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Radical Change Theory, Youth Information Behavior, and School Libraries

ELIZA T. DRESANG AND KYUNGWON KOH

ABSTRACT

School libraries confront significant changes in the digital age, the age of Web 2.0 and of participatory culture. Radical Change theory, based on the digital age principles of interactivity, connectivity, and access, is germane to understanding these transformations. The theory was originally developed to explain changes in digital age books for youth. It is expanded here through the creation of a typology and accompanying characteristics that address how digital age youth think and seek information; perceive themselves and others; and access information and seek community. As a basis for their typology, the authors provide detailed evidence from an extensive interdisciplinary review of research literature concerning youth information behavior. Also proposed is a multistage research agenda that involves applying Radical Change theory in various school library settings for proof of concept followed by an exploration of potential associations between digital age youth information behaviors and twenty-first-century learning skills. This theory development will assist in determining what implications the new information behaviors and resources have for libraries, schools, and other information environments and how information professionals can better help youth become skilled twenty-first-century information seekers.

School libraries in the United States confront significant changes in the digital age, the era of Web 2.0 and of participatory culture. Students and how they seek, use, create, and share information are changing at the same time that the resources they use or create are changing. As evident in national standards and guidelines, over the course of almost a century (1918–2009), the spotlight has moved from counting items to evaluating

programs to settling on the most important aspect of the school library—the learner. To reflect these changes, the *Standards for the 21st-Century Learner* (AASL, 2007), *Standards for the 21st-Century Learner in Action* (AASL, 2009), and *Empowering Learners: Guidelines for School Library Media Programs* (AASL, 2009) speak of multiple literacies, a continuing expansion of information, the social nature of learning facilitated by technology, and the school library as a place where students can practice the learning skills they need to deal with all of these changes.

The theory of Radical Change is based on the digital age principles of interactivity, connectivity, and access. It provides a promising theoretical framework for explaining contemporary changes in information behavior and resources as well as for serving as a guide for investigative studies and professional practice. The *radical* expansion of the theory proposed here is in step with the digital environment. The shift in emphasis of twenty-first-century school libraries makes an expanded Radical Change theory an especially important tool for school libraries in assessing and planning for the radical changes in students, their information seeking, and their expectations for resources.

A THEORY EXPANSION

Radical Change theory was developed in the 1990s to explain the alterations that were initially noted in the watershed picture book, *Black and White* (Macaulay, 1990), winner of the 1991 Caldecott Medal for the most outstanding picture book published in the United States in the previous year. Dresang and her colleague, McClelland, both members of the award committee, noted that although children appreciated this publication, adults seemed more hesitant to embrace it (Dresang & McClelland, 1995). Over the course of the last decade of the twentieth century, this explanatory theory rooted in digital age principles of interactivity, connectivity, and access was developed to explain not only the changes evident in *Black and White* but also those that appeared in a myriad of other contemporary books for youth. See table 1 for explanation of these digital age principles that underlie Radical Change theory.

Dresang (1999) developed a typology based on the three digital age principles of interactivity, connectivity, and access in which she identified

Table 1. Digital Age Principles

Principles	Definitions
Interactivity	Refers to dynamic, nonlinear, and nonsequential learning and information behavior with an increasing sense of control by end-users
Connectivity	Refers to sense of community or construction of social worlds that emerge from changing perspectives and expanded associations
Access	Refers to breaking of longstanding information barriers, bringing entrée to a wide diversity of formerly largely inaccessible opinion

three types of changes occurring in books for youth and described characteristics that would enable users to apply the theory accurately in identifying “digital age books.” It should be noted that the digital age principles explain all three types of books; the fact that there are three principles and three types of books is coincidental. As the title *Radical Change* implies, the characteristics of digital age books depart from, but are still related to, those of traditional handheld books for youth. Table 2 presents an overview of the three types of books identified by *Radical Change* theory and their identifying characteristics. It should be noted that in the typology the three types of books are not mutually exclusive, that is, any one book might exhibit characteristics of each type. There is no one-to-one correspondence.

Table 2. *Radical Change Typology: Digital Age Youth Literature*

Radical Change Types	Indicators
Type One: Changing Forms of Formats	Graphics in new forms and formats Words and pictures reaching new levels of synergy Nonlinear organization and format Nonsequential organization and format Multiple layers of meaning Interactive formats
Type Two: Changing Perspectives	Multiple perspectives, visual and verbal Previously unheard voices Youth who speak for themselves
Type Three: Changing Boundaries	Subjects previously forbidden Settings previously overlooked Characters portrayed in new, complex ways Unresolved endings

The original *Radical Change* theory has proved itself to be robust in terms of providing understanding and prediction of alterations in books for youth (Dresang, 2008). Soon after Dresang developed the theory to explain changes in youth literature, it became apparent that *Radical Change* theory could be applied to explain instances of youth information behavior as well (Pantaleo, 2008). An expansion of the theory describes the characteristics that will enable consistent identification of information behavior, as the three-part typology in table 2 does for books.

Building on the earlier work, the authors extend the theory by establishing three types of information behavior characteristic of digital age youth, which correspond to the types of radical change in handheld literature for youth and which are rooted in the three digital age principles explained in table 1. Some of the characteristics of information behavior in the digital age were also typical of information behavior in the past but these characteristics have become more pronounced, easily observed, and more widespread as a result of the development of digital culture.

The typology of youth information behavior in terms of Radical Change theory consists of *Type One: Changing Forms of Seeking Information and Learning* (the cognitive aspect of information seeking), *Type Two: Changing Perspectives* (identity and value negotiation), and *Type Three: Changing Boundaries* (information access and seeking community). See table 3 for an overview of the proposed Radical Change theory typology. In many cases, as is true with the corresponding book typology, the types are not mutually exclusive. Rather it is important to understand the relationships and interactions between all the aspects of youth information behavior.

The theory is unusually important in that it focuses on both people and resources—the interaction in the digital age between and the combination of users and information resources. It aims to explain how the changing nature of information resources, whether they are digital media resources or handheld books that exhibit digital age characteristics, influence the ways people seek, use, and impact these resources. The theory provides both a holistic and a dialectical perspective.

Youth information behavior is a complex process of interplays among various factors, such as young people's cognitive status, identity formation and value negotiation, and social interaction within a context. Reaching beyond technological determinism, the typology of youth information

Table 3: Radical Change Typology: Digital Age Youth Information Behavior

Radical Change Types	Questions	Characteristics
Type One: Changing Forms of Seeking Information and Learning	How do they seek information and learn?	Obtaining information through a variety of media sources Demonstrating a preference for graphic and visual information Multitasking Seeking information nonlinearly and nonsequentially Developing self-defined and controlled paths
Type Two: Changing Perspectives	How do they perceive themselves and others?	Expressing opinions for themselves Demonstrating identity by creating information Portraying flexible and multiple identities Encountering information from various perspectives
Type Three: Changing Boundaries	How do they access information and seek community?	Obtaining instant access to a wide array of information Seeking, sharing, and creating information collaboratively Forming new types of social networks Participating in community engagement

behavior identifies children's engagement in and interaction with digital media as the interplay of cognitive, noncognitive, and sociocultural factors. Instead of claiming positive impacts of the digital environment on children without systematically-obtained evidence, our approach is to build descriptive characteristics, that is, behaviors that we believe a majority of contemporary children exhibit. We will then study these behaviors in a future research project in order to explore the potential association between new forms of information behavior and the desirable skills and literacies that twenty-first-century students will need.

The contribution of the theory will be to clarify and explain youth information behavior in its many facets and to inform the debate about the impact of the changes that youth are undergoing in digital environments. The theory, therefore, is useful to but not limited to the structure of the school library, which can help to showcase its potential.

The remainder of the paper provides an overview of how paradigms for youth information behavior research have evolved and the need for these paradigms to embrace theory, such as Radical Change theory, if they are to explain adequately contemporary youth information behavior. Most importantly, we present a detailed explanation of how the proposed expansion of the Radical Change theory is based upon existing research.

This exploration and expansion of a digital-age theory in the area of information services occurring in an education environment will prove of interest, we hope, to researchers and professionals in a wide number of educational areas. A school library is an appropriate place in which to apply and test the utility of the Radical Change theory in relation to youth information behavior because this setting mirrors the theory in its holistic nature and its focus on individuals, resources, and the results of complex interactions among them. Like Radical Change theory, the school library stretches across academic disciplines, locales, and life circumstances. Although the underlying context of this investigation is the school library and its environs, the expanded Radical Change theory is not situation-dependent, that is, it could be used to explain youth information behavior in any context.

CHANGING FOCUS OF YOUTH INFORMATION BEHAVIOR RESEARCH

Youth information behavior research, at least with that nomenclature, occurs chiefly in the field of library and information science. However, recent research from related fields focused on youth communication and information technology skills in the digital environment are closely related.

Library and Information Science

The field of youth information behavior research in library and information science [LIS] helps to provide an empirical basis for the development

of appropriate library and information services for youth. Over time the focus of study has changed from an earlier physical and system-oriented perspective to the cognitive and user-centered perspective of the 1970s.

In the earlier period, youth librarianship focused on such operational aspects of librarianship as selection, acquisition, and organization of information resources. Research at that time tended to center on task-oriented needs of youth and the formal channels through which they sought information. User-centered studies, however, emphasize children's cognitive development and their information needs and information seeking as a process occurring in varying contexts (Kuhlthau, 2004). One of the most often studied contexts for youth information seeking has been the school library, the scene for the teaching of information literacy skills and the source of numerous information resources. Moreover, youth have been a more or less captive audience for research in this milieu.

Current behavior studies reflect broadening arenas for studying youth information seeking. The development of the Everyday Life Information-Seeking [ELIS] model in the mid-1990s by Savolainen (2005) motivated studies on children's information behaviors in informal contexts beyond formal school and library settings (Fisher, Marcoux, Meyers, & Landry, 2007; Howard & Jin, 2007; Hughes-Hassell & Agosto, 2007; Meyers, Fisher, & Marcoux, 2009), raising the question of how these behaviors differ or are similar in formal (school) and informal settings.

An increasing number of studies also attempted to examine the phenomena of youth information behaviors from the perspective of children themselves, often called the digital generation, the net generation, digital natives, Millennials, or digital age youth. Sometimes the studies actually involved children as partners in the research process. It is now a striking development in some projects that children are able to contribute to designing new technologies as partners with adults in some projects (Druin, 2002; Large, Beheshti, Nessel, & Bowler, 2007). In addition, studies have begun to reflect more carefully children's cognitive development based on theories of child development and learning (Bilal, 2007; Bowler, Large, Beheshti, & Nessel, 2005; Hughes-Hassell & Agosto, 2007).

Although youth information behavior research has shifted to focus more on the use of information and the process of information seeking in a wide variety of contexts, the research needs to reflect the developments in our knowledge of the effects of digital technology and the digital environment on youth cognition and behavior. Dresang (2005), in a synthesis of meta-analyses of research conducted up to 2005, most of which took place in a school library, found that "taken as whole, the bottom line of these general meta-analyses of information-seeking behavior related to children's use of digital media might be that young people are missing much of the richness of an environment saturated with information because of poorly developed information-seeking skills or a propensity to

take the easiest path possible" (p.181). She suggests that "to view youth information-seeking behavior as generally lacking is to overlook the new behaviors nurtured and facilitated by the digital environment and to miss the golden nuggets embedded in these studies" (p. 182).

The apparently interactive, nonlinear, and multitasking approaches of youth in the digital environment are said to require them to be proficient in new twenty-first-century skills such as information and communication technology (ICT) literacies, higher level critical thinking, collaboration, and appreciation of cultural diversity (American Association of School Librarians, 2007, 2009a, 2009b; Partnership for 21st Century Skills, 2009; Silva, 2008). Even though a few exceptions exist (Druin et al., 2003; Large, Beheshti, Nasset, & Bowler, 2007; Pantaleo, 2008; Radford & Connaway, 2007; Zhou & Stahl, 2007a), too little empirical research has been conducted in the field of digital age youth information behavior in both school and everyday life environments. Since school libraries have been the traditional source of research on youth information behavior, perhaps this is the place to start filling the gaps in knowledge that currently exist. Moreover, as Jenkins (2006b) and Gee (2007) argue, many youth are developing at least some of their skills through informal learning in everyday information-seeking situations, that is, they are self-taught or have picked up their skills from their peers. However, experience suggests that certain information and communication technology skills and knowledge such as those that are higher level or more complex, still need to be taught in school libraries. A more fully-developed Radical Change theory will help distinguish the skills or literacies that are more likely to require guidance from school library media specialists in their roles as collaborative information specialists and teachers.

The field also lacks theoretical framework to explain digital age information behavior, which becomes increasingly multifaceted and complex due to the new digital media culture. Traditional models focusing on a systematic search for information to solve a specific problem (Kuhlthau, 2004; Lowe & Eisenberg, 2005; Shenton & Dixon, 2005) do not explain a variety of information behaviors that are embedded in young people's social practices at home, school, public places, and online (McKenzie, 2003; Meyers, 2009). No overall theory that might explain information behavior in all environments has been fully developed. This has led Erdelez (1999) to call for "holistic and detailed tools for modeling information users' behavior" (p. 28). Radical Change theory providing carefully defined and documented characteristics for each type of behavior can easily fill this gap. The expanded Radical Change theory will guide research studies that aim to understand youth information-related activities as a whole and their interrelationships, not just studies of individual tasks or search sessions isolated from the context.

Related Fields

Recent studies in various disciplines, including education, media studies, cognitive psychology, and sociology, claim that today's children think and learn differently because of the new digital media culture (Gee, 2007; Ito et al., 2008; Jenkins, 2006a; Prensky, 2001; Rushkoff, 1996; Tapscott, 2009). These studies report that new media forms and formats affect the ways youth think, learn, socialize, and seek information.

Differing perspectives see technology as either a hope or a threat for young people's development. Some researchers celebrate technologies such as the Internet and video games for the way in which they facilitate new digital literacies, provide opportunities to represent and expose various perspectives, especially those involving previously marginalized voices, and to create new forms of social communities (Gee, 2007; Ito et al., 2008; Jenkins, 2006b; Prensky, 2006; Rushkoff, 1996; Tapscott, 2009). Others are concerned about the technologies because of their threat to traditional literacies such as reading and writing. These writers often see the new technologies as wastes of time, sources of commercial exploitation, threats to physical social relationships, and creators of the digital divide (Anderson, 2007; Turkle, 1995; Wolf & Stoodley, 2007).

As in the LIS field, major problems in the digital native debate include the fact that a number of studies are based on weak empirical and theoretical foundations. Bennett, Maton, and Kervin (2008) criticize recent studies saying that "they have been subjected to little critical scrutiny, are undertheorised, and lack a sound empirical basis" (p. 776). They call for a more measured and disinterested approach to digital natives and media.

Buckingham (2008) casts doubt on what he regards as the extremists, that is, those who view youth as consistently active and productively using the technology for educational, social, and creative purposes. For him, these optimists regard technology as a force of liberation for young people. Their view "represents not a description of what children or young people actually are, but a set of imperatives about what they should be or what they need to become" (p. 15). This criticism can be illustrated by frequent claims, lacking scientific evidence, that digital natives are critical thinkers and better creative collaborators. He calls for a more realistic point of view that is based on evidence, not speculation.

As explained in more depth below, the expansion of Radical Change theory will provide a theoretical as well as practical approach that has been missing from most contemporary LIS and related studies to understanding the information behavior of digital age youth. It will also pave the way for future research that can tie a realistic assessment of youth information behavior to skills needed in the digital environment.

TYPOLGY AND CHARACTERISTICS OF RADICAL CHANGE YOUTH INFORMATION BEHAVIORS

The new types of information behaviors and the characteristics associated with each type have been developed by an extensive and interdisciplinary review of research literature that focused on youth ages six to eighteen. Please refer to table 3 for a summary of the typology as it is discussed below.

RADICAL CHANGE TYPE ONE BEHAVIORS: CHANGING FORMS OF SEEKING INFORMATION AND LEARNING

The first type of youth information behavior of concern to Radical Change Theory focuses on the cognitive aspects of their information-seeking behavior. Dresang (1999) suggests that the way children are thinking and learning supports the changing forms and formats in children's literature as explained by Radical Change theory. Several of the following characteristics simulate the nonlinear, nonsequential linking to and weaving together of bits of text that have become known in computer parlance as hypertext:

- Obtaining information through a variety of media sources
- Demonstrating a preference for graphic and visual information
- Multitasking
- Seeking information nonlinearly and nonsequentially
- Developing self-defined and controlled paths

In type one behavior the youth's process of seeking information is interactive, not just passively receiving information, and involves an increased sense of control. It is aligned with contemporary research paradigms that involve the empowerment of end-users across disciplines, for example, the user-based approach in communication (Dervin, 2003), the user-centered paradigm in library and information science (Raber, 2003), and reader-response theories in English literature (Rosenblatt, 1938/1995). From the Radical Change theory perspective, digital age youth actively interact with changing information resources, creating a synergy (Dresang & Kotrla, in press). An in-depth explanation follows each of the characteristics that have been tentatively identified in type one Radical Change information behavior.

Obtaining Information Through a Variety of Media Sources. Jenkins (2006b) calls *convergence culture* where old and new media collide. This is "a situation in which multiple media systems coexist and where media content flows fluidly across them" (p. 282). He also observes that today's people "become hunters and gatherers pulling together information from multiple sources to form a new synthesis" (Jenkins, 2006a, p. 46).

Digital age youth are engaged in a range of old and new media and this calls for a variety of ways for them to access information. For the original

Radical Change theory print and digital resources for youth were not in conflict in the digital age. Likewise, the new information and communication technologies do not replace the older materials, but enable children easily to use different formats of information from multiple media sources. However, when children assemble information from various media, they need new methods to help them choose and process different modes of information such as words, images, sounds, 3D models, cinema, and others (Kress, 2003). Jenkins (2006a) suggests that transmedia navigation, "the ability to follow the flow of stories and information across multiple modalities" (p. 4), is one of new media literacies that students in this age should learn.

Demonstrating a Preference for Graphic and Visual Information. Among various modes of information, digital age youth are especially exposed to rich graphic information provided by both digital and print media. Video games present increasingly spectacular graphics, the stunning visual representations known in the games business as *eye candy*. Cell phone displays support thousands of colors, 3D images, and holograms for text accompanied with pictures and animation (Prensky, 2006). Handheld books for youth also show graphics in new forms and formats (Dresang, 1999).

A number of studies suggest that information in graphic and visual modes of learning are especially appealing to children who have grown up with television, video games, and the Internet (Druin, 2005). By conducting Web-surfing sessions with ninth- and tenth-grade children, Agosto (2002) discovered that the criteria young people use to evaluate websites include the perceived quality and amount of graphic and multimedia content. Children (ten to thirteen years of age) who participate in focus group research to explore design criteria for children's Web portals confirm that visual design, that is, use of "attractive screen designs based especially on effective use of color, graphics, and animation" (p. 79), is crucial to young Web users (Large, Beheshti, & Rahman, 2002). In addition, researchers who have worked with children to build digital libraries for youth report that the children have critical needs among other things for *visualization of tools and materials* with an emphasis on the graphical user-interface (Druin, 2005).

Multitasking. Researchers have observed a persistent tendency to multitask (Foehr, 2006, Roberts & Foehr, 2008). Bazilai-Nahon, Lou and Mason (2007) define multitasking as "the tendency for digital natives to engage in several activities simultaneously, seemingly dividing their attention among task-oriented and both work and activities" (p. 7). As an illustration, multitasking describes behaviors of youth who are working on multiple school and home-related tasks while communicating via instant messengers or cell phone with several people and listening to music.

From the traditional point of view, these multitasking information behaviors may be regarded as working inefficiently or paying insufficient

attention to their work as a result of young people's shorter attention spans with the rise of digital media. However, some researchers suggest that multitasking is a new and desirable skill in the digital age. Jenkins (2006a) explains multitasking as "the ability to scan one's environment and shift focus as needed to salient details" (p. 4). Spink, Park, and Cole (2006) mention that "owing to the increasing complexity of the global information environment, people are increasingly engaged in multitasking and information task-switching behaviors. Web search can also include information multitasking behaviors that occur when users juggle the challenge of seeking information on multiple topics" (p. 141). They suggest that understanding and modeling the information multitasking process is a new and important research area in library and information science.

Seeking Information Nonlinearly and Nonsequentially. Along with multitasking information behavior, nonlinear and nonsequential information behavior has emerged as a new direction for human information behavior research (Spink & Cole, 2006). Foster (2006) proposes a framework for "nonlinear, dynamic, and complex inter-relationships of behavior, activity, and context" (p. 155). This nonlinear information behavior can be clearly observed in digital age youth's information seeking in particular. Hart (2008) suggests that information-seeking behaviors of students in the Florida Virtual School can be explained by Bate's berrypicking model, in which typical search queries are represented as not being static or linear, but evolving with the user gathering information in bits and pieces (Bates, 2005).

In describing digital age books, Dresang (1999) defines linearity as writing designed to be read in a step-by-step, one way only progression, and sequentiality as a situation in which what comes next is clearly related to what came before (p. 21). Radical Change theory identifies nonlinear, nonsequential organization in books and we suggest that the theory can be used to determine the same characteristics in the information behavior of youth. Pantaleo (2008) observes that elementary students' responses to picture books with Radical Change characteristics are nonlinear and nonsequential.

The nature of hypertext requires reading of content in a nonlinear fashion and on multiple dimensions. Spiro and Jehng (1990) characterize hypertext materials with random access as "being explored in different ways, with the different exploration path producing what are essentially multiple texts for the same topic" (p. 166). Cognitive flexibility theory [CFT] (Spiro, Collins, Thota, & Feltovich, 2003) suggests that new forms of nonlinear and multidimensional learning and instruction are better suited to conveying complex content in the digital age. CFT has been applied to create hypermedia learning environments that provide nonlinear and multi-perspectival organization of material (Spiro, Collins, & Ramchandran, 2007; Spiro, Collins, Thota, & Feltovich, 2003; Spiro & Jehng, 1990).

Developing Self-Defined and Controlled Paths. Hypertext also permits children to point and click to make their own choices about what they want and need to explore. As a result, they seek their own path and create their own sequence. Becker and Dwyer (1994) indicate that students using hypertext experience *an increased sense of control* over their learning. Dresang (1999) concurs that hypertext gives people choices and also emphasizes the richness of unexpected nonlinear patterns, which appeal to many digital-generation youth. Recent ethnographic research with digital age youth (Ito et al., 2008) reports that these young people often discover “their own pathways to relevant information by looking around with the aid of search engines and other forms of online exploration” (p. 21).

Digital age youth it seems like to be in the driver’s seat when they seek information. LIS researchers who work with children in digital libraries or portal sites for youth recognize an increasing need for the *customization* of these websites to give children more choices (Druin, 2005; Large, Beheshti, Nasset, & Bowler, 2007).

Burnett and McKinley (1998), who propose the hypertextual model of technology interaction, suggest that every information-seeking interaction is crucial and tied to identity formation. The next type of Radical Change deals with changing perspectives of youth in the digital age, incorporating identity formation as part of these changing perspectives.

Radical Change Type Two Behaviors: Changing Perspectives

The second type of Radical Change in youth information behavior focuses on young people’s identity formation and value negotiations during their information-related activities. The original Radical Change theory suggests “diversity in the global village encourages changing perspectives” (Dresang, 1999, p. 58). Characteristics of this type of information behavior include the following:

- Expressing opinions for themselves
- Demonstrating identity by creating information
- Portraying flexible and multiple identities
- Encountering information from various perspectives.

Type Two explains how digital age youth who express opinions are forming and demonstrating their identities by creating information. They constantly negotiate their identity and values by interacting with information in the diverse and connected global society.

While identity is an ambiguous and slippery notion, a practical approach is to think of identity as: we are what we *know* and what we *do*. People who seek information to bridge a gap between what they know and they need to know as well as those who express their opinions by creating information can be said to be in the process of identity formation. Burnett and McKinley (1998) pose a series of relevant questions: “How do

individuals form identities? How do individuals make sense of who they are and how they relate to others? And what role does information play in this process?" (p. 290).

Adolescence has often been viewed as a critical period in identity formation and also a period of "identity crisis" (Erikson, 1968; Marcia, 1980). Considering the lack of investigation into the possibility that people's identity formation and negotiation are undergoing far-reaching changes in the digital age, the information behavior of digital youth, especially their interactions with digital materials, provides one place to study changing ways of youth identity formation and value negotiation.

Expressing Opinions for Themselves. While young people's voices have been relatively unheard in public, young people like to express their opinions. Adults are now starting to acknowledge their voices. Druin (2005) suggests that "they [children] want to be involved in helping to make changes . . . the notion of working with young people is gaining increasing attention both in the United States and Europe" (Druin, 2005, p. 21). Ito et al. (2008) concur: "although we do not believe that youth hold all answers, we feel that it is crucial to listen carefully to them and learn from their experiences of growing up in changing media ecology" (p. 35). In fact, an increasing number of recent studies report information behaviors of youth from the perspective of the children themselves whom they have involved in the research process.

"The Future of Reading," a series of articles in the *New York Times* about how the Internet and other technological and social forces are changing the way people read, reports the information behavior of Nadia, a fifteen-year-old girl, who regularly reads and writes online: "Nadia said she preferred reading stories online because 'you could add your own character and twist it the way you want it to be.' 'So like in the book somebody could die,' she continued, 'but you could make it so that person doesn't die or make it so like somebody else dies who you don't like'" (Rich, 2008). Nadia's story demonstrates the ways digital media appeal to and engage young people by providing a forum for youth to speak for themselves.

Demonstrating Identity by Creating Information. Digital age youth are "creator(s) of information in a larger social context" (Radford et al., 2008, p. 4). Young people who engage in virtual discourse using wikis, blogs, and social networking sites are not only expressing opinions for themselves but also shaping their identities. Their performances, such as the use of avatars, e-mail signatures, IM nicknames, and managing personal homepages and blogs can be considered as a process of identity formation and expression (Buckingham, 2008; Mazarella, 2005b). Some children create more sophisticated forms of information such as digital photos or videos. Recent studies report that children's creative production activities often involves a range of technologies involved in media production (Ito et al., 2008; Lange & Ito, 2008).

Weber and Mitchell (2008) examine a series of case studies that highlight the roles of digital media in the construction of youth identities. They propose the term *identities-in-action* to explain young people's interactive uses of new technologies. Teenage girls' personal Web page production is suggested as an illustration of identities-in-action: "personal website production provides young people with diverse means of constructing and fashioning their identities through images and words. Their sites contain a variety of pictures, expressions, and references relating to the popular culture of media, new and old" (p. 31). In addition, the researchers view various technologies, such as cell phones and Power Point projections as an extension, projection, or presentation of the individual.

Stern (2008) explores why young people find value in expressing themselves online by concentrating on their personal home pages and blogs. She suggests that young people's online expression be viewed as self-reflection, catharsis, self-documentation, identity experimentation, and social validation of self from their audience.

While some researchers (such as Willett, 2008) may argue that young people's identity construction and self-expression online are significantly constrained by consumer culture as a subtle way of a commercial control, a more balanced point of view stresses "the interplay—and tension—between the top-down force of corporate convergence and the bottom-up force of grassroots convergence that is driving many of the changes we are observing in the media landscape" (Jenkins, 2006b, p. 169). In spite of top-down forces including corporate media and government regulation, young people who are eager to speak for themselves are observed at all levels of information seeking, consumption, and creation.

Portraying Flexible and Multiple Identities. Some researchers suggest that the concept of self has been transformed as individuals are exposed to the large amount of information from multiple points of view that is attributable to technology proliferation (Burnett & McKinley, 1998; Gergen, 1991; McKinley, 1995). Gergen (1991) calls the postmodern sense of identity *saturated self*, and Burnett and McKinley (1998) suggest a *multiple* and *processual* model of identity when people gain information access through technology to different selves and communities with different rules of behaviors and expressions.

Researchers suggest new skills are needed to manage these new ideas of identity in the digital age. For instance, Gee (2006) maintains that children enact multiple identities in a massive multiplayer game and "different characters/identities lead to different ways of looking at, feeling about, and interacting with the (virtual) world" (p. 7). He coins the term *projective identity* to refer to the fusion that occurs between game players and their virtual characters. Jenkins (2006a) states "game play also is one of a range of contemporary forms of youth popular culture that encourage young people to assume fictive identities and through this process

develop a richer understanding of themselves and their social roles" (p. 28). He calls "the ability to adopt alternative identities for the purpose of improvisation and discovery" (p. 28) *performance*.

While performing multiple identities is considered as one of the desirable new skills for twenty-first century youth (Gee, 2007; Jenkins, 2006a), it also can be viewed as a form of young people's experimentation with identity. Bentley (1999) argues youth need safe spaces where they can know what they know and try new identities without self-censoring (p. 219). Mazzarella (2005a) suggests that the Internet offers safe places where youth are "free to speak without fear of endangering themselves, their relationships, or their 'realities'" (Stern, 1999, p. 39). Also, given the ability of people to conceal their physical characteristics such as gender, race, and age, they can be whoever they want to be online. Kelly, Pomerantz, and Currie's (2006) interviews with Canadian girls suggest that girls rehearse different ways of being during their online activities through chat rooms, instant messaging, and multiplayer role-playing games before trying them out offline.

Encountering Information from Diverse Perspectives. Dresang (1999) suggests that the Internet provides resources from the perspectives of diverse ethnic, political, social, and cultural groups. It enables digital age youth to spend a lot of time pursuing online activities while being exposed to varying perspectives beyond geographic and cultural constraints. She suggests that "radically changed multiple perspectives are incorporated more and more into the daily life [of youth]. Voices silenced in the past are increasingly given the opportunity to be heard and acknowledged by others" (p. 65).

In this complex and plural digital society, it is critical for youth to understand the existence of diverse and conflicting perspectives and cope with them, especially when there is no right answer or viewpoint. Because of this situation, Jenkins (2006a) suggests that *negotiation*, "the ability to travel across diverse communities, discerning and respecting multiple perspectives, and grasping and following alternative norms" (p. 52) is one of the necessary new media literacies. Cognitive flexibility theory (Spiro et al., 2007) entails modes of *openness* and *flexibility* in educational systems in the complex, ill-structured, interconnected, and contingent information world with its multiple forms of representation.

Much more research is needed to investigate the characteristics of Radical Change theory type two behavior. While new media are bringing young people more information from diverse perspectives that were previously unavailable, there is still a lack of evidence about (a) the extent to which previously marginalized voices of youth have more opportunities to be heard in the digital age; (b) the extent to which digital age youth are more open to acknowledging different points of views and cultures; and (c) the ways in which librarians and other information professionals are working with children to help them to become more tolerant of

different perspectives and of the ambiguity characteristic of an increasingly complex world.

Type two behavior views digital youth activities to create information as the process of identity formation and self-expression. This is something that cannot be considered separately from young people's relationships with others. Buckingham (2008) suggests that identity is "something we accomplish practically through our ongoing interactions and negotiations with other people" (p. 6). For instance, social networking sites not only allow for self-expression but also provide opportunities for connection and relationship building with others at the same time (Stern, 2008).

Radical Change Type Three Behaviors: Changing Boundaries

The third type of Radical Change in youth information behavior involves the social nature of this behavior, which Dresang (1999) calls *expanding horizons* that result from having access to a wide range of information previously unavailable and the development of a new sense of community. Characteristics related to type three behaviors include the following:

- Obtaining instant access to a wide array of information
- Seeking, sharing, and creating information collaboratively
- Forming new types of social networks
- Participating in community engagement

Type three explains the changing nature of information access in the digital age as characterized by expanding boundaries in terms of the amount, subjects, and sources of information children obtain. Beyond having the immediacy and breadth of information access, they *participate* in a range of information practices. Jenkins (2006b) calls this phenomenon *participatory culture*, "culture in which fans and other consumers are invited to actively participate in the creation and circulation of new content" (p. 290).

Obtaining Instant Access to a Wide Array of Information. Given access to the Internet, when something catches their interest, young people can easily look around online. Several studies show how the growing availability of information on the Web has transformed young people's attitudes toward the availability and accessibility of information (Eagleton & Dobler, 2007; Hargittai, 2004, 2007; Ito et al., 2008). For instance, Hargittai (2007) suggests the central role of search engines (the social, political, economic, and cultural dimensions of search engines) in how people access information and the practices of the users who rely on them, given the vast amounts of information available and the need for help in exploring on-line content.

The informational topics and issues that youth encounter on the Web are not (at least not always) preselected for them, including those involving realistic and sensitive subjects. Dresang (2005) suggests that "with this

increase in quantity has come access to topics that previously were forbidden to youth. Greater access to topics that have been considered too controversial or not 'age appropriate' has happened in the handheld book as well as in the online environment" (p. 190).

Seeking, Sharing, and Creating Information Collaboratively. Talja and Hansen (2006) propose that collaborative information behaviors range from "sharing accidentally encountered information to collaborative query formulation, database searching, information filtering, interpretation, and synthesis" (p. 114). A number of studies report that collaborative information behaviors of youth are as common and natural as individual behaviors (Dresang, 2005; Dresang, Gross, & Thompson, 2002; Druin et al., 2003; Lou, Abrami, & d'Apollonia, 2001; Zhou & Stahl, 2007b).

The collaborative information behaviors have shed new light on how youth seek information using information and communication technologies that support collaboration such as e-mail, wikis, and video-conferencing (Kanfer et al., 2000). Digital age youth collaborate to solve problems (e.g., Wikipedia and alternative reality gaming) and circulate and share information (e.g., YouTube, podcasting, and photo sharing sites). Ito et al. (2008) suggest that digital photos and videos taken with friends and shared on sites such as PhotoBucket and MySpace become their initial entry into digital media production.

Forming New Types of Social Networks. Young people working collaboratively often form affiliations in formal and informal communities online such as Facebook and MySpace. Zhou and Stahl (2007b) state that children in online communities engage in all sorts of information seeking and information sharing activities. Ito et al.'s (2008) ethnographic studies, the Digital Youth Project, examine young people's everyday participation in new media and propose a framework of *genres of participation*, which are useful when explaining the nature of new types of social networks.

Ito et al. explain that there are two types of online participation by young people: *friendship-driven* and *interest-driven participation*. While the friendship-driven online social networks mirror their local networks and offline relationships, interest-driven online groups expand their information behavior boundaries because "it is not about the given social relations that structure youth's school lives but about both focusing and expanding on an individual's social circle based on interests" (p. 10).

The majority of youth use new media to hang out and extend existing friendships from a desire to maintain social connections to friends. Meanwhile, a small number of children explore the online world to find information that goes beyond what they have access to at home, school or in their local community. Ito et al. (2008) explain that "online groups enable youth to connect to peers who share specialized and niche interests of various kinds, whether that is online gaming, creative writing, video editing, or other artistic endeavors. In these 'interest-driven' networks,

youth may find new peers outside the boundaries of their local community” (p. 1).

The Digital Youth Project also proposes three genres of participation to describe different modes of young people’s engagement with new media: *hanging out*, *messing around*, and *geeking out*. Each depends on different degrees of commitment to media engagement. The more intense and sophisticated children’s participation in social networks is, the more evidence has been found about how the networks enrich their information behavior. This involves searching online for information of interest, creating information with various technology, and seeking expert knowledge from specialized online networks.

Participating in community engagement. Some scholars believe that young people’s media engagement and social networks will build the foundations of civil society in the twenty-first century (L.W. Bennett, 2008b; Jenkins, 2006b). L.W. Bennett (2008a) states that young people in the digital and global age have demonstrated impressive signs of civic engagement, including “increases in community volunteer work, high levels of consumer activism, and impressive involvement in social causes from the environment to economic injustice in local and global arenas” (p. 2). Young people’s online civic activities range from blogging; to petitioning and protesting behaviors in gaming, fan, entertainment, and consumer sites; to participation in such sites such as The Community Information Corps, Tolerance.org, TakingIT-Global, and Free the Planet! (L. W. Bennett, 2008b; Montgomery, 2008).

The relationships between young people’s shared activities online and their civic engagement are an emerging area of research in disciplines such as media and communication studies, though little research has been conducted in library and information science [LIS] about civic engagement information behavior. Key issues that need to be addressed about the democratic potential of the information behavior of digital age young people include (a) the accessibility and transparency of public information for young people, (b) the skills young people need to communicate social issues and common concerns to public audiences using digital media, and (c) the long-term effects for a more democratic society of their community related information activities.

EXPANDED RADICAL CHANGE THEORY, YOUTH INFORMATION BEHAVIOR, AND SCHOOL LIBRARIES

In the practical day-to-day world of K-12 education and school libraries, school librarians, and teachers must make choices about how to best help students to learn. It is essential to know what strengths twenty-first-century students bring with them, what information-seeking skills are already fairly well developed. The goal of the current research project discussed here is to provide librarians and teachers with a means to gain this knowledge. How this might be achieved is represented in figure 1 below.

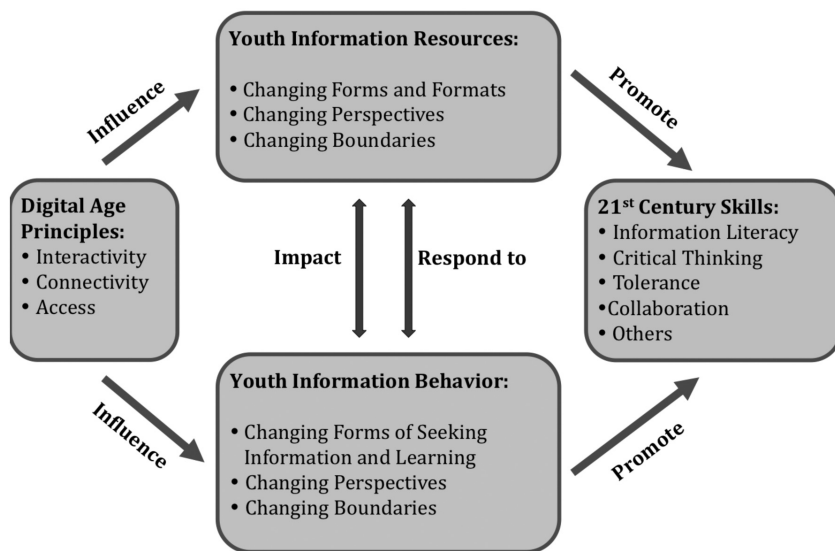


Figure 1. Model of a Proposed Research Agenda Applying Radical Change Theory.

This figure represents the body of research that might flow from the Radical Change theory's digital age principles of Interactivity, Connectivity, and Access (left node). The characteristics of Youth Information Resources influenced by these principles are well developed (top middle node). Expanding Radical Change theory, as proposed above, has been the next step in clarifying youth information behavior in the digital environment and in providing a holistic theory that can assist both scholars and professionals with a better understanding of digital age youth (Bottom middle node). The next step is to establish indicators for the characteristics, that is, concrete observable behaviors in specific information-seeking situations, so that a high degree of observer reliability can be established for collecting data. The time has come for a "proof of concept," that is actually observing youth in various information-seeking situations so that the characteristics of the behavior types of Radical Change theory can be validated or modified as necessary.

Bayesian Network modeling techniques could be used to analyze the collected data. Bayesian Networks are graphical structures that represent the relationships between variables (what we have referred to as characteristic behaviors) by applying statistical rules of probability. Using computer software, Bayesian Networks automatically update relationships and relative weights between each variable as observational data are entered. That is, the technique allows one to discover the strengths of the various variables (i.e., which ones are more influential) and the relationships be-

tween the variables (i.e., relationships between various aspects of youth information behavior). This method, to the best of the knowledge of the authors, has not been applied in youth information behavior research, so if it proves useful, it may add depth not only to theoretical and content knowledge but also to methodological procedures in the LIS field.

Beyond the research suggested above, the expanded Radical Change theory may play an even more important role in fostering research that will lead to a better understanding of the relationship between digital age information seeking and digital age resources. As indicated in figure 1, the relationships between information resources and users are dialectic. It is important to establish how digital age resources and behaviors interact and influence one another. That is, how much influence do the resources have on the behaviors and vice-versa?

Ultimately the theory might lead to an assessment of the ways in which digital age information-seeking behavior and competence in twenty-first-century information-seeking skills are correlated. The final outcome of the research will answer the question: how do information behaviors and/or resources interact to promote (or interfere with) the development of effective twenty-first century information-seeking skills? The debate over the impact of technology on youth will then be much closer to resolution. And assertions about youth information behavior will become more evidence-based rather than speculative. This will benefit both teachers and librarians. Each component of figure 1 is important in helping us to think through how to provide the best possible learning environment in a twenty-first-century school library.

The power of a theoretical approach to professional understanding has been demonstrated over the past decade as both researchers and practitioners in a wide variety of disciplines have applied Radical Change theory to gain an understanding of the changes that have been occurring in books for youth (Campbell, 1999; Latham, 2000; Nodelman, 2002, 2008; Pantaleo, 2008; and Sipe, 2002). It is anticipated that the same type of theoretical power will be demonstrated when the expanded Radical Change theory is applied to youth information behavior. This power will be particularly evident in the milieu of school libraries because of their centrality in helping youth develop the multiple literacies that are needed for them to negotiate the digital world effectively. School librarians in collaboration with teachers will then have confidence that important characteristics in youth information behavior have been validated and this will guide their collection building as well as their instruction.

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