peers think I will benefit from using instructional design methods to create information literacy instruction.

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<td>22. My supervisor confirms my ability and knowledge to use instructional design methods to create information literacy instruction.</td>
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<td>23. My supervisor thinks it is important that I use instructional design methods to create information literacy instruction.</td>
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<td>24. My students think it is important that I use instructional design methods to create information literacy instruction.</td>
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<td>25. I have been reading and hearing more about the use of instructional design methods to create information literacy instruction.</td>
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<td>26. Using instructional design methods to create information literacy instruction is entirely within my control.</td>
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<td>27. I have the knowledge and ability to use instructional design methods to create information literacy instruction.</td>
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<td>28. I would feel comfortable using instructional design methods to create information literacy instruction.</td>
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* 29. I could easily use instructional design methods to create information literacy instruction on my own.

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* 30. I have enough time to use instructional design methods to create information literacy instruction.

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* 31. I have appropriate resources to use instructional design methods to create information literacy instruction.

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32. If you have any final comments, or if you would like to qualify your answers to any of the above questions, please do so in the comment box below.
Appendix B

Qualitative Telephone Interview Questions
1. If you currently use instructional design methods when creating information literacy instruction, what are your reasons for doing so?

2. If you currently do not use instructional design methods when creating information literacy instruction, what are your reasons for not doing so?

3. If you currently do not use instructional design methods when creating information literacy instruction, are there other methods or models that you use to design instruction?

4. What do you enjoy about instructional work?

5. What challenges have you experienced in instructional work?

6. Do you consider teaching to be part of your professional identity? Please elaborate.

7. Do you have any other comments related to your experience as an instructor in libraries?
Appendix C

Listserv Solicitation
Dear colleagues,

I am a doctoral student at Nova Southeastern University, and I am completing a dissertation that explores instruction librarians’ use of instructional design techniques (for example: ADDIE, Gagné’s Nine Events of Instruction, Bloom’s Taxonomy, etc.). Please consider participating in my research by completing a brief (approximately 15 minute) survey.

The survey is open to academic librarians who conduct any kind instructional activity, so whether you only provide an occasional 50-minute information literacy session or you regularly teach credit-bearing courses, this survey is for you! Even if you do NOT use instructional design techniques, your participation is welcome—and important! The survey results will be used to inform the practice and future research of instruction librarians, instructional designers, and library educators.

To access the survey, please click the link below, or copy and paste the URL into your browser’s address bar:

https://www.surveymonkey.com/s/ILBISsurvey

A response by February 23, 2015 would be most appreciated. Thank you for your willingness to complete the survey!

Sincerely,

Michael W. Wilson
Nova Southeastern University