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# Design-based research for LIS

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## Abstract

Design-based research is a methodology emerging from the field of education that may hold potential for research in library and information science (LIS). Based upon the assumption that learning is situated in a real-world context, design-based research combines research, design, and practice into one process. It results in usable products that are supported by a theoretical framework. While definitional and methodological issues do exist, the method holds some promise for research into “user-centered” information systems and services. In the field of LIS, design-based research might contribute to our understanding of how people find, choose, understand, and use information in context. The method is also of interest to professionals concerned with “evidence-based practice.” This article will first explain and describe the method as it has been used in the allied field of education. Issues related to definition and methodology will be explored, as well as some of the solutions that have been proposed. The method will then be related to LIS, using the bonded design work of Large, Nasset, Beheshti, and Bowler [Large, A., Nasset, V., Beheshti, J., & Bowler, L. (2006a). Bonded design: a methodology for designing with children. In S. Kurniawan & P. Saphiris (Eds.), *Advances in Universal Web Design and Evaluation: Research, Trends and Opportunities*. London: Idea Group., Large, A., Nasset, V., Beheshti, J., & Bowler, L. (2006b). “Bonded design”: a novel approach to intergenerational information technology design. *Library and Information Science Research*, 28, 64–82] as a case study to demonstrate the applicability of design-based research to LIS inquiry.

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## 1. Introduction

The relationship between theory and practice is an ongoing concern for both researchers and professionals in library and information science (LIS). How can we build useful theory that translates easily into practice? Design-based research holds promise as a method that can bridge the theory/practice divide, particularly in the design of “user-centered” information systems and services. A research methodology emerging from the field of education, it is based upon the assumption that learning is situated in a real-world context. Design-based research combines research, design, and practice into one process, resulting in usable products that are supported by a theoretical framework. This article discusses the history and development of design-based research in education, examines some of the problems related to its external validity, and relates this emerging methodology to the unique concerns of LIS. It points to potential areas of inquiry where the methodology may have an impact.

## 2. What is design-based research?

In its earliest days, design-based research was referred to as a “design experiment” (Brown, 1992). The name has changed due to problems resulting from the misinterpretation of “experiment,” a word that suggests a controlled environment and therefore connotes a different intent. Design-based research is not to be confused with the design of research. Nor is it the same as a design study—research that creates new products in a formative manner but does not necessarily contribute explanatory models or theory.

The roots of design-based research in education lie in the design sciences—engineering, aeronautics, architecture, and product design (Zaritsky, Kelly, Flowers, Rogers, & O'Neill, 2003). These fields of endeavor strive to create usable products through an iterative and context-based process. The design sciences are concerned with the production of “artefacts or designed interventions” (Gorard, Roberts, & Taylor, 2004, p 578). In designing and testing the product, researchers often discover explanations as to *how* and *why* the product functions. Early research phases in these domains are akin to the iterative, *in situ* processes practiced in design-based research. Indeed,

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educational theorists have referred to design-based research as the engineering of innovation in everyday settings (Bell, 2004, p. 251).

### 2.1. An emerging methodology

Design-based research is a relatively new approach to the discovery of how people learn. As “intervention research designed to inform practice” (Brown, 1992, p. 143), it serves a wide range of “families” in the educational domain—including instructional design, educational and cognitive psychology, and the cultural psychology of the classroom. The varieties of epistemological views, coupled with the relative newness of the method, have confounded the act of defining design-based research. While the exact boundaries of design-based research are still under negotiation within the educational community, the methodology can be broadly described as packaging theory, design, and diffusion (or practice) into one methodological unit for the purposes of studying phenomena in complex social settings (which, in the case of educational research, is often classroom learning). Design-based research in education is driven by two broad goals—to develop educational products (loosely defined as educational technologies, curricula, or participant structures) that work and to build a theoretical framework for future designs. Translated to LIS, those goals might be to develop information products and services that work, while at the same time building a corpus of theory about how people interact with information.

Brown and Campione’s *Fostering a Community of Learners* (FCL) project (Brown, 1992; Brown & Campione, 1998; Collins, Joseph, & Beilaczyc, 2004) resulted in a new curriculum model for Grades 1 to 8. It is considered to be the starting point for design-based research in education (referred to by Brown as a “design experiment”). The FCL curriculum model was developed over the span of a decade, beginning with Palinscar and Brown’s (1984) work on “reciprocal teaching”, an intervention designed to develop reading comprehension skills. It was grounded on the principle of shared discourse. The FCL design-based research resulted in a definitive set of principles of learning, setting the basis for a new curriculum model in which students work collaboratively in small groups—within a community of learners—researching, sharing knowledge, and preparing a product on a topic of interest. To support this community of learners, researchers designed a variety of classroom interventions, such as guided writing and composing, consultation with subject matter experts outside the classroom, cross-age tutoring and, as mentioned earlier, reciprocal teaching (Brown & Palinscar, 1987, 1989; Palinscar & Brown, 1984). The interventions evolved as they were iteratively tested, revised, and re-tested within classroom and laboratory settings, within the framework of the *Fostering a Community of Learners* project. The process ultimately resulted in a working design for a series of classroom interventions, a plausible explanation for why they worked, a set of guiding principles for teaching and learning, and, finally, positive outcomes for the learner.

In the FCL project’s early days, it was not identified as design-based research. Not until 1992, after more than a decade

of successive design refinements, was the methodology finally given a name and positioned as a distinct method in educational research (Brown, 1992; Collins, 1992). In this early articulation of the research method, Brown (1992) unapologetically explained that it was modeled “on the procedures of design sciences such as aeronautics and artificial intelligence” in order to “engineer innovative educational environments and simultaneously conduct experimental studies of those innovations” (p. 141).

What made the FCL project distinct from other educational research? Most notably, it married three distinct components—research, design and practice—into one seamless unit. In other words, the act of developing educational interventions went hand-in-hand with theory generation and the actual practice of teaching, leading to the creation of what has been called “usable knowledge” (Lagemann, 2002, in Sandoval & Bell, 2004, p. 199) or theory that does “real work” (Cobb, Confrey, diSessa, Lehrer, & Schauble, 2003, p. 13).

Design-based research, however, is more than just “making things to see if they work” (Sandoval, 2004, p. 222). It expands the design-test cycle to include “explain” and “practice,” producing usable designs while simultaneously explaining why the designs work—*simultaneously* being the operative word. The design is the hypothesis, the intervention, and the outcome. Merging what was traditionally a three-stage process—theory building, theory testing and theory adoption—into one research design has allowed for the creation of theories of practice rather than “developing theory that can be translated later into practice” (Sandoval, 2004, p. 222). In sum, design-based research is iterative, interventionist, and theory-oriented. It tests *and* generates hypotheses. It is contextual, authentic, and immersive. It is collaborative and learner centered (Kelly, 2003). Those interested in “evidence-based practice” in LIS may find this intertwining of research, design, and practice to be directly relevant to their concerns. Table 1 sets out the general characteristics of design-based research.

The broad base of research foci served by the design-based methodology suggests that this “complex interventionist research” (Bell, 2004, p. 246) might have wide applicability, especially to other domains of study into human behavior. The practice and design of library and information systems and services might be one such area. There is a natural alignment

Table 1  
General characteristics of design-based research

<ul style="list-style-type: none"> <li>• Multi-purpose: Serves theory, design, and practice</li> <li>• Research conducted in context (i.e., situated learning)</li> <li>• Researchers, practitioners and users are part of the context</li> <li>• User-centered design: Users involved in the design and formative evaluation of the product</li> <li>• Longitudinal, iterative</li> <li>• Pragmatic: Interventions delivered in a life-like way</li> <li>• Uses a combination of mixed methods (quantitative or qualitative, as the need demands)</li> <li>• Secondary research questions can evolve or emerge, as the need demands</li> <li>• Creates emerging theory (prototheories or models)</li> <li>• Produces a working artifact (a curriculum, program of studies, participant structure, learning environment, or a piece of software)</li> </ul>
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between design-based research's commitment to studying humans in context and the user-centered paradigm of LIS.

## 2.2. Problems classifying design-based research: What exactly is it?

Notwithstanding the expanded use of design-based research in education, there continues to be much debate within the learning sciences community surrounding this methodology. Problems remain, the least of which is the difficulty of defining what kind of methodological "family" design-based research falls into. Is it qualitative or quantitative research? Is it testing hypotheses or creating them? There is a sense that it must be "either or." Because it incorporates methods from both epistemological views, it can be neither. But this flexibility is one of the strengths of design-based research. Brown (1992), an early adopter of design-based research, used a mixed approach because it allowed her to see "the magnitude of the effect in terms of outcome measures and to get a feel for the phenomenon itself" (p.156).

Design-based research is, like all design, a process. The questions one asks depend on where one is situated along the continuum of development. In other words, the method fits the question of the moment. Several frameworks exist for integrating quantitative and qualitative methods into a cohesive whole. Gorad, Roberts and Taylor (2004) suggest that design-based research be conceptualized in an evolutionary way, as a form of "experimental trials" in the same vein as medical research conducted in complex health education interventions. Such interventions move through phases, or trials. In the earliest phases, the design is launched and formatively evaluated using qualitative methods such as focus groups, interviews, observations, and case studies. As the design is re-evaluated, refined, and scaled up, methods shift toward quantitative measures. Given, however, that medical interventions begin and end with tightly defined outcomes and many design-studies do not, a direct application of the "experimental trials" model might be difficult. Nevertheless, this model offers one framework for integrating quantitative and qualitative methods into a cohesive whole.

Bannan-Ritland (2003) describes a similar research cycle that is not directly modeled upon medical research. Labeled as the Integrative Learning Design Framework (IDL), it is intended to move a design-based study beyond the idiosyncratic and individual. The framework moves dynamically from *informed exploration*, through to *enactment*, followed by *evaluation: local impact*, and finally, *evaluation: broader impact*. As the design project progresses through each stage, the methods used to collect data shift from the qualitative to the quantitative, allowing for a systemic analysis of the design's impact.

## 2.3. Validity or preferability?

Because design-based research is necessarily messy, there are concerns related to external validity and skepticism regarding knowledge claims (Shavelson, Phillips, Towne, & Feuer, 2003; Sloane & Gorard, 2003). The lack of control groups, shifting methods of data collection and measurement, and the constant refinement of the design have led to a certain

"queasiness about DBR" amongst some educational researchers (Dede, 2004, pp. 106). Collins et al. (2004) acknowledged that serious challenges do exist, but they believed these challenges must be looked at in the context of the purpose of such studies. In other words, there are lessons that design-based research can teach us and lessons that it cannot. It may be that what design-based research is best at is describing usefulness and practices that are *preferable* in real-world contexts, rather than supporting broad laws of human behavior. Theory that is developed within a controlled, laboratory environment may lay claim to external validity. However, it may lack ecological validity and make no sense in the real world. The strength of design-based research is that it happens in context, within the framework of the real worlds of students or, in the case of LIS, information seekers.

Nevertheless, design-based research produces messy, aggregated data; blurs researcher, practitioner, and user roles; and mixes methods. And even as design-based research makes claims to authenticity, in some ways it is a false claim because the context is not natural. As O'Donnell (2004) expressed it in terms of educational research, "it represents the joint researchers, teachers, students, and others who, in the normal life of a school, do not typically work so closely" (p. 257). Removing the researcher changes the context again. Can such a method produce a definitive statement about human behavior? How, with such lack of control, can design-research ever reach the "gold standard" of research validity—randomized trials?

A look at other fields of design and how they validate their findings might be useful. Zaritsky et al. (2003) looked to the fields of engineering and management for answers. Unlike in the academy (the traditional forum for research), the fields of engineering and management validate a product through pragmatic indicators of success. Zaritsky et al. asked, "Do a significant number of people adopt and use the products of the research? Is its use (particular to the situation) sustained, cost effective, and perceived as valuable by the user?" (p. 33). The ultimate criterion for success in these fields is, according to Zaritsky et al., whether a product is actually used in real ways. Bannan-Ritland (2003) continued the theme of usability in an effort to set out a framework for planning design-based research. The purpose of design-based research, she claimed, is to go beyond broad generalizations about theory and ask, "For whom is this product most applicable and for what purpose?" Sloane and Gorard (2003) took the argument further, suggesting that design-based research shares with the applied sciences (engineering, computer sciences) a central underlying principle—to avoid failure. Looked at from this pragmatic point of view, the validity of design-based research in the context of LIS might mean designing information systems that work due to the system's ability to meet local needs in individual applications, not because of the development of "big picture" theory. Perhaps this is a useful way to begin thinking of a research methodology grounded in practice.

## 2.4. Theories or models: What is the end game?

Design-based research presents multiple barriers to theory-building. The typically small sample sizes, lack of control



groups, and the iterative, pragmatic nature of the designed intervention make it difficult to identify exactly what factor or factors contributed to the success or failure of the product. However, some argue that the very strength of design-based research is the thick description, triangulated data from multiple sources, repeated across cycles of enactment and over an extended length of time. Despite this argument, many researchers still debate the ability of one design-based study to make strong theoretical claims. One solution to the problem might be to expand, rather than retract, the number of design-based studies. This would generate sufficient data to conduct the kind of meta-analyses that synthesize a collection of studies into a unified whole. (Two examples are systemic reviews such as the Cochrane Collaboration and the Campbell Collaboration, used respectively in health care and the social sciences). [Collins et al. \(2004\)](#) suggested the design-based research community establish an infrastructure—a data archive—that would allow the entire research community to share and analyze the massive amounts of data collected in design-based research (p. 40). [Dede \(2004\)](#) went further and suggested that successful design-based research projects should split into subgroups: one theory-driven and bounded by the “rules” of experimental design, the other a “scalable variant for widespread use” (p. 114).

It may be, of course, that design-based researchers have set their sights in the wrong direction and what they are really doing is model-building, not theory-building. If this is the case, then perhaps generalizing to the level of theory should not be considered the end-game for this emerging methodology. Furthermore, if design and innovation are integrally related to a contextual framework, as many in the design-based research community believe, then the great strength of design-based research may actually be its level of specificity and not its generalizability.

### 3. Why should LIS consider design-based research?

While questions remain and particularities of the method continue to be debated, consensus is slowly building within the field of education as to the nature and purpose of design-based research. Perhaps it is time for the LIS community to take a look at this method. (Note: There may be those in the LIS research community who have already adopted this methodology. As they have not identified their studies specifically as “design-based research”, this study is reluctant to do so on their behalf. The purpose here is to initiate discussion regarding this research method. It is not an attempt to categorize a body of studies, perhaps erroneously, into this type of research method). If one accepts that design-based research is a “fundamental mode of scholarly inquiry that is useful across fields of the academy” ([Bell, 2004](#), p. 251), as many in the learning sciences do, then exploring this methodology is a useful and timely endeavor for those in the field of LIS.

#### 3.1. A common interest in the transmission of human knowledge

What purpose would design-based research serve in LIS? To answer this question, let us begin with [Bates \(1999\)](#), an article

that sets out to define information science. According to her, information science and education share the common characteristic of being meta-fields—fields of study and research that cut “across...the conventional academic disciplines” (p. 1044). Both fields are concerned with the transmission of human knowledge in general, not the actual content of that knowledge. LIS and education study the same phenomenon—human knowledge—albeit through two distinct lenses. While education looks at teaching and learning, LIS focuses on selecting, organizing, storing, retrieving, disseminating, and using information. (A caveat should be added here in relation to the area of information literacy, which is an interesting mixture of education and information science). These shared “roots” suggest that research methods developed within the domain of education might be adaptable to suit the purposes of LIS. Educational researchers have found design-based research to be a useful paradigm for inquiry into human knowledge for many reasons—its focus on the learner/user; its authenticity and ecological validity; its richness; its marriage of theory and practice; its “do-ability” and the end result of a usable, working product. Many of these are also valid in the context of at least some LIS research.

While a shared interest in the transmission of human knowledge suggests that research methods developed in the crucible of one domain might be useful in another, there are reasons unique to LIS for using design-based research as a method of inquiry. Three such reasons are the shift from a system-centered paradigm to one that puts the user at the center of our service, an understanding of the importance of social and cultural contexts to information behavior, and an emerging interest in evidence-based practice in librarianship. They are elaborated below.

#### 3.2. User-centered design of information services and products

Calls for a shift in focus from a system-centered to user-centered perspective arose, at least in part, out of the emergence of information retrieval systems that could be operated without expert intermediation and a need to understand how to serve a new clientele of end users better. Quite simply, in the age of disintermediation where users will actually search for the information, understanding their information behavior is a critical step to designing systems that are functioning and usable. This shift in thinking was articulated by [Dervin and Nilan \(1986\)](#), who identified a research gap in the practice and evaluation of information systems. They appealed to the LIS community to place user-defined information needs and uses at the center of its endeavors. [Nahl \(2003\)](#) outlined this shift toward a user-centered paradigm in her article, *The user-centered revolution: Complexity in information behavior*. Although the paradigm shift was indeed a revolution, it is now commonplace for information professionals to consider users in the design of systems and services. Indeed, it is a core competency of librarianship, as reflected in documents produced by professional organizations such as the Reference and Users Services Association (RUSA) ([RUSA Task Force on Professional Competencies, 2006](#)).

One of the most appealing aspects of design-based research is its emphasis on the user. Lobato (2003) speaks of how design-based research uses an “actor-oriented transfer model” to understand learning (p. 18). This approach is similar to the user-centered paradigm in LIS. In both cases, the needs, abilities, and local context of the actual consumer of a product (service or system) shape its design. In this respect, expertise comes from the user of the product and not from an intervening source. If we view the users as the experts in their own needs, then their inclusion from the earliest stages of development is fundamental. In the field of education, the student then becomes the “expert;” in LIS, the “expert” is the user of information.

Traditionally, product design has turned to the user only in the latter stages of design, in order to see whether a product works. Even in designs that were preceded by user studies, the overall functionality of the product has been set by the designer. The difficulty with this approach is that the designer may not have properly defined user needs or the problems to be solved. The history of information retrieval systems illustrates the potential incongruence between designers’ and users’ conceptions of need. Traditionally the problem of information retrieval has been interpreted from the system point of view: in terms of relevance based on the number of “matches” made by the system. But what if users of information retrieval systems define the problem in other ways, perhaps in terms of meaningfulness and usability? If this is the case, then there may be a mismatch between the current product design and the product that users actually want. The strength of design-based research lies in its ability to define the problem from a user’s point of view, thus providing designers with authentic definitions of the problem.

Information systems (library or computer-based) cannot definitively solve every information problem. Information-seeking occurs in the broader context of real-life situations that can be complex and messy, may happen over an extended period of time, and are context-sensitive. The best an information retrieval system can do is to provide an environment that, at a minimum, helps people move forward in the process. One way to create this friendly environment is to build broad profiles, scenarios, or sets of principles that match the user and his or her community. Design-based research is the ideal vehicle for developing such profiles. The high level of engagement with actual users and the iterative process of research makes it possible to experience a phenomenon from multiple perspectives. Instead of one snapshot, the spiral nature of design-based research means that the same problem can be viewed from many angles. Using this methodology, researchers can watch what happens, for example, in the information search process from the early stages through to the end stages. Or, researchers can watch the events during the same stage, over and over again, but with different sets of people. Potential questions in design-based research are: What criteria do users identify as important in the design of an information product or service? How can these criteria be implemented in a real product or service? How do the users react to this product or service, once a prototype is designed and built? Can the product or service be redesigned to incorporate this feedback?

### 3.3. *Understanding information behavior in context*

As its name suggests, user-centered design focuses on the user, typically from a cognitive, affective, or behavioral point of view. The lens has recently widened to include the social, organizational, and cultural contexts in which information users function. Much research flowing from the area of “information behavior” has reflected this perspective. Some examples can be found in the work of [Chatman, 1999](#); [Fisher, Durrance, & Hinton, 2004](#); [Given, 2002](#); [Pettigrew, 1999, 2000](#); and [Savolainen, 1995](#). This broader, more contextual perspective is also reflected in [Allen’s \(1996\)](#) “person-in-situation” model, a framework that is meant to be used for analyzing user needs in information system design (p. 88–90). The “person-in-situation” model acknowledges that users are influenced by both individual and social variables. Therefore, it is critical to understand the individual, the group that he or she operates in, *and* the interaction between the individual and the group—in other words, the person in the context of a social situation. The naturalistic, longitudinal, iterative, and multi-method approach of design-based research may provide the formula for the “complex research designs” [Allen \(1996\)](#) called for as a necessary step toward a coherent understanding of the person-in-situation (p. 103). Ethnographic studies can also reveal much about the person-in-situation, but they do not marry theory-building with practice and design. Design-based research seeks to do just that, within the context of the user/learner.

### 3.4. *Evidence-based practice*

Evidence-based practice (EBP) is relatively new to librarianship. A principle *and* a practice, it is based on the idea that professionals should rely on research-based empirical evidence and not anecdotes, rules-of-thumb or tradition. EBP (also called *evidence-based librarianship*) is more than just staying up to date with the literature. It asks practitioners to incorporate research into their daily practice by first generating research evidence and then applying it to determine policies, systems, and services. Design-based research mirrors this model of librarianship through its multi-dimensional focus on developing theory that serves practice in immediate ways.

There are many barriers to EBP, the first of which is that research in the area of library science is rather scant and therefore difficult to apply. In their review of the research base in librarianship, [Koufogiannakis and Crumley \(2006\)](#) found that only 30.6 percent of the articles published in the library literature in 2001 could be considered research. This led the authors to conclude that there “is still a need to establish a solid evidence base within our profession” (p. 324). Their review of the research literature also highlights areas where significant gaps in research knowledge continue to exist—information seeking, LIS analysis, LIS education, LIS theory, history, methodology, the profession, publishing, and scientific and professional communications. Clearly there is room for development. Librarians, however, face many obstacles in the production of research, such as a lack of funding, experience, and time. The collaborative nature of design-based research

might help overcome some of these obstacles by creating a supportive, apprentice-like structure for librarians new to research, thus allowing them to step into the research process.

#### 4. Scenarios for design-based research in LIS

One way to conceptualize design-based research in LIS is to frame it around the word *intervention*—a word not unfamiliar to librarians working in reference and information services (see Kuhlthau, 1994, 2004). Librarians could think in terms of design-based research that creates and test interventions that help users find, choose, understand, and use information. The notion of intervention is powerful because it suggests that practitioners in the information professions are not passive, inanimate objects who are indifferent to the experiences of users but instead are active agents of change. Our behavior and the information environments that we create either help or hinder the progress of users. We need to design interventions that actually work, whether in the form of information technology, curricula for a school library, or participant structures within libraries. At the same time, inquiry in LIS is relatively new and small (in comparison to other professional fields such as medicine or engineering). It begs for usable theoretical frameworks. A methodology that can deliver on both fronts may be useful to LIS.

There are many areas of inquiry in LIS that invite intervention; three that stand out are information literacy, reference services, and the design of information retrieval systems. One study from LIS that fills many of the design-based research criteria is the “Bonded Design” work of Large’s research team (Large et al., 2003a,b, 2004a,b,c, 2006, 2004, 2006a,b). Their work can be seen as a point of departure for future dialog into the nature, validity, and usefulness of design-based research in LIS. The “Bonded Design” research involved two intergenerational design teams whose task it was to design a Web portal interface for children. The project resulted in two working Web portals for young people; a set of design principles; and a model for collaborative, user-centered design. In addition, this research opened a tantalizing window into the information-seeking behavior of children by investigating both the ways that children *designed* a Web portal and the ways that children actually *used* the portal.

While the work of Large et al. did not set out to test how design-based research can be used in LIS, it may provide an example of LIS design-based research in action. In the tradition of Brown and Collins, who positioned the FCL project as a “design experiment” only after a decade of research (Brown, 1992; Collins, 1992), this article suggests, post-research, that the work of Large et al. has many of the hallmarks of design-based research. For example,

- The research “engineered” a new environment for developing information technology for children.
- The research resulted in artifacts or “products.” Two Web portals for children, to be used for a real-world purpose—school projects—which were evaluated by children operationally.
- The research was conducted *in situ*, in the real-life context of a school.

- The Web portals addressed a real-life problem for the children: How to find information for history/social studies projects.
- The research was iterative, longitudinal, and formative.
- The research used a combination of methods: (Bonded Design and, later, interviews, observation, focus groups, and descriptive statistics). Methods were chosen based on the stage of the design and the question of the moment.
- Participants included researchers, practitioners, and users.
- The research served both theory and practice through 1) the development of “Bonded Design,” a model that contributes to the theory of design (Bowler, Large, Beheshti & Nesset, 2005; Large et al., 2006, 2003a,b, 2006a,b), and 2) a set of design principles grounded in empirical evidence of children’s ways of searching (Large et al., 2006);

On the other hand, some elements of design-based research, at least from the world of educational research, were missing from the “Bonded Design” study. For example, while the design team included both researchers and practitioners, these two roles were in fact merged. To remain faithful to the design-based research method, perhaps the school librarian or school technologist could also have been involved (although all three researchers had professional training and work experience as librarians). Secondly, the study did not begin like traditional interventionist studies in education, where a “treatment” is applied to the participants. While the Web portals *were* the intervention, the initial *process* of designing the Web portal was not. In other words, designing the portals was not meant to be a training exercise in searching portals, although the children did learn much about information retrieval during the process. (In practical terms, this would have been impossible as the design team itself only produced a paper-based prototype; the working portals followed some months later). What the design process did reveal was children’s thinking about information retrieval, much as Brown’s “design experiments” revealed children’s use of strategies. (See Large et al., 2006, for more on children’s views on information retrieval.)

So is this design-based research or just an exercise in design? If the “Bonded Design” research does not follow all the “requirements” of design-based research in education, this may be more of a reflection of the unique attributes of research in the area of LIS than any failing on the part of the study. As Bates (1999) has pointed out, while education and LIS share a common concern for the transmission of human knowledge, the lens of LIS focuses quite differently on the phenomenon and may reflect different ontological concerns. It would be reasonable, then, to expect that design-based research in LIS has a different look than that which is conducted in service to education. Perhaps librarians need our own brand of design-based research.

More broadly, the difficulty of classifying research within the framework of a methodology that is still in its infancy is considerable. It simply leads us to ask whether the time has come for researchers from LIS to contribute to the broader discussion concerning design-based research. Fundamental questions need to be answered. Is design-based research a different animal



altogether, or is it simply a group of methods cobbled together as a convenient way to look at phenomena over a length of time and *in situ*? Is design-based research a form of scholarly inquiry? If so, should it be part of the “toolkit” of LIS research methods? What should it look like? Is it time to return to the roots of the design sciences—engineering, architecture, and product design—and re-interpret these methods through the lens of LIS?

## 5. Conclusion

Design-based research attempts to address the call for user-centered, context-based, evidence-driven practice. It works in the field, not in the artificial confines of the laboratory, and draws upon the authentic knowledge of practitioners and users. It sets out to solve real-life problems with innovative solutions, results in a working product that has been honed to suit the actual needs of its users, and contributes explanatory models or theory.

Design-based research is a way to concretize the research process for people who are not directly involved in it and bridge the gap between theory and practice. Too often the gap between what researchers do and what practitioners and even the general population understand is miles apart, creating a paradox. Researchers develop theory for use in real world situations, but practitioners reject it because it seems to have no basis in reality (Crowley, 2005). This is not a small concern. In order for practitioners to apply theory to their own practice, they must feel there is a good reason for doing so. On a broader level, garnering support from society for research and development depends on a sense that science is relevant to average people.

Given that there continues to be much discussion within the educational community concerning the challenges faced by designed-based research, the transfer of this method to the field of LIS will no doubt provide even more food for thought. The purpose of this article is not to solve the theoretical and methodological issues surrounding design-based research. Rather, this article aims to present both its strengths and weaknesses in order to begin a conversation about the value of design-based research to LIS.

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