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Proposing a Theoretical Framework for Digital Age Youth Information Behavior Building Upon Radical Change Theory

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PROPOSING A THEORETICAL FRAMEWORK FOR DIGITAL AGE YOUTH
INFORMATION BEHAVIOR BUILDING UPON RADICAL CHANGE THEORY

By

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I dedicate this study to:

My Family and Friends in Korea,
My Grandparents in Heaven,
My Husband, Seungyong You, and
God
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Contemporary young people are engaged in a variety of information behaviors, such as information seeking, using, sharing, and creating. The ways youth interact with information have transformed in the shifting digital information environment; however, relatively little empirical research exists and no theoretical framework adequately explains digital age youth information behaviors from a holistic perspective. In order to bridge the empirical and theoretical gaps in the field of Information Behavior, this study seeks to create a theoretical framework of digital age youth information behavior by applying and further developing the theory of Radical Change.

Adopting the Theory to Research to Theory strategy, Radical Change Theory guided development of the research questions and the research design incorporated the theory to provide structure to the systematic data collection and analysis; finally, the theory was informed and modified by the study results. The two-phase qualitative research design included Phase I: content analysis of research literature and Phase II: Sense-Making Methodology (SMM) group and individual interviews with youth.

In Phase I, the researcher conducted Directed Qualitative Content Analysis using Radical Change Theory, a technique that attempts to minimize potential bias by the pre-selected theoretical framework. Phase I results identified key patterns of contemporary youth information behavior reported in 40 cross-disciplinary research literature that covers a range of contexts. Phase II was implemented to test the findings from Phase I and to add new insights from the perspectives of youth. In Phase II, 12 young adults who engage in active digital media practices using Scratch, a graphical programming language, participated in either group or individual interviews. The SMM interview technique elicited innovative information behaviors embedded in the participants’ collaborative information creation practices in the digital environment, such as interactive magazine production and youth initiated development of both an online media library and a Wiki website.

The study findings deepen current knowledge on the ways contemporary youth who have grown up immersed in digital media culture interact with information. The primary result of the study is the development of a typology of digital age youth information behavior that refines and further develops the original Radical Change Theory. The typology suggests a holistic
perspective for observing youth information behavior as an interplay between various factors, including young people’s (1) intrapersonal processes, (2) identity formation and value negotiation, and (3) social interactions. It also presents 14 specific characteristics related to these factors that operationalize key concepts of Radical Change Theory.

The exploratory study provides theoretical, empirical, and practical contributions to the field. It suggests that the enhanced Radical Change Theory with the newly added typology serves as a holistic framework that explains dynamic digital age information behaviors that are embedded in young people’s activities at home, schools, public places, and online. The typology created in this study will become an instrument that can be utilized in future research further investigating digital age youth information behavior. Also, by expanding knowledge about the changing nature of youth information behavior, the potential impacts of the study include developments of relevant library and information services, information policies, and other educational approaches that better match digital age young people’s unique patterns and approaches to information.
CHAPTER ONE

INTRODUCTION

This dissertation research seeks to understand youth information behavior in the digital age, particularly focusing on new and innovative behaviors of contemporary youth who engage in digital media culture. The study applies and further develops the theory of Radical Change that explains changing youth information resources and behaviors through the properties of the digital society—Interactivity, Connectivity, and Access. Two phases of qualitative research involving youth result in the derivation of a typology of digital age youth information behavior and demonstrate how the Radical Change Theory can appropriately explain the phenomenon of youth information behavior in the digital age.

Problem Statement

Information behavior is “the totality of human behavior in relation to sources and channels of information, including both active and passive information seeking, and information use” (Wilson, 2000, p. 49). Information behavior of youth, i.e., their information-related activities such as information seeking, using, sharing, and creating, is an integral part of their lives. Young people use search engines to find facts, look around online to explore the area of interests, serendipitously encounter information from the Internet, TV, or newspapers, conduct research on a school-related subject, and share information with their friends or family members. Information behavior often becomes a prerequisite for learning, personal and aesthetic growth, enjoyment, and social interaction. In this digital information age, youths’ ability to interact with information critically, creatively, and ethically is key to becoming successful learners as well as responsible citizens of a democratic society (American Association of School Librarians [AASL], 2007).

Although no specific beginning date can be identified, the digital age is defined as the social landscape that gradually emerged in the 1990s with the phenomenal growth of personal computers and Internet connectivity. It is an era in which information can be transmitted over widespread digital networks such as the Internet. In the 21st century, the digital age is also called the era of Web 2.0, a concept used to describe the dramatic changes the Web has brought to
society since 2004 (O'Reilly, 2005). The characteristics of the digital society in the 21st century include ubiquitous mobile computing, information in interactive and multimedia formats, and participation in on and offline communities through social networking technologies.

Youth information behavior has experienced significant transformation, as the information environments drastically change in the digital age and youth are engaged in digital media in many aspects of their life. The most recent national standards for school libraries reflect these momentous changes for youth in the digital age (AASL, 2007, 2009a, 2009b). The guidelines suggest the new dimensions today’s youth encounter in the 21st century with, “the exponential expansion of information, ever-changing tools, increased digitization of text, and heightened demand for critical and creative thinking, communication, and collaborative problem solving” (AASL, 2009a, p. 12).

Nevertheless, few theoretical frameworks and empirical studies exist to illuminate changes or key characteristics of digital age youth information behavior in Library and Information Studies (LIS) (Dresang & Koh, 2009). The field lacks a holistic framework that explains patterns and characteristics of contemporary youth information behavior, which becomes increasingly interactive and multi-faceted in the digital age. Existing models concerning youth are primarily interested in information-seeking behaviors and information literacy, “the ability to locate, evaluate, and use information” (AASL & Association for Educational Communications and Technology [AECT], 1998), related to academic or any other problem-oriented tasks in formal environments, such as schools. No theoretical framework explains the variety of information behaviors embedded in young people’s personal or social practices at home, schools, public spaces, and online. Also, existing knowledge on digital age youth information behavior has to a great extent been informed by anecdotes or based on speculation (Meyers, Fisher, & Marcoux, 2009). Little scientific research explains the effectiveness of young people’s new behaviors or the reasons why they interact with information in such a unique way, as opposed to simply describing the behaviors.

As a result, we do not know enough about how the changed information environment affects many facets of youth information behavior in the digital age or how the new forms of information behavior are associated with young people’s critical, creative, effective, and ethical use of information. This lack of understanding regarding the changing nature of youth
information behavior creates a challenge in developing relevant library and information services and educational approaches that match youths’ unique patterns and approaches to information.

This research is designed as a way to meet the needs of (a) informing researchers and professionals about the digital age youths’ new information behaviors and (b) filling the gaps in the LIS perspective—i.e., the lack of theoretical frameworks and scientific research that explain contemporary youth information behaviors in the digital age. The dissertation employs Radical Change Theory (Dresang, 2005a) as a theoretical framework to guide information behavior research in the digital age. Taking up and developing further the scholarly works on Radical Change Theory (Abele, 2003; Dresang, 2005b, 2008a; Hassett, 2005; Pantaleo, 2008), the study will add to the original theory a new typology that identifies key characteristics of digital age youth information behavior derived from two phases of qualitative research.

**Theoretical Framework: Radical Change Theory**

The theory of Radical Change was developed in the field of Library and Information Studies (LIS) by Eliza T. Dresang. The theory explains that contemporary youth information resources and behaviors experience transformations in ways that reflect the properties of the digital age. In the 1990s when the theory was developed, the digital age clearly emerged and digital media such as personal computers with Internet connectivity had started to permeate the lives of the general populace. Society became increasingly more interactive and connected through digital networks. Radical Change indicated fundamental changes in the new era, departing from the usual or traditional in information resources or behaviors, although still related to it (Dresang, 1999).

The theory proposes the properties of the digital age, referred to as the Digital Age Principles of Interactivity, Connectivity, and Access (See Table 1.1). The Digital Age Principles define the major concepts of the theory.

<table>
<thead>
<tr>
<th>Digital Age Principles</th>
<th>Definitions</th>
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<tbody>
<tr>
<td>Interactivity</td>
<td>Dynamic, nonlinear, and nonsequential learning and information behavior with an increasing sense of control by end-users</td>
</tr>
<tr>
<td>Connectivity</td>
<td>A sense of community or a construction of social worlds that emerges from changing perspectives and expanded associations</td>
</tr>
<tr>
<td>Access</td>
<td>Breaking of longstanding information barriers, bringing entrée to a wide diversity of formerly largely inaccessible opinions</td>
</tr>
</tbody>
</table>
The meaning of the term digital has both technical and cultural aspects. Technically, digital indicates a data technology that uses bytes made up of bits, a binary unit created by the presence or absence of an electrical impulse, i.e., 1 or 0; however, the theory suggests the cultural aspect of digital media in a broad sense—“media which provide for users a high level of choice and interactivity because the bits and bytes can be rearranged and transmitted so easily” (Dresang, 1999, p. 7). Therefore, from the perspective of Radical Change theory, digitally designed media includes not just electronic media with microchip technology, but also new forms of traditional media, such as handheld books, that enable a high degree of interactivity and user empowerment similar to hypertext.

The early development of Radical Change Theory provided an explanation on changes in digital age youth literature. The Radical Change typology of handheld literature for youth consists of three types and indicators of each type. The typology presents representations of the Digital Age Principles in literature for youth (See Table 1.2). The typology has benefited and facilitated research studies across the disciplines that will be discussed in Chapter Two.

Table 1.2. Radical Change Typology: Literature for Youth in the Digital Age (Dresang, 1999)

<table>
<thead>
<tr>
<th>RADICAL CHANGE TYPES</th>
<th>INDICATORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type One: Changing Forms of Formats</td>
<td>Graphics in new forms and formats</td>
</tr>
<tr>
<td></td>
<td>Words and pictures reaching new levels of synergy</td>
</tr>
<tr>
<td></td>
<td>Nonlinear organization and format</td>
</tr>
<tr>
<td></td>
<td>Nonsequential organization and format</td>
</tr>
<tr>
<td></td>
<td>Multiple layers of meaning</td>
</tr>
<tr>
<td></td>
<td>Interactive formats</td>
</tr>
<tr>
<td>Type Two: Changing Perspectives</td>
<td>Multiple perspectives, visual and verbal</td>
</tr>
<tr>
<td></td>
<td>Previously unheard voices</td>
</tr>
<tr>
<td></td>
<td>Youth who speak for themselves</td>
</tr>
<tr>
<td>Type Three: Changing Boundaries</td>
<td>Subjects previously forbidden</td>
</tr>
<tr>
<td></td>
<td>Settings previously overlooked</td>
</tr>
<tr>
<td></td>
<td>Characters portrayed in new, complex ways</td>
</tr>
<tr>
<td></td>
<td>Unresolved endings</td>
</tr>
</tbody>
</table>

Operating in the cognitive paradigm in LIS, Radical Change Theory offered a way to think about contemporary youth in relation to their information resources (Dresang & Kotrla, 2009). The theory addressed both literature and young readers—the synergistic combination of users and information resources in the digital age. Later, research studies that applied the theory investigated the changing nature of youth information behavior in response to the information
resources with Radical Change characteristics. Those studies demonstrated the theory’s applicability to information behavior research in the digital age (Abele, 2003; Dresang, 2005b; Hammerberg, 2001; Hassett, 2005; Pantaleo, 2008).

The current study attempts to test the explanatory power of the Radical Change Theory, which was created during the early development of the digital society to explain changes in handheld literature for youth, in accounting for contemporary youth information behaviors. Also, the study aims to develop further the original theory by adding a typology of digital age youth information behavior, which is concomitant to the typology of handheld literature.

**Research Purposes**

The purposes of the research are twofold. First, it aims to understand contemporary young people’s information behavior based on a solid theoretical and empirical foundation. In particular, the exploratory study focuses on new and innovative behaviors of youth who engage in digital media culture.

Another goal of the study is further developing Radical Change Theory in order to facilitate the application of the theory in explaining digital age youth information behavior. The theoretical and empirical processes of the study result in adding to the original theory a typology that identifies the key characteristics of youth information behavior in the digital age. Therefore, the current study will lay the groundwork for future research that further investigates digital age youth information behavior using Radical Change Theory.

**Research Questions**

The study’s research questions include:

1. What are the key characteristics of information behavior of youth in the digital age?
   1.1. How do youth act independently?
   1.2. How do youth form identity and perceive others?
   1.3. How do youth interact socially with others?
2. How can Radical Change Theory be applied and further developed to explain youth information behavior in the digital age?
Methodology

The study takes the Theory to Research to Theory strategy (Meleis, 2007), and the theory of Radical Change is used throughout the entire process of the research design. Radical Change Theory guides development of the research questions and the research design incorporates the theory to provide structure to the systematic data collection and analysis; finally, the theory is informed and modified by the study results.

Qualitative methodology was selected due to the exploratory and holistic nature of the research. The overall research design consists of two phases:

- Phase I: content analysis of research literature and
- Phase II: group and individual interviews with youth who are immersed in digital media culture

In Phase I, the researcher conducted a content analysis of research literature to discover key patterns of youth information behavior in the digital age. Data involve research-based literature that empirically investigated youth information behavior across the disciplines. Data analysis techniques include the Directed Qualitative Content Analysis method, in which a theory or relevant research finding provides an initial code list while new themes emerge from the data directly. The result of the content analysis identifies characteristics of digital age youth information behavior that represent the concepts of Radical Change Theory, i.e., Interactivity, Connectivity, and Access.

Phase II begins after Phase I is completed. Phase II was designed to test the findings from Phase I and add new insights from the perspective of youth. The purposefully selected interview participants involve a total of 12 young adults, between the ages of 12-15, who participate in digital media production using Scratch, a graphical programming language for youth. They engage in active information behaviors including collaborative information creation in the digital environment, e.g., interactive magazine production and development of an online media library and a Wiki website by youth themselves. Sense-Making Methodology (SMM), one of the most influential and widely used methodologies in information behavior research, informs the Phase II group and individual interviews. Findings from Phase II impact Phase I results by elaborating and adding to the characteristics discovered there.
Due to the nature of qualitative research, the study does not attempt to generalize its findings to all contemporary youth in the digital age. Instead, transferability of the study results is expected to be high, because the findings are (1) supported by a well-established theory, (2) based on systematic analysis of cross-disciplinary research literature that covers a range of contexts in Phase I, and (3) tested with carefully selected purposeful samples in Phase II.

**Significance of the Study**

This dissertation study is significant in terms of its theoretical, empirical, and practical contributions. Kerlinger and Lee (1999) suggest, “the basic purpose of scientific research is theory” (p. 5). This research not only demonstrates how a theory can be used to aid research design and analysis of investigation, but also further develops the theory of Radical Change, one of the very few LIS theories that explain digital age information behavior of youth. As explained above, the field lacks theoretical frameworks to explain youth information behavior, which has become increasingly multi-faceted and complex in the digital age. The expansion of Radical Change Theory that occurred as a result of this research contributes to filling the gap.

The study result, i.e., a typology of digital age youth information behavior built into Radical Change Theory, will spur researchers to conduct more empirical studies on the topic, just as the original theory has generated interest in research questions and guided research across several disciplines (Abele, 2003; Hammerberg, 2001; Hassett, 2005; Pantaleo, 2008). The studies largely benefited from the clear types and indicators that the theory provided regarding the changing nature of handheld literature for youth. A concomitant typology that is established as a result of the study may demonstrate the same usefulness in motivating research studies on contemporary youth information behavior. Therefore, the study is not an end in itself but provides an instrument to be utilized in further research.

The research is also significant due to its methodological soundness. The study applied well-established, yet innovative qualitative research methods, including Sense-Making Methodology (SMM) group and individual interviews (Dervin, 2008; Dervin & Devakos, 2010) and Directed Qualitative Content Analysis (Hsieh & Shannon, 2005). The SMM group interview technique, in particular, was recently developed and pilot tested by Dervin and Devakos (2010). To the best knowledge of the researcher, the study is the first attempt to apply the method with the young adult population and provide methodological implications on application of the new
technique with young people. Also, the SMM individual interviews were conducted in the online environment. The study shows that the online interview is a legitimate research method when the research questions address online phenomena and online communication is a preferred and familiar method for the study participants. In addition, application of the Directed Qualitative Content Analysis technique demonstrates a dialectic and reciprocal relationship between a theoretical framework and data, which minimizes potential bias by a pre-selected theoretical framework in analyzing data.

Moreover, it is fundamental to understand the characteristics of youth information behavior in order to provide information resources and services that appeal to contemporary youth. The current research suggests a new holistic perspective for information behavior of youth—a complex process as interplay between various factors such as young people’s (a) intrapersonal process, (b) identity and value negotiation and (c) social interaction. Therefore, the study will help increase understanding of youth information-related activities as a whole and their interrelationships, which is different from studies of individual tasks or search sessions isolated from the context. Ultimately, the research will inform several audiences, such as librarians, information professionals, information service providers, educators, parents or guardians, and finally digital age youth themselves.

Assumptions

The underlying belief of the study involves the reciprocal relationship between digital media and contemporary young people’s lives from the perspectives of Social Construction of Technology [SCOT] (Bijker, Hughes, & Pinch, 1987) and the Social Shaping of Technology [SSOT] (MacKenzie & Wajcman, 1999). These viewpoints place an emphasis on how technology is embedded in its social context, beyond technology deterministic which reduces “the intimate intertwining of society and technology to a simple cause-and-effect sequence” (MacKenzie & Wajcman, 1999, p. xiii). Long before SCOT and SSOT, Vygotsky (1978) suggested social constructivism, particularly its notions of mediation and tools—all human experience is shaped by the tools that the culture provides, such as any material artifact, language, symbol, or digital forms of information access (Engeström, 1987; Kuutti, 1996; Nardi, 1996). Based on the dialectic relationship between technology and people, the study assumes that youths’ engagement in digital media culture is reshaping the ways they interact with information.
Scope of the Study

The study investigates information behaviors of youth in the digital age. In this study, youth or young people refer to both children and young adults ages between 5 and 18. Young Adult Library Association (YALSA) identifies young adults as ages 12 to 18, and the Association for Library Services to Children (ALSC) defines children as ages birth through 14. The study does not investigate information behavior of toddlers and babies under 5 years old, since they are developmentally too young to show various engagements in information behaviors that the study aims to investigate.

The data collected in Phase I include research literature on information behavior across contexts such as school, libraries, everyday life, and the digital environment. The collected literature is not limited to studies from the Information Behavior or Library and Information Studies (LIS) areas, but also covers studies from the cross-disciplinary fields concerning digital media and youth. Collected studies include literature published in English only. Phase II data addresses information behavior of young adults in an after-school club as well as an online environment in everyday life. Phase II participants involve youth who participate in a U.S. originated and organized online environment and are fluent in English.

The digital age emerged in the 1990s, and since 2004, the digital age in the 21st century is often called the era of Web 2.0. This time period, from 2004 to the present, forms the focus of the research. The dissertation mainly uses the term of digital age youth when referring to contemporary young people born after 1989.

The dissertation study focuses on the process or action aspect of youth information behavior. Information behavior is an overarching concept that includes information needs, processes or actions in response to the needs, and circumstantial factors that affect the response to the perceived needs. The study is mainly interested in illuminating key characteristics of the process aspect of youth information behavior. Therefore, it is beyond the scope of the study to assess youth information needs, factors involved in the digital age information environments, or effectiveness of the behaviors discovered in the study.

Also, the study does not conduct a comparative study of information behaviors between older generations and digital age youth. One can compare current young people’s information behavior and the information behavior of older generations in their childhood in order to see if some of the noticeable characteristics in digital age youth information behaviors are really new.
The research, however, does not study youth information behavior historically for comparison purposes, because the goal of the study is to enhance understanding of contemporary young people and serve them better. Some of the key characteristics identified by the study may have also existed to some extent in the past as well, although they are much more prevalent nowadays, but this fact does not mitigate the importance of understanding such characteristics to provide relevant library and information services for youth in the digital age.

Conclusion

Today’s young people are engaged in a variety of information behaviors and the ways that they interact with information have changed significantly with the prevalence of digital media. Applying the theory of Radical Change, the study suggests that contemporary youth information behavior shows distinct features that reflect the properties of the digital society, which include the Digital Age Principles of Interactivity, Connectivity, and Access. Two phases of qualitative research develop and add to Radical Change Theory a new typology that identifies key types and characteristics of digital age youth information behavior. The study will provide a significant contribution to the field of Information Behavior, since the study result will propose a theoretical framework of digital age youth information behavior based on sound empirical studies. The typology as a result of the study will spur further research studies on youth information behavior in the digital age. By informing about the changing nature of youth information behavior, the potential impact of the study includes developments of relevant library and information services, information policies, and other educational approaches that match digital age youths’ unique patterns and approaches to information.
CHAPTER TWO

LITERATURE REVIEW

This chapter provides analytical reviews on the four areas that create a foundation for the current dissertation research: (1) youth information behavior, (2) information literacy and standards for school libraries in the digital age, (3) digital media and youth, and (4) Radical Change Theory. Studies discussed in the first two sections are conducted in Library and Information Studies (LIS) and the latter two parts of the review discuss relevant studies across other disciplines, such as Education, English, Media and Literacy Studies.

Since this dissertation study resides primarily in the field of youth information behavior research in LIS, key achievements and gaps in the field are discussed in order to substantiate the need for and the importance of the study. Subsequently, the newest guidelines and standards for school library media programs are discussed because they provide an appropriate and timely reflection on changing students, learning environments, and new skill sets needed in the digital age, which is lacking in the current youth information behavior research. Although they do not specifically focus on information behavior, related fields also provide important insights into behaviors and attributes of digital age youth that might affect their interaction with information. In addition, scholarly works that apply Radical Change Theory across the disciplines are analyzed; this review not only demonstrates the usefulness of Radical Change Theory in guiding research but also suggests a way to further develop the theory to facilitate investigative studies applying it to explain contemporary information behaviors.

Youth Information Behavior Research: Changing Focus

The field of youth information behavior research in Library and Information Studies (LIS) provides the basis for the development of appropriate library and information services for youth. Over time, the focus of scholarly study has changed, incorporating the research paradigm shift from the physical and system-oriented perspective to the cognitive and user-centered perspective that emerged in the 1970s. In the former paradigm, specialization in youth librarianship focused on operational aspects of librarianship, including selection, acquisition, and organization of
information resources. Research centered on task-oriented needs of youth and the formal channels through which they sought information. More recent studies from the user-centered paradigm emphasize children’s cognitive development and their information needs and seeking as a process occurring in various contexts (Kuhlthau, 2004).

Current youth information behavior studies show promising characteristics. While one of the most often studied contexts for youth information seeking has been school libraries, emerging studies display broadening arenas for studying young people’s information behavior in everyday life. Also, researchers now pay more attention to child developmental needs and attributes throughout the research process. A review of the field, however, still reveals gaps, such as the lack of youth-centered theories and models from a holistic perspective, and shows a need for further study of youth information behavior in the digital environment.

Theories and Models of Youth Information Behavior

The development of theories unique to Library and Information Studies LIS is essential to the growth of the discipline, and theory use in scholarly research is a distinguishing characteristic of a discipline’s academic maturity (McKechnie & Pettigrew, 2002). In that sense, previous research efforts in LIS primarily with adults have developed rich theories and models for understanding information behavior. Widely used models and theories include, but are not limited to, Wilson’s Information-Seeking Behavior model (1999), Dervin’s Sense-Making (2005), Bates’ Berrypicking model (1989), Savolainen’s Everyday Life Information Seeking (2008), Chatman’s Normative Behavior (2000), and Fisher’s Information Grounds (2005). Also, some models explain new patterns of information behavior in the digital age, such as the Nonlinear Model of Information Seeking Behavior (Foster, 2004) and Multitasking and Co-ordinating Framework for Human Information Behavior (Spink, Park, & Cole, 2006).

Although general information behavior theories and models are applicable to youth information behavior research, it is important to have frameworks specifically focusing on youth because the general models are limited in understanding unique developmental needs and characteristics of youth behaviors. Therefore, although only a few exist compared to the models derived from research with adults, efforts have been made to create youth-centered frameworks in LIS. According to Shenton and Dixon (2005), youth information behavior models can be categorized into the four types: (1) instructional, (2) grounded, (3) narrative, and (4) synthesized
models. Instructional models offer a recommended and idealized approach that young people should internalize and a structured set of skills to be taught. In contrast, grounded models evolve directly from research and aim to portray actual behavior of youth. Narrative models are found in accounts of actual research, but descriptions of behavior are presented based more on the investigators’ logical interpretation, rather than emerging from the data collected. Lastly, synthesized models are derived from analysis of past work, and fieldwork may be conducted later to allow further investigation of the model (pp. 5-6).

Traditional models of youth information seeking are primarily interested in evaluating young people’s information literacy and focused on problem-oriented information behaviors. The models are grounded in youth information seeking research that focuses largely on children’s performance related to academic tasks in school environments (Reuter, 2007b). The most widely used frameworks include the Information Search Process Model (ISP) (Kuhlthau, 2004) and the Big 6 Skills model (Lowe & Eisenberg, 2005). These models provide a series of sequential stages for systematic problem solving, although the steps are not always part of a linear, step-by-step process.

The fact that the models of youth information seeking, which stem from research in the school context, tend to be developed to provide educational implications shows both strengths and limitations of the traditional models. They are useful because “these information process models provide a road map for implementation and instruction of information literacy skills in the curriculum” (Lowe & Eisenberg, 2005, p. 63). The models are, however, limited in explaining a variety of information behaviors that are embedded in young people’s personal and social practices at home, school, public places, and online (McKenzie, 2003; Meyers, 2009). Until now, a theoretical framework that explains the action and process aspect of youth information behavior has not existed and no overall theory that might explain information behavior in all environments has been fully developed. In that sense, Erdelez (1999) calls for the development of “holistic and detailed tools for modeling information users’ behavior” (p. 28).

**Everyday Life Information Seeking [ELIS] of Youth**

Youth information behavior research in everyday life attempts to capture a variety of youth engagements in information activities for many purposes beyond curriculum-related academic needs at home, school, local communities, and online environments (Dresang, Gross, & Holt,
Those studies were motivated by the development of the Everyday Life Information Seeking [ELIS] models in the 1990s by several researchers (McKenzie, 2003; Savolainen, 2008; Williamson, 2005), where ELIS refers to “the ways in which people acquire information in non-work contexts, for example by monitoring problems at hand” (Savolainen, 2008, p. v). Specifically for children and adolescents, ELIS concerns “their engagement with information to address everyday life concerns, such as growing up, identity, relationships, careers, and lifestyle choices” (Todd, 2003, p. 34).

It is an essential development of the field to broaden arenas for studying young people’s information behaviors in their everyday lives, because young people’s ELIS has a critical importance to their development and maturation (Agosto & Hughes-Hassell, 2006a; Meyers et al., 2009). A study conducted by Agosto and Hughes-Hassell (2006a) explored the everyday life information needs of urban teenagers. The researchers suggested “the essence of teen everyday life information seeking (ELIS) is the gathering and processing of information to facilitate the teen-to-adulthood maturation process. ELIS is self-exploration and world exploration that helps teens understand themselves and the social and physical worlds in which they live” (p. 1394). The researchers explained that the reasons why adolescents engage in various information behaviors in their everyday life is to support the development of seven aspects of the self, including the emotional, reflective, physical, creative, cognitive, sexual, and social self.

A few studies appropriately situate information seeking among youth in everyday life as a social practice (Agosto & Hughes-Hassell, 2006a, 2006b; Meyers, 2009; Meyers et al., 2009). One of the noticeable patterns found in youth ELIS involves their interpersonal information seeking. Researchers report the use of other people to be the most common information-seeking method pursued by youth (Connaway, Radford, Dickey, Williams, & Confer, 2008; Shenton & Dixon, 2003), and this links to their preferred social, connected nature of information seeking in using public library computers (Dresang et al., 2003), and enhanced interpersonal information sharing through technologies such as cell phones, instant messaging (IM), and e-mails (Meyers et al., 2009).

In particular, Meyers et al. (2009) studied the everyday-life information worlds of youth aged 9-13, referred to as tweens, “a population that has been nurtured from birth to seek information interpersonally and...engaged in media-rich interpersonal information-seeking
behavior” (p. 308). They applied Fisher’s concept of information grounds, “social settings where people go for a particular purpose/activity (e.g., to get a bike fixed, to get a haircut, to eat, or to play a sport) but wind up sharing information in the course of interacting with other people” (p. 312), and identified a variety of places that tweens share information, usually with their peers. They found that the most common information grounds for tweens include schools, shopping malls, athletic fields, community parks, home, and their neighborhoods. Less common information grounds ranged from churches and libraries to restaurants and public transit.

Due to the exploratory and holistic nature of ELIS, a qualitative approach is necessary to investigate the phenomenon at this point. In fact, much of the ELIS research, including studies about youth, employed qualitative methodologies. Agosto and Hughes-Hassell (2006a) stated that “interviews, diaries, participant observation, and other ethnographic methods have proven to be effective not only for procuring rich, authentic ELIS data, but also for gaining participant trust, a critical element in understanding information behavior” (p. 1395). Their study collected rich qualitative data from teenagers through multiple data collection methods including written surveys, activity logs, audio journals, photographic tours, and group interviews. The collected data were analyzed using iterative pattern coding with qualitative data analysis software (QSR NVivo 2) and this resulted in the derivation of theoretical and empirical models of urban teens’ common everyday life information needs.

Meyers et al. (2007) established the Tween Day methodology, which is also a qualitative approach through scenario-based focus groups and individual interviews. Their qualitative data analysis methods included a set of coding techniques using another qualitative data analysis software Atlas.ti, memos, and research team conversations. In addition, Shenton and Dixon (2005) qualitatively derived a typology of youth information needs and five information-seeking models—a general macrocosmic model and four specific source-based models regarding books, CD-ROM, the Internet, and other people. Data was collected through 12 focus groups and 121 individual interviews and coded inductively using the constant comparative method of Glaser and Strauss (1967).

So far, only a few research studies on youth information seeking in everyday life were conducted in spite of the critical importance of ELIS to young people’s maturation. A range of information-related topics in young people’s everyday lives remain uninvestigated, creating a gap in the field of youth information behavior. An improved understanding of youth ELIS is
fundamental to providing expanded youth services in both public and school libraries and in other information institutions that are relevant to their needs and appeal to youth.

Child Developmental Needs and Processes in Research Procedure

An increasing number of studies attempt to capture the phenomena of youth information behaviors from the perspective of children themselves. It is desirable to involve youth in various stages of the research process because (1) researchers need to look at adolescents’ behavior in their own terms to better understand and serve youth (Shenton & Dixon, 2005) and (2) young people can provide rich data for analysis and also are enthusiastic to express themselves (Agosto & Hughes-Hassell, 2006b). Moreover, it is a striking development that children contribute to designing new technologies as partners with adults in some projects (Druin, 2002; Large, Beheshti, Nasset, & Bowler, 2007). The studies involving children pay special attention to children’s developmental needs and processes in two ways: (a) by designing a methodology that is developmentally appropriate and (b) by applying child development and learning theories.

Children’s developmental characteristics are considered in the research design process because children are not little adults but an entirely different user population with their own culture and norms (Druin, 2002). In that sense, Meyers et al. (2007) conducted the Tween Day research, devoting close attention to “how the methods used target the developmental attributes and needs of early adolescents (physical, social, and cognitive)” (p. 310). The Tween Day research design was carefully structured not only to meet child developmental needs but also to obtain quality rich data. The research activities with youth were selected to “engage and stimulate tween participants; provide an array of interactions with adult researchers and peers; and promote a sense of empowerment and achievement” (p. 313). For instance, focus groups were employed as a data collection method to facilitate tweens’ peer interaction and approval as well as interaction with adult researchers. They also incorporated a creative computer activity, WebQuest, in order to create enthusiasm and excitement for the research project and to gain unique insights into children’s information behavior in their areas of interest. The Tween Day study provided methodological implications for studying with youth and called for more efforts that investigate “how researchers can most effectively explore children’s information universes in group and individual conversation, as well as through interactive, creative activities” (p. 326).
Due to an emphasis on usability, children specifically participated in the design process of technology for youth themselves (Large et al., 2007). Large et al. (2007) reviewed existing methods that have been used with children to design technologies, including User-Centered, Contextual Design/Inquiry, Learner-Centered Design, Participatory Design, Informant Design, and Cooperative Inquiry. Drawing upon ideas from those existing methodologies, Large and his colleagues developed a Bonded Design approach in order to design Web portals for elementary school students. In the Bonded Design model, intergenerational design teams comprised of adult researchers and children conducted several design sessions, such as needs assessment, evaluation, discussion, brainstorming, prototyping, and consensus building, which resulted in low-tech prototypes of children’s Web portals. Large et al. included eight grade-six students and six grade-three students, and the children in the team played a full and active role in all aspects of the technology design process.

Not just developmentally beneficial to children, working jointly with youth provides the most direct way to gain rich and honest data on youth information behavior if the researcher understands what children can offer at different ages with different abilities and preferences. Druin (2002) proposed four main roles that children can play in the technology design process—the child as user, tester, informant, and design partner. Each role was defined based on (a) differences in how researchers relate to children, (b) the stage in the research process in which children participate, and (c) the goals researchers have for inquiry with children. Regardless of what role children play in the research process, Druin suggested that the strengths of involving children include empowering children to contribute their opinions and to see that they are taken seriously by adults. The researcher found that partnering with children can build confidence in children academically and socially, and also improve their communication and collaboration skills.

The theories of learning and child development provide significant implications for designing, conducting, and interpreting youth information-seeking behavior research because they represent children’s specific needs and characteristics in their information seeking. In fact, recent youth information behavior studies reflect more carefully children’s cognitive development based on theories of child development and learning (Bilal, 2007; Bowler, Large, Beheshti, & Nesset, 2005; Hughes-Hassell & Agosto, 2007). These studies demonstrate that
developmental theory can provide powerful tools for research design, data analysis, and theory building (McKechnie, 2007).

For example, the theoretical foundation of the Bonded Design discussed earlier was the Zone of Proximal Development (ZPD), a sociocultural approach to knowledge development. The theory of ZPD explains that when appropriate scaffoldings are put in place, children are able to accomplish more complex tasks than if left to their own devices (Bowler et al., 2005). Also, Hughes-Hassell and Agosto (2007), who developed models of urban teens’ everyday life information needs, applied Havighurst’s developmental tasks of adolescence, a typology of tasks that describes developmental changes that occur during adolescence. By combining the ideas presented in Havighurst’s typology and the data they directly collected from teens, the researchers developed seven major areas of teen development.

Child developmental theories are also used to understand and interpret observed information behavior of youth. Bilal’s research (2007) found that children browse more than they search by keyword on the Web. The researcher explained the finding using Piaget’s theory, i.e., children who are in transition to the formal stage of development (ages 11 to 13) have limited vocabulary and recall knowledge. Since the vocabulary implemented in information systems does not match children’s vocabulary, they move toward browsing. In that sense, Bilal suggested the importance of understanding children’s thoughts, feelings, and actions based on child development theories in studying youth information behavior in the digital environment.

Recent studies on youth information behavior show changing perceptions of children that empower their affinity with and ability to use digital media, and involve children as active participants in 21st century knowledge societies. Also, child developmental and learning theories provide a useful framework in various aspects of the research process. It is, however, unfortunate that the field lacks a domain-specific theoretical framework that considers child developmental needs and processes and can be applied to a range of youth information behaviors in LIS. In fact, Hughes-Hassell and Agosto (2007) mention that they applied Havighurst’s developmental tasks of adolescence since “a comprehensive theoretical model of teen information behavior did not exist” (p. 36) when they looked for a preexisting model or theory that could bring added meaning to their data on information topics. Future research with a carefully designed methodology that considers children’s developmental needs and process should lead to a development of theoretical frameworks in LIS that may fill this gap.
Youth Information Behavior in the Digital Environment

As today’s young people spend a substantial amount of time using technology (Lenhart & Madden, 2007; Pew Internet & American Life Project, 2008a, 2008b), it has been of central interest to investigate youth information seeking using digital media, such as online library catalogs, CD-ROM, online databases, and the Web. Such studies identified a number of barriers that children encounter in information seeking, such as developing search terms and navigating Web sites (Bilal, 2004; Large, 2004; Reuter, 2007b); however, the research lacks a full understanding regarding new characteristics of digital age youth information behavior. Dresang (2005) found that the previous studies on youth information-seeking behavior in the digital environment predominantly focused on young people’s lack of skills or challenges they experience with digital media. Dresang suggested 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).

Youth information behavior research needs to be developed more fully in step with changing knowledge of youth cognition and behavior in relation to a digital environment and digital technology. The apparent interactive, nonlinear, and multitasking approaches of youth as they interrelate in a digital environment are said to require youth to be proficient in new 21st 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, 2009; Partnership for 21st Century Skills, 2009; Silva, 2008). Even though a few exceptions exist (Druin et al., 2003; Large et al., 2007, 2008; Zhou & Stahl, 2007), too little empirical research was conducted in the field of digital age youth information behavior in both school and everyday life environments. The most critical areas for suggested future research include, but are not limited to: (a) youth information behavior outside of institutional settings, (b) youth as creators of information in a larger social context, (c) youth and the short life of information, (d) youth and information as fun, and (e) youth and digital immigrant researchers (Radford et al., 2008).

In the field of youth information behavior, research and theoretical frameworks have been slow to adapt to changes in the digital environment. On the other hand, the newest guidelines and standards for school library media programs provide an appropriate and timely reflection on changing students, learning environments, and new skills sets needed in the digital
age. Also, it is important to discuss the concept of information literacy because of (a) its inseparable relationship with information behavior, and (b) the new meanings it wears in the digital age.

**Information Literacy and Standards for School Libraries in the Digital Age**

One of the most often studied contexts for youth information seeking is the school library, the scene for the teaching of information literacy and the source of numerous information resources. School libraries provide a dynamic research place to study youth information behavior because they are “organized around the intersection of information and communications technology (ICT); teaching and learning; and information creation, provision, and use: topics applicable to many areas of current studies in library and information studies” (Mardis, 2009, p. 1). In that sense, Mardis (2009) suggested a shift of “staid conceptions of school librarianship in the LIS academy to the idea of dynamic educational informatics in school” (p. 1).

Information literacy—the ability to locate, evaluate, and use information (AASL & AECT, 1998)—has been a central theme for information behavior studies in school libraries due to an inseparable, reciprocal relationship between information behavior and information literacy. For example, desirable information behaviors constitute a driving force toward obtaining information literacies and skills. On the other hand, relevant skills and literacies lead to productive behaviors. That is, “information literacy, the use of technology, critical thinking, and ethical decision making all have a basis in skills and an actualization in the behaviors that students choose to exhibit—from seeking diverse perspectives, to evaluating information, to using technology appropriately, to applying information literacy skills, to using multiple formats” (AASL, 2009a, p. 13).

The physical dimension of students’ information behaviors can also be viewed as a representation of their information literacy. Since literacy itself is not observable or measurable, it needs to be inferred through physical behaviors. In that sense, students’ information behavior is studied as an indicator of their information literacy. Therefore, one of the major goals of studying youth information behavior is to infer or assess students’ information-related skills throughout a series of problem-solving processes and to help them enhance their skills by providing appropriate educational interventions (Eisenberg, Lowe, & Spitzer, 2004; Kuhlthau, 2004). Due to the close relationships between information literacy and behavior, it is an
important issue of the 21st century to explore links between information behavior, information literacy, and information impact (i.e., how the information will be used) and establish “an overarching conceptual framework that represents the unified whole” (Kuhlthau, 2008, p. 72).

The notions of information behavior and information literacy have grown much more complex in the digital age as resources and technologies continue to change, and the ways students access and use information have transformed within the past two decades. The changes are explicated in the following statement by AASL (American Association of School Librarians) (2009a):

Learning in the twenty-first century has taken on new dimensions with the exponential expansion of information, ever-changing tools, increased digitization of text, and heightened demand for critical and creative thinking, communication, and collaborative problem solving. To succeed in our rapid-paced, global society, learners must develop high-level thinking skills, attitude, and responsibilities. All learners must be able to access quality information from diverse perspectives, make sense of it to draw their own conclusions or create new knowledge, and share their knowledge with others (p. 12).

In order to meet the needs of the changing school library environment, the newest set of guidelines for school library media programs were established to define the future direction of school libraries—i.e., school libraries “empower students to be critical thinkers, enthusiastic readers, skillful researchers, and ethical users of information” (AASL, 2009a, p. 5). The guiding principles for school libraries, involving the Standards for the 21st-Century Learner (AASL, 2007), Standards for the 21st-Century Learner in Action (AASL, 2009b), and Empowering Learners: Guidelines for School Library Media Programs (AASL, 2009a), 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. Along with those documents, the AASL Standards and Guidelines Implementation Task Force launched a national plan to implement the learning standards and program guidelines under the brand Learning4Life (L4L) (AASL, 2008). Together these documents, promoted through the Learning4Life (L4L) brand, emphasize the fact that school library media programs contribute not only to school-based learning but also to lifelong
learning and personal and aesthetic growth of 21\textsuperscript{st} century students as ethical and productive members of a democratic society.

The analyses of the current youth information behavior research and new guidelines for school libraries reveal two gaps. First, although the standards clarify that the school library stretches across academic disciplines, locales, and life circumstances, far too little empirical research on youth information behavior in school libraries addresses the expanding role of school libraries beyond task-oriented information activities. Also, traditional theories and models on youth information behavior that concern information literacy skills have not been updated to reflect changing youth and information environments in the digital age, even though the school library guidelines provide a timely direction for the 21\textsuperscript{st} century. In order to further develop the field of youth information behavior in the digital age, it is necessary to examine relevant studies from related fields, which provide knowledge on digital media and youth with implications for information behavior.

\textbf{Digital Media and Youth}

Although not specifically focusing on information behavior, recent studies on young people’s use of technology and digital media from related fields, such as Education, Media Studies, and Literacy Studies, provide insights into behaviors and attributes of digital age youth that might affect their interaction with information. A growing body of research investigates the role of digital media in young people’s lives “to help determine how digital technologies are changing the way young people learn, play, socialize, and participate in civic life…[because] answers are critical to developing educational and other social institutions that can meet the needs of this and future generations” (The MacArthur Foundation, 2006). In relation to contemporary youth information behavior research, the studies are particularly useful in defining the digital society culture (Jenkins, 2006b), the nature of the digital age youth (Palfrey & Gasser, 2008; Prensky, 2001; Tapscott, 2009), and new ways of learning and 21\textsuperscript{st} century skills/literacies (Gee, 2007, 2008; Jenkins, 2006a; Partnership for 21st Century Skills, 2004; Spiro, Collins, Thota, & Feltovich, 2003). They also provide understanding of the far less investigated aspects of youth information seeking in Library and Information Studies (LIS), such as identity and value negotiation during young people’s interaction with information (Buckingham, 2008) and the
information behaviors embedded in various social practices, including participation in online social networks (Ito et al., 2008).

Relevant findings from digital media studies in various disciplines are congruent with the current issues of youth information behavior research in the digital age, such as (a) collaborative information behavior, (b) everyday life information seeking, and (c) new skills and literacies required to interact with digital forms of information. For example, the current emphasis on collaborative, interpersonal information seeking in LIS can be understood through the concept of participatory culture, the “culture in which fans and other consumers are invited to actively participate in the creation and circulation of new content” (Jenkins, 2006b, p. 290). The connectivity of the digital media enables young people to constantly interact with each other and to participate in new types of social communities. Youth working collaboratively often form voluntary affiliations in formal and informal communities online such as Facebook or MySpace.

Ito et al.’s (2008) ethnographic studies on young people’s everyday participation in new media showed new types of information behavior in the digital age. They proposed a framework of Genres of Participation to describe different modes of young people’s engagement with new media including Hanging Out, Messing Around, and Geeking Out, depending 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 on how the networks enrich the information behavior of youth. Among these behaviors are searching online for information of interest, creating information with various technologies, and seeking expert knowledge from specialized online networks.

With particular relevance to youths’ everyday life information seeking (ELIS), rich case studies demonstrate that today’s young people are engaged in a wide variety of social practices including online book fandom and popular culture activities (Jenkins, 2006b). That is, digital age youths’ information needs and activities are no longer limited to school-related tasks, and they meet their various needs in relation to popular culture in informal contexts, and also learn through play. In that sense, the concept of Affinity Spaces proposed by Gee (2007) indicates an informal learning culture, “a space where informal learning takes place, characterized by, among other things, the sharing of knowledge and expertise based on voluntary affiliations” (Jenkins, 2006, p. 280). For example, in the Web-based Harry Potter fandom, youth draw upon their own experiences to flesh out various aspects of the book, express their interpretations and feelings.
toward the books, and circulate what they create on the Web, so that it can be shared with others (Jenkins, 2006). The process of learning occurs outside the classroom and beyond direct adult control.

Also, digital age culture results in a shift in the skills youth need to acquire in order to successfully interact with information. Along with the newest guidelines and standards for school libraries that reflect these changes, new skills and literacies suggested by scholars from other disciplines provide further insights. For instance, new media literacies, “a set of cultural competencies and social skills that young people need in the new media landscape” (Jenkins, 2006a) include: Play, Performance, Simulation, Appropriation, Multitasking, Distributed Cognition, Collective Intelligence, Judgment, Transmedia Navigation, Networking, and Negotiation. Gee (2007) proposes the 36 learning principles that are embedded in good video games. In addition, the 21st century skills identified by the Partnership for 21 Century Skills (Partnership for 21st Century Skills, 2009) influenced the development of new guidelines for school library media programs (AASL, 2009a).

Still lacking in these fields allied with LIS is a coherent theory that directly and specifically refers to youth information behavior as it is defined and studied in Library and Information Science, which is an integral part of young people’s digital media use. An examination of one particular theory, Radical Change, and its application to date demonstrates how such a theory might work to fill this gap.

### Radical Change Theory

Radical Change Theory, as a theoretical and analytical framework, has promising potential to guide research in explaining various phenomena in the digital age across the disciplines. The theory was initially developed in the 1990s by Eliza T. Dresang to explain changes in handheld literature for youth in the digital age through digital age principles—the theory’s major concepts involving Interactivity, Connectivity, and Access. Radical Change theory proposes three types of changes in handheld literature for youth, i.e., Type One: Changing Forms and Formats, Type Two: Changing Perspectives and Type Three: Changing Boundaries (Table 1.2). Indicators for each type demonstrate operationalization of the digital age principles of Interactivity, Connectivity, and Access in youth literature. For instance, indicators of the Type One Changing Forms and Formats include: graphics in new forms and formats, words and pictures reaching
new levels of synergy, nonlinear organization and format, and multiple layers of meaning. In addition, Dresang (1999) identifies a number of children’s and young adults’ book titles that exhibit indicators of Radical Change.

The theory has proven its usefulness as a new framework for literary criticism and evaluation in the digital age (Burnett, 2002; Burnett & Dresang, 1999; Dresang, 2008a, 2008b; Latham; Lehr, 2008). Its applicability, however, was not limited to research on literature for youth. The theory guided research in various disciplines including Library and Information Studies, Education, and English (Abele, 2003; Dresang, 2006; Hammerberg, 2001; Hassett, 2005; Latham; Pantaleo, 2008). Research projects that applied Radical Change Theory incorporated elements of the theory in order to (a) observe phenomena and interpret study results through the lens of Radical Change perspective, (b) identify information resources (such as books) that exhibit Radical Change characteristics as research instruments, and (c) analyze data according to the types and indicators provided by the theory. The following studies conducted by the three researchers (Pantaleo, Hammerberg [Hassett], and Abele) across the disciplines, in particular, were largely benefited by (1) the clear typology and indicators for digital age youth literature the theory provides, and (2) an extensive list of children’s and young adults’ book titles with Radical Change characteristics identified by the theory.

Other than Dresang, Pantaleo (2008) has conducted the most extensive research using Radical Change Theory. Pantaleo explored Grade 1 and Grade 5 students’ interpretations of and responses to a variety of contemporary picture books that employ Radical Change characteristics. In 2001 and 2002, the researcher worked directly with Grade 1 students and classroom teachers in two different elementary schools in Canada. Using several picture books with Radical Change characteristics, such as Wiesner’s *The Three Pigs* (2001), Lyon’s *A Day at Damp Camp* (1996), and Macaulay’s *Black and White* (1990), she conducted small groups and whole class interactive read-aloud sessions and observed student response activities that integrate drama, the visual arts, and writing. Collected data were analyzed according to each indicator of Radical Change, but mainly focused on Radical Change Type One (Changing Forms and Format) characteristics.

Pantaleo’s research reported a lively and detailed description of children’s understandings of and responses to the picture books in oral, written, and visual arts forms. While some individuals may think it is too difficult for young children to read books with Radical Change
characteristics, e.g., nonsequential organization and format, multiple layers of meaning, and unsolved endings, the Grade 1 students’ responses demonstrated their (a) heightened involvement in the creation of meaning, and (b) ability to handle the quite sophisticated visual and narrative design of the books. Pantaleo (2002) suggested that “the abilities to tolerate ambiguity and to understand irregularities and complexities are fundamental to children’s growth as readers and to their future successful transactions with more sophisticated texts” (p. 81). Therefore, books with Radical Change characteristics reveal a potential to teach literacy and artistic codes and conventions, critical thinking skills, visual literacy skills, and interpretive strategies in addition to providing pleasurable aesthetic reading experiences.

Pantaleo (2007) further discussed the cognitive and social aspects of Grade 1 students’ information behavior observed in the small group interactive read-aloud sessions using the concept of interthinking—using talk to think collectively and engage with others’ ideas through oral language—the term was coined to link cognitive and social functions of group talk (Mercer, 2000). Her observations of students’ interthinking that occurred during the discussions of picture books with Radical Change characteristics revealed that children’s oral exchanges serve “a multitude of functions including scaffolding interpretations, extending understandings, exploring significances, and constructing storylines” (p. 445). Pantaleo suggested that as the Grade 1 students participate in each small group read-aloud session, collaboration with others is a source of cognitive development, and children’s identities are influenced by the particular interaction patterns of the small group discussions.

Subsequent to her research with the Grade 1 students, Pantaleo conducted two studies with three Grade 5 classes during the fall of 2003 and 2004 to explore the responses of older elementary students to a similar collection of Radical Change picture books. This time, the researcher and the classroom teacher conducted more interactive and creative activities during the eleven or ten weeks of the studies, respectively. Students read each picture book independently, completed their response journals, and engaged in peer-led, small group discussions following a whole-class discussion. As a follow-up activity, students viewed movie clips that exhibit Radical Change characteristics such as nonlinear and nonsequential organization or multiple layers of meaning and narratives. The students engaged in discussion about their observations of the existence of Radical Change characteristics in their everyday life, including other books, movies, TV shows, video games, and the Internet. Students also read
novels with Radical Change characteristics and wrote two responses, and created a poster about the novel. In addition, the Grade 5 students not only responded, but also created their own stories with Radical Change characteristics as the culminating activity of the project.

Rich qualitative data about students’ responses were collected, including photocopies of students’ journal entries and books, transcriptions of small-group and whole-class discussions, photographs of students’ posters, transcription of the interviews with each student, transcriptions of discussions between the classroom teacher and the researcher, and researcher and teacher field notes. Data analysis using the Radical Change framework reflected Grade 5 students’ intellectual and affective engagement in information resources with Radical Change characteristics. Just as in her studies with Grade 1 students, Pantaleo reported that the older children also seemed to develop an increased appreciation for the abilities required to comprehend and interpret various sign systems, had pleasurable aesthetic reading experiences, and learned about literary and artistic codes and conventions through engagement with information resources with Radical Change characteristics.

The Radical Change Theory was also applied in Early Childhood and Literacy studies by Hammerberg [Hassett] (2001; 2005), who incorporated the theory with early writing and comprehension instructions. The researcher strongly concurred with the theory that contemporary children’s literature is undergoing notable changes in its formats, perspectives, and boundaries. She also explained that new technologies, i.e., the computerization of type design and the photomechanical printing technologies, enable the combination of textual, visual, and verbal elements into new modes of communication. As a result, “children’s literature today embodies cues for reading that extend beyond the letters and words on the page, demanding interpretation and interaction with the text beyond the decoding of print” (Hammerberg, 2001, p. 207).

Hammerberg (2001) juxtaposed Radical Change characteristics of children’s literature with the characteristics of writing taught in early elementary school instruction. In this process, she found mismatches between “the ways in which children are taught to write and the materials they are currently reading” (Hammerberg, 2001, p. 208). That is, the researcher used the theory to find places where early elementary writing experiences can be updated to reflect the characteristics of contemporary reading materials, such as hypertextual reading, meaning beyond printed words, multiple perspectives, and complexities of plot. The researcher urged the
alteration of early writing instruction to reflect the nature of contemporary children’s literature and their reading behavior in the digital world.

Along with her research on young children’s writing instruction, Hassett (2005) [formerly Hammerberg] subsequently applied the theory to children’s reading comprehension instruction research. Hassett suggested that new technologies, which make interactive, nonlinear, and hypertextual forms of communication possible, extend into the printed world and called for new ways of reading and comprehending. For example, hypertext indicates the text “that contains extensive cross-referencing elements, evocative graphics, various pathways to follow, links to other meanings, and/or parallel displays of information” (para. 2). Since there are many ways to read a hypertext (i.e., many interpretations and pathways to follow), hyperreading in the digital age is “when the reader (not the author) decides where to look and how (or whether) to engage in particular aspects of the text” (para. 2). The problem is how to update the current methods of comprehension instruction for young children to include the new forms of hypertextual materials and the idea of hyperreading. In order to assess whether the current ways of teaching reading comprehension are enough to meet the new demands of the books, she drew on the titles with Radical Change characteristics.

Hassett concurred with Dresang’s findings on the Radical Change characteristics in literature for youth and extended the theory’s applicability to literary studies, leading to practical implications for early writing and comprehension instruction for children. Therefore, her studies revealed the usefulness of the theory in practice as well as in research.

Abele (2003) investigated information behavior of adults using the Radical Change theory in her dissertation work, where she studied pre-service teachers’ responses to Radical Change literature. Abele conducted a qualitative study with eight pre-service teachers enrolled in the Children’s Literature course required in the elementary teacher education program at the University of Dubuque during a four-week period. Multiple data sources were collected, including response journals, comments on book evaluations, interviews, and observations during classroom discussions in order to describe pre-service teachers’ various responses and reactions to the books.

The research findings included pre-service teachers’ recognition of fundamental differences between Radical Change books and traditional children’s books. The differences identified by the pre-service teachers were closely aligned with Dresang’s typology. Also, the
pre-service teachers responded to Radical Change books in a positive way. Abele found that understanding the characteristics of the digital age books not only affected the reading attitudes of pre-service teachers, but also changed their planned future use of books with Radical Change characteristics in their classrooms. In addition, the study revealed that reading is a social experience, best shared with others for more pleasurable involvement. Radical Change books for youth required a higher level of interaction by readers, and this interaction was welcomed by the pre-service teachers and valued as an effective part of future teaching. Therefore, Abele’s study tested the propositions of the Radical Change theory with the pre-service teachers, and discovered that understanding the theory made positive differences in the pre-service teachers’ reading attitudes and future teaching plans.

Because the research studies applying Radical Change Theory explained not only contemporary books but also information behaviors, such as behaviors in response to the information resources with digital age characteristics, Dresang (2005a) suggested that “the theory started with looking at system design in the technology of the book and has moved on to explaining systems of information behavior” (p. 301). While the studies discussed above are still largely related to youth literature, Dresang showed how the theory can be applied to explain youth information behavior in general (2005b) as well as other issues in LIS such as intellectual freedom (2006).

Reexamination of existing research on youth information behavior through a lens of Radical Change Theory demonstrates how the theory, as a new perspective, can be used to explain general information behavior in the digital environment (Dresang, 2005b). Dresang focused on some of the research meta-analyses, which view children’s information seeking skills as generally lacking and poorly developed. According to Dresang (2005b), however, those studies overlooked the new behaviors nurtured and facilitated by the digital environment, which are manifestations of Digital Age Principles in young people’s behaviors. Therefore, understanding the digital age principles and how the principles are manifested in contemporary youth information resources and behaviors brings a new perspective to the study of digital age youth information behavior and also suggests new directions for further investigations.

As an illustration, Dresang demonstrated an interpretation of the research findings of Project CATE (Children’s Access to and Use of Technology Evaluation) (Dresang et al., 2003; Dresang, Gross, & Holt, 2007) through the perspective of Radical Change. The project
investigated children’s use of technology in a public library and found the social and connected nature of youth information seeking. The focus group interviews with children and the researchers’ observations of library activity showed that youth want to work together on the computer and desire the opportunity to share information that they find. Through the lens of Radical Change, this characteristic of contemporary youth information behavior reflects one of the digital age principles, Connectivity.

The review of the literature applying Radical Change theory shows how the theory generated new research questions in various disciplines and how the theory plays a significant role in guiding investigative studies. The theory, however, is still young and the potential applications of the theory have not yet been fully explored (Dresang, 2005). In particular, more studies are needed to test Radical Change’s usefulness in human information behavior research beyond its application in relation to handheld books for youth. In the studies on digital age books, it was obvious that the Radical Change framework that the theory provides (i.e., types and characteristics) played an important role in guiding research design, collecting and analyzing data. Therefore, it will be useful to establish Radical Change types and characteristics of information behavior and test them through empirical research to facilitate further research in the field of information behavior.

**Literature Review Conclusion**

Chapter Two has discussed relevant research studies in LIS as well as across other disciplines in order to ground the work and substantiate the importance of the current dissertation project. The analytical reviews find that the area of youth information behavior needs detailed and holistic theories/models, which explain digital age youth information behaviors across contexts. The field also lacks an understanding of the range of youth engagement in digital media to seek, use, share, and create information because little research has been conducted on the topic. To fill the gaps, the researcher suggests conducting empirical research on youth information behavior in the digital age that applies Radical Change Theory, because research projects using the theory show its usefulness in guiding research with a new perspective. Also, establishing a typology of digital age youth information behaviors concomitant to those of handheld literature for books will enhance the theory’s applicability.
Chapter Three presents an explanation of the methodological approaches used to answer the following research questions:

1. What are the key characteristics of information behavior of youth in the digital age?
   1.1. How do youth act independently?
   1.2. How do youth form identity and perceive others?
   1.3. How do youth interact socially with others?

2. How can Radical Change Theory be applied and further developed to explain youth information behavior in the digital age?

Before discussing the methods applied in the current dissertation study, this chapter presents the methodological implications of the pilot study conducted in May 2009 since it provides influential insights into the design of the current dissertation research. Subsequently, the chapter addresses the overall research design, population, data collection and analysis methods, ethical considerations, and trustworthiness of the qualitative study.

Pilot Study

The pilot study was conducted in an elementary school classroom with 18 third graders in Tallahassee, Florida in May 2009 by the researcher and her major professor (Koh & Dresang, 2009). The researchers worked with a science teacher, who is also a certified school librarian, to plan an assignment involving collaborative problem solving sessions to last one hour per day on three consecutive days. The assignments were based on the teacher’s regular science curriculum and Florida state science standards. Students worked in teams of two or three; they were given both closed and open-ended questions about planets in the solar system and were instructed to find answers from books, encyclopedias, and the Internet with no further specifications. Students also created posters to answer the questions, presented the posters, and had a class discussion about their information-seeking experiences. The researchers recorded all activities during the assignment with four video cameras for further data analysis. Photocopies of students’ posters
were obtained to examine how they created information. A post-pilot interview was conducted with the teacher. The study was approved by both the Florida State University Human Subjects Committee and the Leon County School District Institutional Review Board. Child assent and parent/guardian consent forms were obtained from all participants prior to the data collection.

The quantitative data collection procedure included systematic observation. The researchers developed observation sheets that documented indicators of what to observe, i.e., researcher-defined observable characteristics of digital age youth information behavior. The initial review of research literature identified key characteristics of digital age youth information behavior, e.g., multitasking, seeking information nonlinearly and nonsequentially, demonstrating a preference for graphic and visual information, and obtaining information through a variety of media sources. Each characteristic was broken down into observable indicators. For example, indicators of the multitasking characteristic in the classroom situation included working on at least two different questions at the same time, using two or more modes (visual, verbal, etc.) of information simultaneously, and using two or more media at the same time.\(^1\) With the teacher’s assistance, two teams of students who were of both genders and of an ethnic mix were selected for in-depth observation. The researchers counted how many times the children exhibited the target behaviors while they searched, used, shared, and created information.

The systematic observation technique applied in the pilot study revealed both its strengths and limitations. The technique of creating indicators, i.e., identifying key characteristics from the literature and splitting each until it is observable and measurable, seems powerful because it enables one to observe components of complex and multifaceted youth information behavior in the digital age. Also, when multiple researchers work together, the method renders a high degree of observer reliability for collecting data.

Nevertheless, several obstacles occurred that led to a decision that this largely quantitative method would not be appropriate to answer the research questions posed in this study. A major issue was that no single, or even a series of, tasks or situations can elicit all types of youth information behavior, while the research intends to identify key characteristics of digital age information behavior from a holistic perspective. Also, the direct systematic observation method cannot capture students’ micro-behaviors, intentions or preferences, and cognitive

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\(^1\) The technique was motivated by Evidence-Centered Design (ECD), a methodology for designing assessment (Mislevy, Steinberg, & Almond, 2003; Shute & Zapata-Rivera, 2008).
processes. Although other methods can be incorporated into the study to offset limitations, e.g., having human videographers zero in on specific students or eye tracking, such multi-method studies will be more appropriately conducted once the overall model of types and characteristics is in place and researchers can choose focus areas. Therefore, it was determined that systematic observation of the phenomenon with quantitative measurement as attempted in the pilot study would not be sufficient for the purpose of creating a theoretical framework that documents comprehensive characteristics of digital age youth information behavior.

On the other hand, useful information was gathered from the qualitative portion of the pilot study. Students’ debriefing after the problem-solving sessions provides insights into their preferences and underlying reasons for their specific information behaviors from their own perspectives. As a result, the methodological implications of the pilot study led to the development of a qualitative research design, which is an appropriate approach to investigate phenomenon about which little is yet known (Hoepfl, 1997).

**Overall Research Design**

Qualitative methodology was selected due to the exploratory and holistic nature of the dissertation research. The qualitative approach will allow the generation of clear identification and definitions of the characteristics of digital age youth information behaviors, which are prerequisites for conducting further research studies on this topic. In fact, much of the information behavior research from a holistic perspective has employed qualitative methods, e.g., interviews, diaries, and participant observation, and has produced rich and authentic data to enhance the understanding of human information behavior. Major research projects on digital media and youth across the disciplines were conducted from the qualitative research tradition, such as ethnography with digital age youth.

The use of theory is an integral part of the design of the dissertation research. In quantitative research, testing a theory provides variables for developing hypotheses. The use of theory in qualitative research varies from using a theory as an overall perspective or lens that shapes research questions to generating a theory as an end result by finding patterns that emerge from data. In this study, the theory of Radical Change is used throughout the entire process of the research design; the theory drives the research questions of the dissertation research, and the
results that answer these research questions inform and modify the theory—the approach referred to as the Theory to Research to Theory strategy (Meleis, 2007).

The overall research design consists of two qualitative, sequential phases:

- Phase I: content analysis of research literature and
- Phase II: Sense-Making Methodology (SMM) group and individual interviews with youth who engage in digital media practices

In Phase I, the researcher conducts a qualitative content analysis of research literature to discover key patterns of youth information behavior in the digital age. Phase II was designed to test the findings from Phase I, add new insights from the perspective of youth themselves, and test the applicability of Radical Change Theory to explain a specific phenomenon of contemporary youth information behavior. Findings from Phase II will modify and refine Phase I results.

**Target Population**

The target population of the research is contemporary youth in the digital age, ages 5 through 18, often referred to as digital age youth in this dissertation. In this study, youth indicates both children and young adults; Association for Library Services to Children (ALSC) defines children as ages birth through 14, and Young Adult Library Services Association (YALSA) identifies young adults as ages 12 to 18. Information behaviors of toddlers and babies under 5 are not included in the interest of the study, since they are developmentally too young to show various engagements in information behaviors, which the study aims to investigate.

The literature identified for the content analysis in Phase I involves research on youth ages 5-18 years old. Collected studies include literature published in English only. Phase II interview participants are young adults, ages 12-15, in order to observe more active participation in various information behaviors among youth with relatively greater autonomy than younger children might exhibit. Youth involved in Phase II are those who actively engage in digital media practices, e.g., leaders of an online community and information creators using digital media. Phase II samples involve youth who participate in a U.S. originated and organized online environment, i.e., Scratch (http://scratch.mit.edu), and are fluent in English.
Phase I: Content Analysis of Research Literature

Phase I of the study involves conducting content analysis of research literature to identify and categorize key characteristics of youth information behavior that reflect the Digital Age Principles—Interactivity, Connectivity, and Access—suggested by Radical Change Theory (See Table 3.1). The goal of Phase I is the development of a typology of digital age youth information behavior that elaborates the original Radical Change Theory by operationalizing the core concepts. This approach to literature analysis was selected in order to (a) build upon previous research efforts, and (b) cover diverse contexts such as different age groups, tasks, and both school and everyday life settings.

Table 3.1. Concepts of Radical Change Theory: Digital Age Principles (Dresang & Koh, 2009)

<table>
<thead>
<tr>
<th>Digital Age Principles</th>
<th>Definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interactivity</td>
<td>Dynamic, nonlinear, and nonsequential learning and information behavior with an increasing sense of control by end-users</td>
</tr>
<tr>
<td>Connectivity</td>
<td>A sense of community or a construction of social worlds that emerges from changing perspectives and expanded associations</td>
</tr>
<tr>
<td>Access</td>
<td>Breaking of longstanding information barriers, bringing entrée to a wide diversity of formerly largely inaccessible opinions</td>
</tr>
</tbody>
</table>

Phase I Data Collection Methods

The scope of literature collected covers research studies that address contemporary youth information behavior produced in the Information Science or Library and Information Studies field as well as various related disciplines such as Education, Communication, Media and Literacy Studies. Since studies on the topic across the scholarly fields are quite extensive, a selective review was conducted. The literature selected adhered to the following criteria: (1) research-based, (2) topics that address information-related activities, e.g., information seeking, use, sharing, and creation, and (3) subjects born between 1992 and 2005, i.e., youth ages 5 to 18 in 2010, the year when data was collected. The researcher employed several strategies to identify relevant literature, such as footnote chasing, citation searching, author searching, journal runs, and subject searches (Bates, 1989). The data collection stopped in May 2010 when the content became repetitious or irrelevant.
An effort was made to separate the research evidence from unsubstantiated anecdotes and rhetoric because one of the main critiques of digital age youth research suggests that a number of studies are based on weak empirical and theoretical foundations (Bennett, Maton, & Kervin, 2008; Meyers et al., 2009). Although what constitutes scientific evidence is a controversial issue in Social Sciences, literature to be included must meet one or both of the following conditions in order to be considered research-based literature in this study— (a) providing a description on the methodological procedure to draw conclusions, instead of speculation or opinion papers, and/or (b) appearing in peer-reviewed scholarly journals, conference proceedings, or books based on research or theory.

**Phase I Data Analysis Methods**

The collected research literature was analyzed using the method of qualitative content analysis. Content analysis can be conducted qualitatively or quantitatively. While quantitative content analysis often indicates counting words or rating responses on predetermined scales, qualitative content analysis is “a research method for the subjective interpretation of the content of text data through the systematic classification process of coding and identifying themes or patterns” (Hsieh & Shannon, 2005, p. 1278). Since the purpose of this study is to identify patterns of digital age youth information behavior, the qualitative approach was chosen.

Types of qualitative content analysis also vary. Three distinct approaches of qualitative content analysis are suggested based on the degree of involvement of inductive reasoning, including Conventional, Directed, and Summative analysis. In Conventional Content Analysis, coding categories are derived directly from the data and researchers avoid using preconceived categories. With a Directed approach, content analysis starts with a theory or relevant research findings as guidance for initial codes. Last, a Summative Content Analysis involves counting and comparisons, followed by the interpretation of the underlying context (Hsieh & Shannon, 2005; Zhang & Wildemuth, 2009).

The study takes a Directed Qualitative Content Analysis approach, where a theory guides initial coding to validate or extend the theory conceptually, while researchers still immerse themselves in the data and allow themes or patterns to emerge from the data inductively. The approach is strong because it allows a dialectic and reciprocal relationship between a theoretical
framework and data. The Directed Qualitative Content Analysis technique is also appropriate for a study with the Theory to Research to Theory strategy.

A specific coding strategy that enabled the Directed Qualitative Content Analysis method was developed and applied. Throughout multiple coding cycles, the researcher coded patterns of youth information behavior as well as the concepts of Radical Change Theory—Interactivity, Connectivity, and Access—when the behaviors reflected those concepts. The Initial Coding process was open to exploring all possible patterns of youth information behavior reported in the literature. The researcher coded all passages that appear to represent a characteristic of youth information behavior. In the subsequent coding cycle, the researcher assigned additional codes to the passages using the predetermined codes of Interactivity, Connectivity, and Access, only when the passages manifested the Digital Age Principles. By following these procedures, the coding processes captured all patterns of youth information behavior that both comport with and refute the theory of Radical Change. Therefore, the strategy enabled the researcher to avoid bias by the pre-selected theoretical framework, i.e., Radical Change Theory.

Different coding techniques were applied, such as Initial Coding, Focused Coding, and Process Coding. The first cycle included Initial Coding, also called Open Coding, i.e., “breaking down qualitative data into discrete parts, closely examining them, and comparing them for similarities and differences” (Strauss & Corbin, 1998). Focused Coding or Axial Coding followed Initial Coding in order to combine redundant codes, delete insignificant ones, and to begin to create categories of the codes. Since the focus of the study is the action or process aspect of youth information behavior, Process Coding is a method used to code actions in the data including simple observable activities, e.g., downloading, using web search engines, and more general conceptual behaviors, e.g., negotiating (Charmaz, 2006; Saldana, 2009). The coding processes were documented in analytic memos over the course of the data analysis.

**Phase I Instruments**

The instruments in Phase I involved qualitative data analysis software, Atlas.ti. The use of computer software facilitates a systematic coding process in terms of managing a large amount of data and memos, classifying themes, and identifying relations between codes.
**Phase I Strengths and Limitations**

The strengths of Phase I are threefold. First, the findings include information behavior of youth in diverse contexts, as the collected studies cover different age groups and settings, e.g., schools, everyday life, digital environments. Also, Phase I findings build on previous research efforts. Since the study purposefully distinguishes research-based evidence from anecdotes or opinions, it only includes empirical findings on the topic. Last, the use of Directed Qualitative Content Analysis approach allows a dialectic and reciprocal relationship between data and theory. While benefited by a theoretical framework, i.e., Radical Change Theory, Phase I is still open to discovery of emerging new themes.

Limitations of this approach also exist. It is not possible for a researcher to review every existing piece of research literature related to the topic within a finite time frame. Also, data include literature written in English only. Therefore, the collected literature is not an exhaustive or comprehensive list of studies on the topic. In addition, Phase I data only include existing scholarly literature, therefore do not directly capture the voice of digital age youth themselves.

**Phase II: Interviews with Youth**

Phase II of the dissertation research consists of Sense-Making Methodology (SMM) group and individual interviews with a purposeful sample of youth, ages 12-15, who actively engage in digital media practices in an online youth community named Scratch. The goals of Phase II include (1) testing findings from Phase I, (2) obtaining new data from the perspective of youth themselves, and (3) testing the applicability of Radical Change Theory in explaining a specific phenomenon of digital age youth information behavior.

**Scratch**

Scratch is a graphical programming language developed for youth to create various digital projects, such as interactive stories, games, simulations, magazines, animations, music, and art, and share these creations on the Web (MIT Media Lab, 2011). Since the Scratch Website was made public in 2007, it has become a vibrant online community where members share, discuss, and remix one another's projects. The core participants of the site are between the ages 8 and 16, but there is also a sizable group of adult members (Resnick et al., 2009).
Scratch is uniquely based on a building block programming approach, and young people can simply build a script by dragging blocks and snapping them together (See Figure 3.1. and 3.2.). It is also easy to combine graphics, photos, music, and sound into interactive Scratch projects. The Scratch program is developed by the Lifelong Kindergarten Group at the MIT Media Lab and available for free download from their website.
The Scratch program was designed to support young people’s learning. As people create and share Scratch projects, they learn mathematical and computational ideas that are built into the Scratch experiences. Also, Scratch is intended to promote the development of 21st century learning skills, including information and communication skills, problem-solving skills, creativity, critical thinking, and collaboration skills, as described by the Partnership for the 21st Century (http://www.21stcenturyskills.org) (MIT Media Lab, n.d.). Scratch has been used in various educational and recreational settings, such as classrooms, after school programs, libraries, museums, and everyday life at home.

**Descriptions of Purposeful Sample**

The study takes the purposeful sampling approach, i.e., selecting information-rich participants who can provide in-depth understanding on the study topic (Patton, 2002). Youth who are active members of Scratch were recognized as likely to be capable of providing deep and detailed descriptions of the topic, since they are heavily immersed in digital culture and engaged in active information behaviors embedded in digital media creation practices. The researcher identified
three of the most information-intensive projects in the Scratch community: The Interactive Journalism Institute for Middle Schoolers (IJIMS), Scratch Wiki, and Scratch Resources.

IJIMS is a National Science Foundation (NSF) funded project designed to introduce middle schoolers from underrepresented populations to opportunities in computing by following the shift of journalism onto the Web. Its goals include developing middle school students’ interest in 21\textsuperscript{st} century writing, media, math, and computing skills through interactive journalism and digital storytelling (IJIMS, 2010). As a partnership between faculty and students at The College of New Jersey and Fisher Middle School educators and students, the project includes an intensive five-day immersive workshop in the summer followed by a yearlong after-school club. The IJIMS students and their teachers create an online magazine using Scratch and other digital media in a collaborative setting. The students conduct interviews with members of the community, write articles, and create an interactive online magazine with assistance from teachers and undergraduate mentors. The IJIMS students participate in dynamic information-related activities, since they produce information themselves, i.e., the online magazine, and IJIMS creates a setting for collaborative information creation activities of digital age youth.

Figure 3.4. The IJIMS Project Homepage (http://www.tcnj.edu/~ijims/)
While young people enjoy production of creative projects using Scratch, they have a need for a specified forum or method for collaboration and information sharing. Therefore, some young adults who are Scratch members voluntarily developed websites to fulfill the need to share information and resources—Scratch Wiki and Scratch Resources. Scratch Wiki (Figure 3.5) is an information website that provides shared information from the Scratch community on various aspects of Scratch. Also, Scratch Resources (Figure 3.6) is a digital media library developed to share characters, sounds, and tutorials, also contributed by members of the Scratch community, that can be used for Scratch projects. Several young Scratch members who live in different parts of the world collaboratively created the websites. The individuals who develop and maintain Scratch Wiki and Scratch Resources were selected as ideal informants in this study, as they clearly exhibit innovative information behaviors and are immersed in the digital media culture.

![Scratch Wiki](http://wiki.scratch.mit.edu/wiki/Scratch_Wiki)

Figure 3.5. Scratch Wiki (http://wiki.scratch.mit.edu/wiki/Scratch_Wiki)
Participant Recruitments

The Florida State University Human Subjects Committee approved the Phase II study involving youth (Appendix C: Human Subjects Committee Approval Memorandum). Participation in the study was completely voluntary. The interviews only involved youth who submitted both Youth Assent Form (Appendices E and F) and Parent/Guardian Consent Form (Appendices G and H) prior to the data collection.

Recruitment for Group Interviews. Scratch members who participate in IJIMS were recruited for Sense-Making Methodology (SMM) group interviews. The researcher contacted a reading teacher at the Fisher Middle School, Ms. F, who participates in IJIMS and leads the afterschool club, and asked her for help in recruiting the students participating in IJIMS. Ms. F distributed the Youth Assent Form, Parent/Guardian Consent Form, and pre-questionnaire to the students ahead of time. Students were asked to complete all three forms before the group interview, if they decided to participate in the study. The researcher informed the IJIMS participants that there might be follow-up individual interviews, if needed; however, no follow-
up interviews were necessary after the group interviews, because the SMM group interviews resulted in quality and sufficient data.

**Recruitment for Individual Interviews.** At the same time, youth who develop Scratch Wiki and Scratch Resources were contacted for participation in SMM individual interviews. The researcher was able to identify 10 Scratch members who are Scratch Resources Team and Scratch Wiki youth administrators by examining Scratch Wiki, Scratch Resources, Scratch Forum, and Scratch Blog. The researcher consulted the MIT Scratch Development Team, i.e., researchers at the Lifelong Kindergarten Group at the MIT Media Lab, about recruitment strategies for the identified members. The Scratch Team suggested posting a recruitment statement on each individual’s public user page.

A recruitment message was posted on the personal Scratch user pages of the individual members of Scratch Resource Team or Scratch Wiki administrators. The recruitment message asked them to have their parents or guardians send the researcher an email if they wanted to participate in the study (Appendix D). Once contacted by their parents or guardians, the researcher sent the Parents/Guardian Consent Form and Youth Assent Form via email, and arranged the interview time and method. Conducting distance interviews such as phone or online interviews were necessary because the youth who develop Scratch Wiki and Scratch Resources live in different parts of the world, such as Europe and the U.S.A. The researcher provided youth with three distance interview options: text-based chatting with Instant Messaging, telephone, or Skype.

**Phase II Data Collection Methods**

Qualitative data were collected from 2 face-to-face group interviews and 4 online individual interviews using the Sense-Making Methodology (SMM) interview technique (Dervin, 2008; Dervin & Devakos, 2010). Results from the Phase I data analysis directed the focus of designing the content of the interviews.

**Sense-Making Group Interview Methodology.** This study applies a new group interview technique informed by Dervin’s Sense-Making Methodology (SMM) with Scratch members who participate in IJIMS, because the newly developed group interview technique has a potential to obtain deep and honest data dialogically and efficiently. The SMM approach focuses interviewing practice on queries that address “how informants see themselves moving
and bridging gaps from one situated sense-making instance to another” (Dervin & Devakos, 2010, p. 2). The SMM interview methodology has been influential and widely applied in various areas including Information Behavior. The SMM approach to group interviewing, however, is newly developed and recently pilot tested on undergraduate informants by Dervin and Devakos (2010) in order to obtain deep data efficiently and dialogically. The unique aspects of the SMM group interview include: “a) disciplining communicating with prescribed talking and listening turn-takings; and b) limiting spontaneity in order to constrain the impact of powerful interests and habitual communication patterns” (Dervin & Devakos, 2010, p. 2). The specific procedures are threefold:

1. Interviewees independently complete a pre-questionnaire that addresses major interview questions;
2. Once a group interview begins, interviewees take turns presenting their answers from the pre-questionnaire without interruption; and
3. Throughout the group interview, interviewees keep writing a journal concerning their reactions to other participants’ interview answers. The journaling sheet used in Dervin and Devakos’ study contains several analytical points: things I heard that were like my experiences; things I heard that were different from my experiences; things I heard that I agreed with; things I heard that I disagreed with; things that confused or challenged me; and things that helped me.

Pre-Test and Development of Group Interview Instruments. The study adapted the instruments and procedures developed and implemented in Dervin and Devakos’ pilot study (2010), which explored undergraduate information seeking and use for meeting class assignments. Since the method is new and no study has reported the implementation of this technique with youth, the researcher conducted a pre-test in November 2010. Pre-questionnaire interview questions were developed in plain English to elicit the interviewees’ independent, identity-related, and social information behaviors. Three 9th graders, who are not subjects of the study but are similar in age to the actual participants, voluntarily participated in the pre-test. The researcher provided the participants with the pre-questionnaire and asked them to complete it in approximately 20 minutes. A group interview followed for another 20 minutes, and participants took turns presenting their answers and simultaneously writing in a journal.
The pre-test result revealed both strengths of the existing method and a need for some modifications of the procedures. A primary strength showed that the interviewees had a chance to reflect on the interview questions carefully while they completed the pre-questionnaire, which resulted in providing a variety of relevant answers during the group interview session. Also, their answers conformed to some of the characteristics found in Phase I, even though the interview questions did not specifically address the characteristics. This result demonstrated that the interview questions were likely to be on target.

Meanwhile, some modifications of the procedure were necessary mainly due to the ages of the dissertation study subjects and the multi-faceted research questions. A major problem was that the interviewees did not fully concentrate on writing the journal during the group interview, even though journaling is one of the unique and core elements of the SMM group interview technique. Two possible reasons were identified. First, because youth have a shorter attention span than undergraduates in Dervin and Devakos’ study, the pre-test interviewees felt fatigue or got bored after working diligently on their pre-questionnaires for 20 minutes. Also, although the researcher gave instructions for writing in the journal, youth might have needed more detailed instructions and continuous reminders of the journaling throughout the group interview session.

Another challenge stems from the multi-faceted research questions of the study and a time constraint. Compared to the relatively simple research question in Dervin and Devakos’ study, the dissertation research has multi-faceted and sophisticated research questions. Because more interview questions are needed to cover the research questions of the dissertation study, this consequently requires a longer interview session. The pre-test, however, provided a realization that the interview session should remain relatively short, less than an hour, considering the limited attention span of youth.

According to the insights from the pre-test, the final group interview instruments were developed based on the following modifications:

1. Asking interviewees to complete the pre-questionnaire at home in order for them to pay full attention to presenting their answers and journaling during the group interview session
2. Providing clearer instructions on the procedures with an emphasis on individual journaling, and reminding them of journaling throughout the interview
(3) In order to meet the time constraint, limiting the number of interviewees in a group interview and the number of major interview questions
(4) Asking probing questions that elicit further detailed explanations of the initial answers for youth who do not initially articulate details
(5) Revising minor wording for the interview questions considering youths’ apparent vocabulary knowledge

(See Appendices I and J for the final group interview instruments.)

**Group Interview Data Collection.** In order to collect group interview data, the researcher visited the after school club at the Fisher Middle School three times in December 2010 (the first three Thursdays of the month). The Fisher Middle School is a public middle school (grades 6-8) and resides in a small city, Ewing, in New Jersey. The school has students of diverse race/ethnicity and almost equal numbers of male and female students. Approximately 30% of the enrolled students are eligible for free lunch or reduced-price lunch (U.S. Department of Education Institute of Education Sciences, 2011). The after-school club meets every Thursday for 50 minutes in the school computer lab and approximately thirty 8\textsuperscript{th} grade students participate in the club activities.

During the first visit, the researcher met Ms. F to explain the purposes and procedures of the study and collect the consent forms and pre-questionnaires students submitted. For the following two visits, the researcher conducted a group interview with 4 students for 45-50 minutes per visit. That is, a total of 8 students participated in the group interviews. The researcher played a moderator’s role and the group interviews were audio-recorded and transcribed. Light snacks and drinks were provided for the students. The SMM group interview procedures in this study included:

1. **Pre-questionnaire (Appendix I):** Students had completed self-administered pre-questionnaires, which include 5 major interview questions, in advance.
2. **Group interview (Turn-taking rounds):** Each of the 5 questions was the focus of the round where each informant presented their answers uninterrupted. During these rounds, the researcher asked follow-up probing questions.
3. **SMM Journaling (Appendix J):** While an individual presented his/her answers, others listened carefully and wrote in a journal to record similar and dissimilar experiences,
agreements and disagreements, confusions, challenges, and helpful comments by other participants.

**Individual Interview Data Collection.** Another set of qualitative data was collected through 4 individual interviews with youth who develop Scratch Wiki and Scratch Resources. Since their Scratch-related experiences were very unique and innovative, the individual interview approach is appropriate for them to tell freely their stories in detail. Also, the SMM group interview approach was not chosen for them because the method was only tested in the face-to-face environment.

Online interviews were an effective method for the study since the individual interviewees live in different parts of the world, such as Europe and different regions of the U.S.A. Also, considering that the individual interviews explore the Scratch members’ information-related experiences in the online environment, the online interview was identified as a relevant data collection method because “research questions that explore an online phenomenon are strengthened through the use of a method of research that closely mirrors the natural setting under investigation” (Geiser, 2002, p. 3). Moreover, interviewees involved in the study are youth who are heavily immersed in the digital media culture, and their activities in the Scratch community show that they regularly communicate with one another using digital technologies. The interviewees had an option to choose an online interview method, such as text-based chatting with Instant Messaging, telephone, or Skype. All four participants chose the Skype voice calling method. By communicating through methods that they prefer and are familiar with, the interviewees would be more comfortable and therefore more likely to provide quality data.

Compared to the well-structured and disciplined group interviews, the individual interviews were less structured and more conversational. Semi-structured individual interview questions were constructed according to Dervin’s Sense-Making interview methodology. The interview questions drew out various aspects of information behavior by specifically eliciting the interviewees’ experiences with Scratch. The lengths of each interview varied between 20 minutes to an hour depending on the degree of detail in each interviewee’s answers. All four Skype voice conversations were recorded (total 140 minutes) and transcribed. Instruments for individual interviews include a list of semi-structured interview questions (See Appendix K for
individual interview questions), a computer with Skype software, headset, and Skype conversation recorder.

**Phase II Data Analysis Methods**

Qualitative data collected from the group and individual interviews include the transcriptions of the interviews, pre-questionnaires and journals from the group interviews. The data were imported to Atlas.ti for qualitative data analysis. Just like data analysis in Phase I, Phase II data analysis took the directed qualitative content analysis approach and applied various coding techniques such as Initial Coding, Focused or Axial Coding, and Process Coding.

Phase II data analysis was conducted more systematically by building upon the findings of Phase I. For example, construction of the list of codes began with the characteristics discovered in Phase I and concepts of Radical Change Theory—i.e., Interactivity, Connectivity, and Access. The researcher also looked for other emerging themes by immersing herself in the interview data.

**Phase II Strengths and Limitations**

The designs of group and individual interviews in Phase II reveal both strengths and limitations. One particular strength stems from the fact that the interview data collection informed by Sense-Making Methodology (SMM) elicits rich and relevant data from the carefully selected purposeful sample. Also, a systematic analysis of qualitative data was possible since the Phase I results provide an analytical framework. The common weakness in Phase II interview data collection, however, lies in the fact that the quality of the collected data largely depends on the participants’ self-reporting skills. Also, the data analysis does not attempt to delineate differences in youth information behavior based on ages, gender, or nationality. In addition, each group and individual interview has specific opportunities and challenges.

**SMM Group Interview Method.** The newly developed SMM group interview method provides several unique opportunities. Above all, the SMM journaling that elicits analytical reactions to other participants’ answers enables the researcher to capture both intrapersonal and interpersonal communication between the interviewees simultaneously. The technique retains the strengths of traditional group or focus group interviews, which provide interview participants with a social experience to listen and build upon others’ ideas. The SMM group interview also
overcomes drawbacks of the traditional method, i.e., the honesty of the interviewees’ remarks might be influenced by peer-pressure, and not all participants might have a sufficient chance to present their thoughts. In the SMM group interview, each interviewee can provide more honest data in the individual journaling sheet without feeling peer-pressure. Also, by completing a pre-questionnaire in advance, interviewees have an opportunity for in-depth self-reflection regarding the interview questions. As a result, their answers are well prepared and reflect in-depth thinking. Last, the SMM group interview is a structured and disciplined way of communication with prescribed talking and listening turn-takings, which limits spontaneous conversation that is out of focus. Therefore, a researcher can efficiently obtain focused data in a relatively short amount of time.

The challenges in conducting the SMM group interview with youth rest in that the method largely depends on young people’s verbal and analytical thinking skills in presenting their answers and writing individual journals. The technique requires heavy cognitive participation from interviewees, since participants are committed to multi-tasking activities, i.e., listening, presenting, and writing simultaneously. Therefore, young individuals without sufficient cognitive development might have difficulty expressing their thoughts through the method.

**Online Individual Interview Method.** Conducting the online interviews with youth also highlights both strengths and weaknesses. A major strength of online interview includes the ability to recruit the best subjects around the world by affordably overcoming the considerable geographical barriers. The individual interviews conducted via Skype voice calling demonstrated a particularly appropriate method for the dissertation study, because the research questions explore an online phenomenon and the subjects are heavily engaged in online communication with others in their everyday life. Beyond verbal communication, the use of chat texts or sharing links can assist an interview when needed, since the interview topic particularly addresses interviewees’ online behaviors. The limitations of online interviews, however, include that it is difficult to capture non-verbal cues from interviewees. Also, the method might not be applicable for interviewees who are not accustomed to online interactions.

**Ethical Considerations**

The dissertation research received research approval from the Florida State University’s Human Subjects Committee. Phase I does not involve any human subjects; however, careful ethical
considerations are required for Phase II, which involves minors under age 18. The study respects the ethical standards of voluntary and informed consent by human subjects. Therefore, the researcher allowed only those who had both Youth Assent and Parent/Guardian Consent to participate in this study.

For the group interview recruitment, the researcher worked closely with a schoolteacher to discuss any school protocols in conducting research with their students. The teacher also provided assistance in recruitment, e.g., distributing Youth Assent and Parents/Guardian Permission forms. In recruiting youth who are members of the online community Scratch, the researcher consulted the MIT Scratch Development Team to discuss potential ethical issues in light of youth protection. In recruiting youth online, the interview participant volunteers were asked to have their parents or guardians contact the researcher first. Upon request, the researcher wrote a detailed email for individual parents and explained the purpose of the study.

The collected data, including audio-video recordings and interview scripts, are stored safely in the researcher’s password-protected personal computer. In order to protect participants’ confidentiality, their identities are not disclosed in reporting study results.

**Trustworthiness of the Qualitative Study**

Criteria used to evaluate the quality of qualitative research are different from those typically employed to judge quantitative work, such as validity, reliability, or objectivity. Lincoln and Guba (1985) suggested an alternative set of criteria for judging trustworthiness of qualitative research, including credibility, transferability, dependability, and confirmability. The study was carefully designed to enhance those qualities.

Credibility refers to “the adequate representation of the construction of the social world under study” (Bradley, 1993, p. 436). The study was designed to draw findings that are congruent with the phenomenon under scrutiny, i.e., youth information behavior in the digital age. One strategy to ensure credibility in the study is triangulation via data sources. Phase I data include empirically found research results on youth information behavior, while Phase II data come directly from the target population of the study, i.e., digital age youth themselves. Also, in Phase II, triangulation via different types of informants and different sites is made since data are collected from two different youth groups, i.e., Scratch users in different contexts, including
IJIMS students in an afterschool club and young adults who are members of Scratch Resources Team and Scratch Wiki administrators in an online environment.

The adaptation of well-established research methods creates a strategy to ensure credibility of qualitative research (Shenton, 2004). The study applies well-established data collection and analysis methods including directed qualitative content analysis and group and individual interviews informed by Sense-Making Methodology (SMM). Dervin's SMM has been applied in myriad settings since developed in 1972 and is particularly influential in information behavior research. Although the SMM group interview technique is new, the study adapted the specific procedures and instruments that were developed and pilot-tested by the methodologist herself and her co-worker (Dervin & Devakos, 2010).

Transferability indicates “the extent that the researchers’ working hypotheses about one context apply to another” (Bradley, 1993, p. 436). In the naturalistic paradigm, the transferability depends on the degree of similarity between the original situation and the situation to which it is transferred. It is not the task of the current study to specify the transferability of the findings to another setting. Instead, the study provides sufficient contextual information about the fieldwork sites, such as IJIMS and Scratch, so that readers can make such a transfer. The transferability of the typology as a result of the study is expected to be high, because it was initially created by analyzing cross-disciplinary research literature that covers a range of contexts including different age groups, both formal (schools) and everyday life situations, and self-driven and imposed information tasks.

Dependability defines “the coherence of the internal process and the way the researcher accounts for changing conditions in the phenomena” (Bradely, 1993, p. 437). A strategy to enhance the dependability is the use of an inquiry audit, in which reviewers examine both the process and the product of the research for consistency. The committee of the dissertation research serves this role. Also, the methodological description provided in this chapter allows the study to be repeated by others if desired. Dependability in qualitative research, however, does not indicate obtaining the same results when the original study is replicated by others; instead, the research design may be viewed as a prototype model (Hoepfl, 1997). The result of qualitative research would differ by theoretical sensitivity of a researcher, i.e., a personal quality of researcher that includes an awareness of the subtleties of meaning of data, the attribute of having insight, and the ability to give meaning to data (Strauss & Corbin, 1998).
Last, confirmability refers to “the extent to which the characteristics of the data, as posited by the researcher, can be confirmed by others who read or review the research results” (Bradley, 1993, p. 437). In order to enhance confirmability of the study, this methodology chapter provided a detailed methodological description to allow integrity of research results to be scrutinized by readers.

**Methodology Conclusion**

This dissertation study is designed to understand and explain key characteristics of contemporary youth information behavior that reflect the properties of the digital society, which include the Digital Age Principles of Interactivity, Connectivity, and Access proposed by the Radical Change Theory. Two phases of qualitative research design, which apply content analysis and group and online individual interviews, creates and adds a new typology of digital age youth information behavior to the Radical Change Theory. Table 3.2 Study Procedure in the next page presents a summary of Phase I and II, with the purpose, procedures, products, instrument, participants, permissions, and timeline in each. The following chapter will describe the results of the data collection and analysis detailed in this chapter.
<table>
<thead>
<tr>
<th></th>
<th><strong>Phase I: Content Analysis of Research Literature</strong></th>
<th><strong>Phase II: Sense-Making Methodology (SMM) Interviews</strong></th>
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<tbody>
<tr>
<td><strong>Data Collection</strong></td>
<td><strong>Data Analysis</strong></td>
<td><strong>Data Collection</strong></td>
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<td></td>
<td><strong>Group Interviews (Face-to-Face)</strong></td>
<td><strong>Individual Interviews (Online)</strong></td>
</tr>
</tbody>
</table>
| **Purposes**     | Development of an initial typology of digital age youth information behavior | • Testing findings from Phase I  
                  |  
                  | • Obtaining new data from the perspective of youth themselves  
                  | • Testing the applicability of Radical Change Theory in explaining a specific phenomenon of digital age youth information behavior |                  |
| **Procedures**   | Searching and selecting research-based literature | Directed qualitative content analysis | SMM group interviews | SMM individual interviews |
|                  |                  |                  |                  | Directed qualitative content analysis |
| **Products**     | 40 research literature to be analyzed | Initial typology (3 types and 13 characteristics) | • 8 pre-questionnaires  
                  |  
                  | • 8 individual journals  
                  | • 2 group interview transcriptions from audio recordings (total 95 minutes) | 4 individual interview transcriptions from audio recordings (total 140 minutes) |
|                  |                  |                  |                  | Enhanced typology of digital age youth information behavior |
| **Instruments**  | Scholarly literature database | Qualitative data analysis software, Atlas.ti | • Pre-questionnaire  
                  |  
                  | • SMM individual journal  
                  | • Audio-recorder | • Computer with Skype software  
                  |  
                  | • Headset  
                  | • Skype recorder | Atlas.ti |
| **Participants** | The researcher |                  | • Eight 8th graders (4 girls and 4 boys)  
                  |  
                  | • The researcher | • Four boys ages 12-15  
                  |  
                  | • The researcher | The researcher |
| **Permission**   | None | Florida State University Institutional Review Board |                  |                  |
CHAPTER FOUR
DATA ANALYSIS

Chapter 4 reports qualitative data analyses conducted during Phase I (content analysis of research literature) and Phase II (group and individual interviews with youth) sequentially and iteratively. The chapter presents analysis of the data that concern the following research questions of the study:

1. What are the key characteristics of information behavior of youth in the digital age?
   1.1. How do youth act independently?
   1.2. How do youth form identity and perceive others?
   1.3. How do youth interact socially with others?
2. How can Radical Change Theory be applied and further developed to explain youth information behavior in the digital age?

Chapter 4 includes (1) Phase I Data Analysis, (2) Phase II Data Analysis, and (3) Data Analysis Conclusion.

Phase I Data Analysis

The purpose of the Phase I data analysis was to identify and categorize key characteristics of youth information behavior in the digital age reported in previous research studies. As explained in Chapter 3, research literature from various disciplines was collected and imported into qualitative data analysis software, Atlas.ti. The Directed Qualitative Content Analysis approach, where a theory or previous research findings guide initial coding while still allowing themes to emerge from the data inductively, enabled discovery of patterns that both comport with and refute the Radical Change Theory. As a result, the researcher identified specific behaviors that reflect the digital age concepts of Interactivity, Connectivity, and Access, suggested by Radical Change Theory (See Table 4.1). Although not a focus of the dissertation study, the finding also included some traditional patterns in contemporary youth information behavior that have existed in the past and do not strongly represent the concepts of Radical Change Theory.
Table 4.1: Concepts of Radical Change Theory: Digital Age Principles (Dresang & Koh, 2009)

<table>
<thead>
<tr>
<th>Digital Age Principles</th>
<th>Definitions</th>
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<tr>
<td>Interactivity</td>
<td>Dynamic, nonlinear, and nonsequential learning and information behavior with an increasing sense of control by end-users</td>
</tr>
<tr>
<td>Connectivity</td>
<td>A sense of community or a construction of social worlds that emerge from changing perspectives and expanded associations</td>
</tr>
<tr>
<td>Access</td>
<td>Breaking of longstanding information barriers, bringing entrada to a wide diversity of formerly largely inaccessible opinions</td>
</tr>
</tbody>
</table>

Nature of Research Literature Collected

Phase I data collection resulted in a total of 40 literature sources published between January 2005 and May 2010. The collected studies cover information behaviors of diverse youth population, e.g., different age groups (ages between 5 and 18), racial, ethnic, and socio-economic backgrounds in several settings, e.g., schools, everyday life, and digital environments. The types of literature comprised books, scholarly articles, dissertations, white papers, book chapters, and conference proceedings. Studies varied in terms of applied research methods, including interviews, surveys, observations, focus groups, meta-analysis, and literature reviews. The majority of the works collected were from the qualitative research tradition. See Appendix A for the full list of literature analyzed in Phase I and Appendix B for more details about each literature source, e.g., study subjects, context, methods, and types.

Major Themes: Radical Change Types and Characteristics

Multiple cycles of coding generated several codes and sub-codes that capture noticeable patterns of digital age information behavior, which manifest the concepts of Radical Change Theory. Each code indicated a characteristic of youth information behavior in the digital age. Identified characteristics were grouped into three categories of Type One: Intrapersonal Process, Type Two: Identity and Perspectives, and Type Three: Social Interactions, according to the research questions of the study.

Because the purpose of Phase I involved identifying digital age information behaviors by applying Radical Change Theory, the characteristics presented in this chapter are by no means an exhaustive list of youth information behaviors; nor are these behaviors exhibited by all youth. Instead, the characteristics are innovative digital age information behaviors reported in previous empirical studies. The following section is framed by the three types, and explains each
characteristic (code) with specific examples (data) from the literature itself. In addition, the end of this chapter includes traditional information behaviors that persist in the digital age. In-depth discussions and implications of the data analysis will be provided in Chapter 5.

**Type One: Intrapersonal Processes.** Type One explains intrapersonal information behaviors of digital age youth, who engage in nonlinear and interactive information seeking, use, and creation activities with an increasing sense of ownership. The characteristics that belong to this type include Personalizing, Interactive Seeking, Squirreling, Remixing, and Tinkering.

**Personalizing.** This characteristic defines designing one’s own information environment to facilitate access to and use of information concerning his/her interests. Customization or personalization is a key element of designing information systems and web/media environments in the digital age, such as social network services (e.g., MySpace or Facebook) (boyd, 2008), commercial websites (e.g., eBay and Amazon) (Rowlands & Nicholas, 2008), and online games, which come with the ability to create a custom avatar and customize the game experiences (Ito et al., 2009). The analyzed studies suggested ways today’s youth customize their information/media environments to make it easy to access and use specialized information or knowledge, such as creating bookmarks for web pages (Johnson, Smith, Levine, & Haywood, 2010; Meyers et al., 2009). Also, Ito et al.’s study (2009) explained how a fifteen-year-old boy personalizes his information environment in everyday life:

[A boy discussed] the way he keeps up with information about his interest in technology by creating a customized Google home page with various RSS (Really Simple Syndication) feeds so he can keep tabs on different sites of interest. In addition to Slashdot, one of the most popular technology news blogs featuring “news for nerds,” [he] regularly reads a variety of technology websites specific to his interest, including MacRumors.com and Engadget.com. His sources of information are sites with high status within the tech geek community, where the credibility of technology information is debated among people who identify as tech experts. (p. 67)

**Interactive Seeking.** Interactive Seeking exemplifies dynamic and interactive information seeking behaviors of youth. Most common searching activities of youth (the sub-codes for interactive seeking) involve search engine use, looking around online, and seeking by linked sites, and they are associated with the nature of search engines and the organization of
information on search results pages (Enochsson, 2005; Ito et al., 2009). Compared to other aspects of information behavior, e.g., information sharing and creation, a great deal has been written about information seeking behavior. The studies proposed several terms to describe the ways youth seek information interactively, including fortuitous searching, berrypicking searches, horizontal seeking, non-linear information seeking, exploration, serendipitous information seeking, and others.

Interactive information seeking of digital age youth is distinguished from traditional information searching processes, which are often goal-oriented, sequential, and stage-based. For instance, horizontal information seeking—“a form of skimming activity, where people view just one or two pages from an academic site and then ‘bounce’ out, perhaps never to return” (Rowlands & Nicholas, 2008, p. 10)—describes the ways youth scan online pages rapidly and click extensively on hyperlinks, rather than reading sequentially. Also, fortuitous searching is defined as open-ended information seeking and involves moving from link to link and looking around for information. Ito et al. (2009) suggested that fortuitous searching represents:

a strategy for finding information and reading online that is different from the way kids are taught to research and review information in texts at school. Students are taught to use tools such as identifying a purpose for reading, activating prior knowledge, predicting the content of the text before and during reading, and summarizing or discussing the text after reading in order to improve their skills in finding and comprehending information in both traditional and online resources.

By contrast, fortuitous searching relies upon the intuition of the search engine and the predictive abilities of the reader. (p. 55)

Young people’s interactive seeking is not only observed in everyday life situations but also in school/curriculum-based contexts. Hart’s study (2008) found that the manner in which the majority of Florida Virtual School students participating in his research seek out and use information conforms with the model of berrypicking information-seeking behavior (Bates, 1989). That is, students search in multiple information sources using various shifting techniques, i.e., evolving search queries and bit-at-a-time retrieval. Chung and Newman (2007) also explained that high school students’ understanding, strategies, and activities during information seeking and use to complete class projects were interactive and serendipitous. They found that students’ information processes are non-linear and stated, “gathering, selecting, and using
information were not separate processes for the students. They were dynamic and repeated themselves in large and small cycles so that it was very difficult for the researchers to identify the processes in a linear manner” (p. 1511).

**Squirreling.** Squirreling behavior is a term to describe how youth gather and keep information in the digital environment. Today’s youth “squirrel away content in the form of downloads, especially when there are free offers” (Rowlands & Nicholas, 2008, p. 10). Specific activities of youth squirreling behaviors (sub-codes) include copy and paste, download, e-mailing, and printing. For instance, Chung and Newman (2007) explained common information gathering activities by high school students:

because students believed that information consists of physical entities—that is, facts, quotes from experts, statistics, and examples—and wanted to have their information in their hands, one of their most popular behaviors was to e-mail the full-text documents to themselves and then print them later…‘I look at all of them and scrolled down … And I open it. And if there is information that looks good, even one piece, I just send it to my e-mail’. (p. 1512)

Information gathered through copy and paste and downloading is often remixed and used to produce new information, knowledge, or creative products.

**Remixing.** Remixing describes the creative ways of reusing information to produce new information, knowledge, or expressive materials. According to a Pew Internet & American Life Project (Lenhart & Madden, 2005), remixing is prevalent among today’s youth regardless of gender, age, and socioeconomic group. Remixing is also suggested in relation to 21st century skills, such as “the ability to gather, chop, blend, and re-blend content to create new expressive materials” (Lenhart & Madden, 2005, p. 2) and appropriation, “the ability to meaningfully sample and remix media content” (Jenkins, 2006a, p. 4). Although most of the studies on youth remixing activities concern remixing and reproducing content (often digital media content), the following example about young people’s MySpace profile creation demonstrates a case of remixing in information behavior contexts:

Experimenting with the generic forms, a few early adopters discovered that MySpace had failed to close a security hole. While most other sites blocked HTML, CSS, and Javascript in their forms, MySpace did not. Early adopters began exploiting this hole to personalize their pages by adding code to the form
fields that changed the background and added multimedia to their pages. There is no simple way to make these modifications; individuals must figure out what CSS or HTML goes in what form. While the site itself does not offer support, numerous other websites (most initially created by teenagers) emerged to provide code and instructions for modifying every aspect of a MySpace page. Individuals choose a desirable layout and then they are instructed to copy and paste the code into the appropriate forms. This code inevitably includes links back to the helper page. A copy/paste culture emerged, as teens began trafficking in knowledge of how to pimp out their profiles. (boyd, 2008, p. 128)

In this example, young people hoping to change their personalized MySpace profile layout seek out and locate information often created by other youth. They copy and paste the codes needed to change the layout, alter the code (i.e., remix) based on their own personal information and tastes, and produce a new product.

**Tinkering.** Tinkering is an interactive mode of information/knowledge production in the digital age (Balsamo, 2009a, 2009b; Ito et al., 2009; Resnick et al., 2009). Without planning in advance, new ideas and goals evolve and creative productions emerge during one’s messing around, i.e., unstructured experimentation and play. It is a non-traditional and distinctive way of knowledge production from the manner youth have been taught in school.

**Type Two: Identity and Perspectives.** The second type explains the ways digital age youth identify and negotiate value systems while they interact with a range of information from different, often conflicting perspectives. Type Two consists of four characteristics including Self-expression, Seeking Identity-related Information, Negotiating Value Systems, and Sense of Empowerment.

**Self-expression.** This characteristic explains the ways youth express and explore themselves by producing information that reflects their identities and perspectives. Young people’s identity construction process in digital information environments can be best described through the concept of identity bricolage—“improvising, experimenting, and blending genres, patching together contrasting or even contradictory elements, creating and modifying meanings to suit the context and in response to the requirements, affordances, and meanings of the situation” (Weber & Mitchell, 2008, p. 43). In order to express themselves, digital age youth draw on a variety of sources and then piece together, recontextualize, and personalize items in
several formats, such as self-images and favorite music. For instance, young people’s personal Web page production provides them with “diverse means of constructing and fashioning their identities through images and words. Their [teenagers’] sites contain a variety of pictures, expressions, and references relating to the popular culture of media” (Weber & Mitchell, 2008, p. 31). Personal web pages maintained by youth reveal a range of information and opinions of youth, such as favorite music, sports, daily experiences, jokes, photos, and more (Weber & Mitchell, 2008).

The digital environment particularly offers young people the chance to be powerful and to express their identity and creativity (Willett, 2008). Youth find value in expressing themselves online, because self-expression online plays several roles in their identity construction, including self-reflection, catharsis, self-documentation, identity experimentation, and social validation of self from their audience (Stern, 2008). Meanwhile, by creating and publishing information within a specific area of interest, young people define themselves as experts, geeks, freaks, or artists within particular communities (Ito et al., 2009).

**Seeking Identity-related Information.** The information youth seek is often related to identity issues such as gender, race, and sexuality (Weber & Mitchell, 2008). For instance, looking for body images online is common for teenage girls (Willett, 2008). Young people’s seeking identity-related information sometimes includes solitary activities, especially when they seek information on sensitive topics online, e.g., sexuality or health topics. As an illustration, Lenhart et al. (2010) reported that teens “use the internet to look for information on health topics that are hard to talk about, like drug use, sexual health or depression. A bit more than one in six (17%) internet-using teens look online for information about sensitive health topics...[teens] were more likely to look online for answers to health questions that were hard to ask of others” (p. 26-7).

**Negotiating Value Systems.** This characteristic involves processing various perspectives and dealing with ambiguity when interacting with diverse information, people, and communities. For example, a fourth grader who encountered multiple information sources from conflicting perspectives on the Web in Enochsson’s study (2005) stated: “there can be some problems, since you can see all pages all over the world, there will be problems. In Iran they have other laws [than in Sweden], for example women cannot have shorts outdoors, and then, so to speak...there are the same Web pages with women having shorts outdoors and so” (p. 9). Studies often
discussed this behavior in relation to the relevant skills, as Jenkins (2006) defined negotiation as “the ability to travel across diverse communities, discerning and respecting multiple perspectives, and grasping and following alternative norms” (p. 4).

**Sense of Empowerment.** This characteristic indicates a greater ownership over information activities as a result of innovative information behaviors and the nature of information environment in the digital age. Livingstone, Bober, and Helsper (2005) suggested where television permits its audience to ‘sit back’ and relax, we have asked: does the Internet invite its users to ‘sit forward' and become engaged? Some of the opportunities we have examined in this article facilitate peer-to-peer connection, some provide information needed to participate in society, all require young people to go beyond the content provided for them by others and to seek out, select and judge, even to create content for themselves as part of a community of actors that is larger than any individual. (p. 305)

Also, the following example demonstrates how a fourteen-year-old boy who seeks out information interactively using a search engine is being self-taught, which leads to the sense of ownership:

I just searched on Google and I just went to…because I bought myself a video card. I had no idea what a video card looked like. I typed in video card image. Before I went to searching for it, image. I wanted to know what it looked like first. I seen [sic] different pictures. So Google sometimes gives you different pictures…so I’m confused. I’m like, “I thought it looks like this but it looks like”…so I typed something in and I seen [sic] on Google what it looks like. So I looked at mine and I seen [sic] exactly where’s [sic] it at. If you [sic] smart you don’t got to search out, “How do I put in and put out.” It’s simple. It’s just take the piece out. Have your computer off. Take it out. When you get your new one if it has a fan you can’t have your sound card too close to it. So you’ve got to put your sound card in another slot and I bought myself a sound card too. I had no idea what none of those looked like. I thought a sound card was called a sound disk. I learned a lot on my own that’s for computers...Just from searching up on Google and stuff…That’s why I like Google. (Ito et al., 2009, p. 57)
**Type Three: Social Interactions.** Type Three explains that digital age youth expand the boundaries of information behavior by connecting to diverse resources, people, and communities to meet their information needs. The characteristics in this type include: Networking, Collaborative Problem Solving, Access to Collective Knowledge, and Socio-emotional Support.

**Networking.** In the context of information behavior, Networking indicates the act of reaching and connecting resources, people, and communities to meet one’s information needs through technological networks, such as the Internet or mobile networks. Although traditional interpersonal information behaviors where youth seek and share information with peers, family members, teachers, and librarians in their local communities are still common, networking behavior allows today’s young people to interact increasingly with diverse people with little common ground such as age, gender, and country. Moreover, information behavior embedded in young people’s online activities often requires distance and global interactions. Although there is negligible external common ground and participants are from different regions and countries, the information with similar interests they share creates common ground (Aragon, Poon, Monroy-Hernandez, & Aragon, 2009). A member of the online programming community for youth Scratch appreciated this fact, saying “you can be part of a group with lots of different kinds of people. The girl-boy barriers, age barriers, anything based on appearance -- you don't have those” (Aragon et al., 2009, p. 8).

**Access to Collective Knowledge.** This characteristic defines the availability of aggregated information that is contributed by individuals, especially on the Web such as Wikipedia, online forums, and expert communities. Collective knowledge is Pierre Levy’s term to indicate “the sum total of information held individually by the members of a knowledge community that can be accessed in response to a specific question” (Jenkins, 2006b, p. 282). Access to Collective Knowledge allows today’s youth to pursue in-depth knowledge or specialized topics in their interest area. While some youth with specialized interests can be discouraged due to the lack of local resources, the increasing availability of search engines, online forums, and networked publics permits them to access online resources for an initial introduction to a particular area (Ito et al., 2009).

For instance, interviewees in Ito et al.’s study (2009) accessed and shared information about their interests by participating in online communities. A teenage member of a fan sub community (a fan community to translate and create subtitles for foreign films or TV shows)
described “how initially he was attracted to the specialty because of the depth of knowledge that he could pursue within an expert community. ‘It just got interesting because other encoders were like, ‘here are some tips and tricks.’…There were so many tricks in how to handle that stuff that it got pretty interesting.’” (p. 273). Also, an eleventh grader sought information on manga (Japanese comic books) such as reading recommendations from her MySpace friends, who represent a community of experts. She noted that “it’s actually really interesting because they [her MySpace friends who are into manga] have read so many books that I haven’t and I would be like—if they would give me a brief summary about like the book they have read or a movie they’ve seen, an anime movie, we would be like, ‘Okay. I have to read this book, or I have to see this movie. And I would look for it’” (p. 75).

**Collaborative Problem Solving.** Collaborative problem solving is defined as “working together in teams, formal and informal, to complete tasks and develop new knowledge” (Jenkins, 2006a, p. 3). According to Jenkins’ definition, collaborative problem solving embraces collaborative information/knowledge creation activities. Young people’s collaborative problem solving is facilitated as they engage in multiple social worlds including home, school, neighborhood, clubs (Meyers et al., 2009), and, increasingly in the digital age, online communities. They seek and often voluntarily form interest-based communities, where rich information behaviors occur (Ito et al., 2009; Jenkins, 2006b; Meyers, 2009). Rather than a single activity, collaborative problem solving or information creation is a combination of co-occurring information behaviors such as Interactive Seeking, Squirreling, Remixing, Tinkering, Networking, Accessing Collective Knowledge, and more.

**Socio-emotional Support.** Socio-emotional Support indicates exchanging non-task related comments or actions to build rapport or trust during collaborative problem solving and knowledge creation. Also, sharing this form of support can lead to developing trust between participants. Although it is already been known that forming relationships and trust are an integral part of interpersonal information sharing (Meyers et al., 2009), what is noticeable in this age is the way today’s youth build trust even when they only know each other through exchanging and sharing information together online. For example, Aragon et al. (2009) suggested that sharing socio-emotional support is critical in forming the relationships and trust that are required for successful collaborative work. In studying an online collaborative team of youth, the researchers found a significant portion of the chats being used for socio-emotional
conversation and these types of conversations contributed to building relationships among collaborators. One of their interviewees stated, “it's easier to work with someone when you know them, and it's hard to get to know each other without injecting personality and emotion into your comments. Also, saying ‘good job!’ motivates people to contribute good features to the games” (p. 8).

**Traditional Information Behaviors**

Besides youth information behaviors that represent the digital age concepts of Interactivity, Connectivity, and Access, the content analysis of research literature discovered some traditional patterns, which existed in the past and still persist in the digital age. For instance, as opposed to Interactive Seeking, the dynamic, nonlinear, and nonsequential manner of information seeking, Druin et al. (2010) identified a type of child information searchers called Rule-bound Searchers. The Rule-bound searchers “seek information online according to an inflexible set of rules that they have learned through experience or other people, such as teachers or parents” (p. 418); however, the researcher discovered only 6 children out of 83 with this characteristic. The most pervasive traditional behavior concerns Type Three and explains young people’s use of local people as information resources, i.e., asking parents, teachers, librarians, and friends (Agosto & Hughes-Hassell, 2006a, 2006b; Meyers et al., 2009).

**Summary of Phase I Data Analysis**

Using the content analysis of research literature, the researcher identified youth information behaviors that manifest the concepts of Interactivity, Connectivity, and Access, suggested by Radical Change Theory. These are behaviors that were commonly discovered across contexts and age groups through empirical studies. The identified 3 types and 13 characteristics resulted in a construction of a typology of youth information behavior in the digital age (Table 4.2), which can be built into the original Radical Change Theory as operationalizations of the core concepts. Definitions of each characteristic are presented in Table 4.3 below. In the subsequent Phase II data analysis, the typology provides an analytical framework.
Table 4.2. Initial Typology of Digital Age Youth Information Behavior [Phase I]

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Personalizing</th>
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<tbody>
<tr>
<td></td>
<td>Interactive seeking</td>
</tr>
<tr>
<td></td>
<td>Squirreling</td>
</tr>
<tr>
<td></td>
<td>Remixing</td>
</tr>
<tr>
<td></td>
<td>Tinkering</td>
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</tbody>
</table>

**Type One: Intrapersonal Processes**

**Proposition:** Digital age youth engage in nonlinear and interactive information seeking, use, and creation activities.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th><strong>Intrapersonal Processes</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Personalizing</strong></td>
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<td></td>
<td><strong>Interactive seeking</strong></td>
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<td></td>
<td><strong>Squirreling</strong></td>
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<td></td>
<td><strong>Remixing</strong></td>
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<td></td>
<td><strong>Tinkering</strong></td>
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</tbody>
</table>

**Type Two: Identity and Perspectives**

**Proposition:** Digital age youth identify and negotiate value systems while they interact with a range of information from different, often conflicting information.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th><strong>Identity and Perspectives</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Self-expression</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Seeking Identity-related Information</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Negotiating Value Systems</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Sense of Empowerment</strong></td>
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</tbody>
</table>

**Type Three: Social Interactions**

**Proposition:** Digital age youth expand the boundaries of information behavior by connecting to diverse resources, people, and communities to meet their information needs.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th><strong>Social Interactions</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Networking</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Access to Collective Knowledge</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Collaborative Problem Solving</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Socio-emotional Support</strong></td>
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</tbody>
</table>

Table 4.3. Initial Definitions of the Characteristics [Phase I]

<table>
<thead>
<tr>
<th>Types</th>
<th>Characteristics</th>
<th>Definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type One: Intrapersonal Processes</td>
<td>Personalizing</td>
<td>Designing one’s own information environment to facilitate access to specialized information of one’s interests</td>
</tr>
<tr>
<td></td>
<td>Interactive seeking</td>
<td>Fortuitous and berrypicking information seeking behaviors that include search engine use, looking around online, and searching by linked site (Bates, 2005; Ito et al., 2009)</td>
</tr>
<tr>
<td></td>
<td>Squirreling</td>
<td>The way youth gather and keep information in the digital environment in the form of copy and paste and download (Rowlands &amp; Nicholas, 2008)</td>
</tr>
<tr>
<td></td>
<td>Remixing</td>
<td>The creative ways of information reuse to produce new information, knowledge, or expressive materials.</td>
</tr>
<tr>
<td></td>
<td>Tinkering</td>
<td>Interactive mode of information/knowledge production. Without planning in advance, new ideas and goals evolve and creative productions emerge during one’s messing around, i.e., unstructured experimentation and play (Balsamo, 2009a, 2009b; Ito et al., 2009)</td>
</tr>
</tbody>
</table>
Table 4.3 – Continued

<table>
<thead>
<tr>
<th>Types</th>
<th>Characteristics</th>
<th>Definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type Two: Identity and Perspectives</td>
<td>Self-expression</td>
<td>The ways youth express, explore, and experiment themselves by producing information that reflect their identity and perspectives.</td>
</tr>
<tr>
<td></td>
<td>Seeking Identity-related information</td>
<td>Seeking information related to identity issues such as gender, race, and sexuality.</td>
</tr>
<tr>
<td></td>
<td>Negotiating Value Systems</td>
<td>Processing diverse perspectives and dealing with ambiguity when interacting with various information, people, and communities.</td>
</tr>
<tr>
<td></td>
<td>Sense of Empowerment</td>
<td>A greater ownership over information activities as a result of new and innovative behaviors and the nature of information environment in the digital age</td>
</tr>
<tr>
<td>Type Three: Social Interactions</td>
<td>Networking</td>
<td>The act of reaching and connecting resources, people, and communities to meet one’s information needs through technological networks, such as the Internet or mobile networks</td>
</tr>
<tr>
<td></td>
<td>Collaborative Problem Solving</td>
<td>Working together in teams to complete tasks and develop new knowledge (Jenkins, 2006a)</td>
</tr>
<tr>
<td></td>
<td>Access to Collective Knowledge</td>
<td>The availability of aggregated information that is contributed by individuals, especially on the Web such as Wikipedia, online forums, and expert communities.</td>
</tr>
<tr>
<td></td>
<td>Socio-emotional Support</td>
<td>Exchanging non-work related comments or actions to build rapport or trust during collaborative problem solving and knowledge creation</td>
</tr>
</tbody>
</table>

**Phase II Data Analysis**

The purposes of Phase II included testing findings from Phase I, i.e., the typology of digital age youth information behavior (Table 4.2), and gathering additional data from the perspective of youth themselves. As explained in Chapter Three, Scratch, an online community designed to create and share digital projects using a graphical programming language (MIT Media Lab, 2011), was selected as an exemplary place to observe innovative information behaviors of digital age youth. A total of 12 Scratch members, ages 12-15, were recruited for group and individual interviews. The following section presents a description of the interviewees and interview analysis based on the typology created in Phase I. Data are presented from the young people’s perspectives using their own words. Interpretations and implications of the data analysis will be discussed in Chapter Five.

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**Description of Interviewees**

Two Sense-Making group interviews involved eight 8th graders who were participants in the Interactive Journalism Institute for Middle Schoolers (IJIMS), the 21st century journalism project that engages middle schoolers from underrepresented populations who do not view themselves as computing types (IJIMS, 2010). The students engage various information behaviors while they collaboratively create online interactive magazines using Scratch in an afterschool club. Eight 8th grade students volunteered to participate in the study, including 4 girls and 4 boys from diverse racial and ethnic backgrounds.

Four individual interviewees involved young adults who voluntarily initiated and developed Scratch Wiki, a collaborative information website on Scratch, or Scratch Resources, an online media library for sharing resources on Scratch. Four boys, ages 12-15, voluntarily participated in the online interviews. They live in different parts of the worlds such as Belgium, the Netherlands, and the U.S. In spite of the differences in nationality, they all are fluent in English and are active members of Scratch, a U.S.-based online community.

**Interview Data Collected**

All group and individual interviews were audio-recorded and transcribed. Data collected through two group interviews included 8 pre-questionnaires, 8 individual journaling sheets, and 2 group interview transcriptions from the recordings (total 95 minutes). Another set of qualitative data was collected through four individual interviews. The lengths of each individual interview varied between 20 minutes to an hour depending on the degree of detail in each interviewee’s answers. Data collected from the individual interviews involved interview transcriptions from the audio recordings (total 140 minutes).

**Major Themes Radical Change Types and Characteristics**

**Type One: Intrapersonal Processes.** In Phase I, Type One: Intrapersonal Behaviors explained that today’s youth engaged in nonlinear and interactive information seeking, use, and creation activities. Type One included five characteristics such as Personalizing, Interactive seeking, Squirreling, Remixing, and Tinkering. Phase II interviews provided rich data that support Phase I findings, and discovered detailed aspects of some of the Type One characteristics, e.g., Interactive Seeking, Remixing, and Tinkering in particular.
**Personalizing.** Phase I defined Personalizing as designing one’s own information environment to facilitate access to and use of information concerning his/her interests—e.g., a customized Google home page with various RSS feeds and bookmarks for web pages. In Phase II, a boy who is a Scratch Wiki administrator informed that Scratch members customize their online environment by creating an individualized profile. For example, members of the Scratch Wiki can create their own signature, a short piece of text and/or images that appear under a user’s post: “We implemented this new feature for the signatures on the wiki, for example because we wanted to make it easy to identify users on certain posts, so now it features, like, their avatar. So it definitely shows that we want to make the community discussions as easy to use and work with as possible…But, I mean, it’s an option, but yeah.”

**Interactive Seeking.** Phase I discovered dynamic and fortuitous information seeking behaviors of youth, where the most common activities include search engine use, looking around online, and seeking by linked sites. Phase II findings precisely concurred with the Phase I findings. Several interviewees addressed their frequent use of search engines: “And places that I looked were mostly like search engines”; “We tried to go onto the basic web searches like Google and Dog Pile and different resources like that.” SMM group interview participants also recorded their agreement with the regular use of search engines in individual journals in which they reflected on what they were hearing from their peers: “Google was the best search engine,” “He also used the same search engine.” The interviewees not only retrieved information, but also explored and navigated online resources by moving from link to link and looking around online.

Interactive Seeking of the study participants was facilitated by the nature of search engines and linked information on the Web as an organic whole. When asked why he liked Wiki as a type of information resource, a Scratch Wiki administrator pointed out that a Wiki is like an “organic source of information” in which “information is always linked”:

[In Wiki] when you look something up, there are links everywhere, and you can just explore a topic by clicking new links, opening tabs, I really have these moments, I just go on Wikipedia and read. And, then I end up with 15 tabs opened with all different Wikipedia articles and I have to go back and check out everything. I think that’s a cool way of learning new stuff. You just click what you’re interested in…
And, it’s all one thing. And, that’s important when you’re browsing through information, and you’re like, ‘Oh, yeah, that might be interesting.’ Like, at the bottom of every page, you have ‘see also,’ like related stuff… So, yeah, is the main reason I really like Wiki, it’s like an organic source of information and everyone can add and edit, and change. And, information is always linked, I mean, that’s important.

When the interviewees seek information, they use both approaches of searching (retrieval) and exploring (navigation) based on their needs and situations. For instance, a boy pointed out searchability and explorability in Scratch Wiki:

The wiki previously was like searchable, like you could search something you were looking for, and then it could return a relevant article. But, exploring it was very tough. Well, so say I want to learn more about Scratch, just that I want to learn more, I could not go to the wiki, because it was just, it had the main page and search box, where you could search stuff, and we are now trying to add a new table of contents, which looks appealing, inviting, and it should make the Scratch wiki explorable…

During data analysis, Interactive Seeking emerged as a way of learning or acting that makes youths’ learning more meaningful. For example, a Scratch Wiki administrator said that he learned the skills and knowledge needed to maintain Scratch Wiki by looking around online: “It was mostly just by looking around the Internet, you know, whether from Scratch website – people post various stuff there—or looking at tutorials at other wikis.” Also, the IJIMS students engaged in active information seeking in order to prepare for performing interviews, conducting further research beyond the interviews and writing an article. They looked for background information on the topic or the interviewees before conducting interviews. Seeking information as part of the interview preparation benefited students by allowing them to conduct the interview more effectively. An IJIMS student said: “my mentors taught me to always come to an interview prepared and always come with background knowledge and about the subject to prepare for the interview, and that helped me a lot because instead of not knowing what I was doing or not knowing any of the base answers or anything about the person, I was able to go into deeper questions by knowing that.” Also, data from individual journals showed that the group
Interviewees explicitly concurred information seeking was an essential activity in their journalism projects.

**Squirreling.** Squirreling behavior was defined in Phase I as the way youth extensively gather and keep information in the digital environment in the form of downloading. Specific activities included copy and paste, download, emailing, and printing. Phase II interviews elicited little data on gathering and keeping information itself; however, downloading projects is an integral part of Scratch. Although it is possible for users to play Scratch projects online, they often download projects for free to look at how the projects were built, e.g., examining scripts and other elements, and re-use the projects for the purpose of remixing. Also, the development of Scratch Resources by one of the interviewees enabled Scratch members to download each element of Scratch projects, e.g., background images, sounds, and characters, free of charge.

**Remixing.** Phase I defined remixing as the creative ways of reusing information to produce new information, knowledge, or expressive materials. Phase II data provided particularly rich examples and various aspects of Remixing, because Scratch was designed to make it easy for users to download and remix others’ projects. In Scratch, a remix indicates a modified and shared version of an uploaded project in which a user can simply download a project, make some changes, and re-upload the changed project. Also, Scratch Resources as an online media library expands the possibility of remixing in Scratch by sharing elements of Scratch projects. The founder of Scratch Resources, who is one of the interviewees in this study, explained the purposes of Scratch Resources in relation to Remixing:

> And, so I sort of wanted to make it like an online media library for Scratch. Currently, Scratch projects are just like the total concept of all that inside, and it’s really difficult if you want to use, say five different elements from five different projects, it’s really tough from the normal Scratch website. And, Scratch Resources allows people to share little puzzle pieces of a project and they can easily be matched together to form a new project. That’s sort of the concept [of Scratch Resources]...

It [Scratch Resources] is more like expanding remixing as it exists in Scratch. So, you could already remix projects, but I wanted to make it possible to blend many different projects by many different people, and it was before, you could, a remix was more like a chain, you could build upon the project one other Scratcher, and
then re-upload, but merging many projects was very tough And, I was sort of
hoping that Scratch Resources could allow, yeah, you could just import that one
sprite or one song you need, and I think it’s working fairly well. I mean, there
aren’t that many resources, I think until now we’ve had like 100,000 or a bit
more.”

Remixing exemplifies one of the reasons that participants like Scratch. An interviewee
mentioned, “I thought it very interesting and certainly how you could share projects is a very
interesting aspect. Like, you can remix everything and it’s the only place that actually happens.
Whatever you share is always remixable.” Remixing is also one of the motivating and rewarding
aspects of participation in Scratch. An interviewee suggested that they feel honored when others
use their information, resources, or remix their projects:

When they are buzzing on Scratch, everyone around them is like remixing and it
doesn’t make a problem out of the mixing. And, everyone allows the owners to
remix or actually feel honored when people reuse their stuff. And, that just gives
Scratch a different mentality, well, a different way of thinking than the rest of the
world…I mean, people want to be sort of popular. They like it.

The Phase II findings revealed various aspects of Remixing, such as creative, educational, and
ethical aspects of remixing. First of all, Remixing is used as a way of collaborative creation.
Scratch members often create projects which are meant to be remixed and those projects create
Remix Chains. An interviewee explained: “Remixing is handy and it leads to some possibilities
that people like. There’s one called Remix Chain. Someone makes something like ‘add your
character to this’ or ‘sign the guestbook’ and everyone remixes it and adds stuff to it and it
grows.”

Also, Remixing provides a learning opportunity in Scratch—i.e., learning by example.
An individual interviewee suggested:

So, remixing is a very important part of Scratch. Without remixing, we wouldn’t
have been half as cool. And, the good thing is that because of all of this remixing,
every single project out there is a tutorial. You can, so if you’re interested in
drawing a cake, you can just download a project and that has a cake in it and just
see how it works and start playing with it. And, that’s not possible on any other site or platform or whatever.

An IJIMS participant’s answer concurred: “When I see other people that have added more intricate, more difficult things to their Scratch project, then I’m like oh, how did you do that? I will ask them how to do that. And then I will want to go add that to mine to make my scratch better than it already was.” Also, another interviewee explained how remixing in Scratch accelerates learning the programming language: “I mean, it [remixing] is really important. When you’re learning a new, a typical new programming language, you have to rely on the people that are specifically supplying tutorials, and in Scratch you can just explore projects. You can say, ‘Oh, I like this.’ And, then you download and you see how it’s made.”

While interviewees mentioned they feel “honored or proud” when they share projects and the projects were remixed, they also recognized the issue of ownership and giving credit to other people. Once a remix is re-uploaded, the Scratch program automatically produces credit for the original project and Remix Visualization, “a way of showing what a project is a remix of and all of the projects that are remixes of it” ("Scratch Wiki,"). All Scratch projects are under the Creative Commons Attribution-Share Alike License, which allows freedom to share and remix the project (Creative Commons, n.d.). On the other hand, the Scratch members call downloading the project and uploading it without changing anything Project Copying and do not allow this practice ("Scratch Wiki,"). An interviewee described his feelings when someone remixed his project, sometimes not providing credits:

I have a look and see what I think, like oh, I’m so honored or proud or something like that. So it’s like no credit at all sometimes. There’s this thing people call stealing but it’s not really like stealing, where you take someone’s project and you upload it, but you don’t get credit at all, so it’s not your work…Well, I like it when people use my stuff. I made a project full of stuff for people to just take and use, though it is nice if they can give me credit because otherwise, it’s like uh, you didn’t make that yourself and they didn’t do all the work. But that’s okay.

**Tinkering.** In Phase I, tinkering was defined as an interactive mode of information/knowledge production in the digital age. It is a way new ideas and goals evolve and creative productions emerge during one’s messing around, i.e., unstructured experimentation and play, without planning in advance. In Phase II, the study participants took part in
information/knowledge creation activities in the digital environment. The data provided concrete examples of digital age youths’ tinkering, i.e., creating interactive magazines, tutorials, Scratch Wiki, Scratch Resources, and different types of Scratch projects. The interviewees’ answers concurred that tinkering starts as an idea and the idea grows and evolves by continual modification and experimentation. The evolution is accompanied by many trials and errors and messing around.

An IJIMS participant explained how Scratch particularly supports the way they tinker, starting from an idea: “Well, you can start from the beginning, and you can just start up. So Scratch has no limits. There’s no expectations, and you can start a Scratch on your own thoughts, somebody else’s thoughts, yeah. And so you can just kind of go from there and by using your own feelings and all that stuff, and Scratch let’s you do that.” Also, the founder of Scratch Resources explained how he developed the website from the beginning:

And, you have to do a lot of work, without really knowing what’s it gonna be. Before you can actually see something. And, if you have never done any web development work before, well, that was really tough, because you have to sort of build a base to work on. But, you have no idea what a base should look like for a web application, so it really happened again, doing stuff again and again, and again, and I think I had something working in the beginning, and then built upon it, but then changed the first part to make it better, and then had to change it again, so actually, it was really a project that just really changed all the time…it was tough to have something to start. I mean, doing work without actually seeing the result is annoying…But, then when you have done everything and it appears there working that’s really cool.

The initial idea grows and evolves by continuously experimenting, adding, and modifying. An individual interviewee described trial and error as a way of tinkering in creating Scratch projects: “And, trial and error is just the nicest way to learn and I just did it like in Scratch. Just open the file you’re working on, and keep refreshing your browser and see, just see it evolve. Every single new thing I added just check it out immediately, and just like you would do in Scratch actually.” An IJIMS participant also pointed out that she likes the fact that she can keep adding or modifying contents in Scratch, compared to other video/animation production tools:
It [Scratch] was more a way for me to express my thoughts because I could change it if I were to change my opinion on it, and I could add, and I could take out things all depending on like – where like opposed to a video where if you have it, the video is all set out. And as you can cut and paste from the video, but you can’t add more to the video after you already recorded the video. But I could add more to Scratch when I’m finished with Scratch.

As the creators of information and knowledge, the interviewees are concerned with both organization and accuracy of information; however, IJIMS students who create the interactive magazine and Scratch Wiki/Resources administrators showed a different focus in creating knowledge. The primary concern of IJIMS students included creating and publishing “accurate” and “true” information; therefore, information credibility judgment is one of the major challenges for them. The students mention that they cannot rely on information in the Wiki format because anyone can change the information, saying, “we have to go to a stable website where people can’t change the answers”. They also mentioned that the information created by younger people, e.g., “a kindergartner or third grader”, is not always reliable, because the authority of the information creator is an important factor in determining accuracy of the information.

On the other hand, the answers from the Scratch Wiki administrators focused more on the organization and presentation of information, such as relationships between information and presenting information in multiple formats. An interviewee described “a category tree” in Wiki: “it all starts with one thing and it goes down to several branches…it shows how everything is related”. He “actually look[ed] each [Wiki] article up to see how they relate” in order to develop and maintain information on the Wiki. In addition, the interviewees mentioned that they are trying to present information in various formats such as texts, images, and links in Scratch Wiki. Scratch Wiki administrators seemed less afraid of incorrect information in the Wiki format, because they believe “someone would fix it if there is inaccurate information”. That is, while the IJIMS students did not consider a Wiki as a reliable source because anyone can edit the information, Scratch Wiki administrators chose to create information on Wiki for the same reason. The capacity to build an information resource through community effort greatly attracted the young Scratch administrators to the concept of the Wiki.
Last, the interviewees’ information or creative projects building processes simultaneously accompanied information seeking, use, and sharing behaviors. For example, interviewees often sought information in order to find out how to create digital media, i.e., looking for manuals and examples online, during their creation activities. An IJIMS participant mentioned: “I needed to find information on how to make a Scratch by going on the Website (Scratch) and looking at other examples. It [The information seeking] helped me by being able to make a Scratch and be able to finish it by the due date.”

**Type Two: Identity and Perspectives.** Type Two suggests that digital age youth identify and negotiate value systems while they interact with a range of information from different, often conflicting information sources. Phase I identified four characteristics that belong to Type Two, including Self-expression, Seeking identity-related Information, Negotiating Value Systems, and Sense of Empowerment. With the exception of Seeking Identity-related Information, Phase II interviews provided rich data that support Phase I findings and discovered aspects on each characteristic.

**Self-expression.** Phase I suggested that information creation is a way for youth to express and explore themselves, and the digital environment offers young people the chance to be powerful and to express their identity and creativity. Interviewees in Phase II engaged in expressive activities, particularly digital media production, in both school and everyday life. An IJIMS participant mentioned “I have been using Scratch before/not in IJIMS. One particular time [I created Scratch projects] was just on my own…trying out what was on my mind.” An interviewee’s description revealed how his Scratch production is a way of self-expression:

Interviewee: It [working with Scratch] does help because that’s one of those programs where you’re not limited. You can do a lot of things. It’s pretty much putting your emotions in a computer screen. And it kind of helps. It’s kind of relieving in a way.

Interviewer: Can you explain the word relieving?

Interviewee: You can just put it out there, and you know that it’s down there, so you can go back and look at it another time. So if you were feeling sad, you could go there, and you could just make a Scratch and just let it out.
A few interviewees reported times when they create digital projects about themselves in order to get familiar with or practice the tools. An IJIMS participant described making a video about herself, such as what she liked and where she was from using Windows Movie Maker:

I was trying to learn more about Scratch, so I chose myself to make a Scratch about because I had all the background information that I needed because it was from myself. So it was also a way for me to keep what I had. All the information about myself, I could make it into something that I can show. If my family were to ask me what did you learn, I could say I made this about myself.

**Seeking Identity-related Information.** Phase I findings suggested that the information youth seek is often related to identity issues such as gender, race, and sexuality. Interview questions in Phase II elicited little data on this characteristic.

**Negotiating Value Systems.** In Phase I, literature revealed that today’s youth encountered and processed conflicting information, as they have increasing opportunities to interact with various people and run across information from diverse perspectives. Phase II interview data analysis produced three sub-codes of the characteristic: (a) encountering conflicting facts and opinions, (b) information credibility judgment, and (c) handling disagreement.

The group interviewees reported that they often encountered conflicting information when they produced the online magazine. They provided various examples, such as when different information resources presented contrasting facts:

I encountered a conflict while I was working on Scratch because while I was doing research on our topic was the history of mixed martial arts, so we were looking up where it started and who created it. And from many different sources, they were saying it started in Korea, it started in Japan. There were many different sites saying different things. So we actually had to go deeper into books and we had to see encyclopedias about this because we couldn’t just pick which one was accurate. We had to find the one that was the most accurate. So we did use our teachers as resources to help us and when we were looking online. So that would probably have been our biggest conflict that we had because some people wanted to say that it came from Japan. And others wanted to say that it came from Korea. Or it all depended on what they thought. So we kind of just had to move past that and do more research to back up our thoughts.
Besides different facts, the IJIMS students also found contradictory opinions or points of view during their information seeking and sharing:

I’ve worked on politics beats a couple of times, and in politics, there are a lot of conflicting opinions. And some of the group members had opinions that were different from others. But we tried not to let that get into our work, our article, and our Scratch… We didn’t want to sound biased towards one side. And what I was talking about before, the election, some people favored other candidates, but we didn’t want to make the other ones sound bad when we wrote about them… We tried to write something neutral. We didn’t really get into the opinions.

A few interviewees commented that determining accurate information is one of the challenges in their projects: “The most difficulty I would have is knowing if the information is true or false. Like sometimes I would look for a particular thing, and then I would look on a different website, and it tells me something totally different so that throws all of my research off, and I have to pretty much go back to square one and redo the whole thing looking for a more accurate website.” Several interviewees concurred in their individual journals: “I’ve also had trouble in my groups with finding reliable resources,” “had to find most reliable answer,” “making sure if it’s accurate information.”

One of the important aspects of this characteristic stems from what youth do when they encounter conflicting information—i.e., information credibility judgment. The interviewees basically used their own best judgment and strategies. For example: “When I hear a lot of different things, I try to really figure it out. I go and research that person’s background, and I think which one will fit best… I would really just narrow down my choices and really put myself in their shoes.”; “Like if we found it located in many different websites, if we found it located in numerous places, that would be a reason for it to be correct.”; “So that was kind of confusing. But based on the articles, where the article was placed, the reputation of the site, I decided on what to do.”

More specifically, interviewees answered that they looked for (a) who created the information, (b) formats/ nature of the information resource, and (c) asked others, such as teachers, for help. The interviewees answered that they looked for who created the information to determine the reliability of the information: “Like we can’t rely on something that a
kindergartener or a third grader made up if they were doing a class project, and they made something in their minds. We can’t rely on that as accurate information.”;

Basically, I would look at who the website is, who makes it. If it’s college kids or middle school kids creating a website or something, or if it’s a website that people can just go and create on their own, then I wouldn’t consider that a reliable resource. But certain things like websites owned by the government and people that know what they’re doing, then I would use theirs. Like big incorporations or things like that, I would use their information because it’s most likely reliable.

The format/nature of the information resource was another criterion the students examined to determine “true”, “accurate”, or “reliable” information: “if we found a website that was real, like an encyclopedia website or dictionary website, something that’s official enough, that’s correct, that would be easy if we found something like that could tell us that it was correct where it came from.” Two people said information in the Wiki format is not reliable:

“When you get different answers, then you should see if they’re rumors or true, and you have to go onto – you can’t go really onto Wikipedia because that can be edited by anybody. And you should go onto Yahoo or Google or something to help you see if it’s real or fake.”

“We have to go to a stable website where people can’t change the answers. Like Wikipedia, I know you could change the answers. People can blog about it and change the answers. But if we were to find a site that’s stable, and nobody can log on and change the facts or the information about it, I would consider that an accurate website.”

Also, they asked teachers or mentors: “Well, at the moment [I encountered conflicting information] I was worried about what I would do. And then I asked the teacher, and she told me what I should do. And I decided after a bit that I should go with what her idea was.”

Not only did the students encounter conflicting facts from information resources, but also they negotiated different opinions with peers during collaborative information behavior. Debate between group members with different opinions was common: “Some things we clashed on, but of course, that’s just what a group does sometimes. And we really saw all the different sides of the thing. We saw some people wanted to do less deeper questions, and some people really
wanted to get deep into her background and anything like that, all different sides of it. We were able to work together to create a format that we all were able to enjoy.”; “My team often had debated on which direction we should lead the interview in…some wanted more general as others wanted more personal questions.”

Several patterns emerged concerning how the IJIMS participants handle different opinions and conflicts between group members while working together. First, they debated and compromised to balance different opinions: “My team often had debates on which direction we would lead the interview in. Like I said, some wanted more general, others wanted more personal questions. And we basically just kind of balanced it with what we were doing. We used a little bit of both, and we were able to put it together nicely so that we got the right information that we needed.” Also, when they had conflicts or different opinions between group members, they asked teachers, mentors, and leaders for help: “Well, we each have leaders for our group, and that was really when the leader stepped in, and she really took charge of our group. And we really did go through it, and we were really specific because we wanted our assignment to be the best out of any other ones. So we really wanted to set ours apart.”;

We had a mentor, which was one of our teachers, and she was experienced in journalism and interviewing and the web and everything. So she was able to guide us through it and say well, for example, since you already know about her background, and that’s what you did the research on, then ask her more about her job, about how she got into her job and things like that. And we were able to get both sides, and nobody’s questions really got left out. We might have put two questions together in one question or broader questions that could answer a lot of the smaller questions that people had.

It was noticeable that some IJIMS groups sought information for decision-making; they adjusted disagreements between group members based on information, e.g., facts, they found. For example, a group worked on creating a fantasy football game project using Scratch and the group members debated on which players they should include in their projects:

Choosing our characters were [sic] difficult because each of us had different opinions to who was better and who we should choose. We solved this by looking at different websites with NFL players’ stats to find the better ones…We knew NFS.com would have it so we found our information there…. It helped us make
and choose the best players for our Scratch project…This let us draw more people’s attention by having famous people they know.

Similarly, another group had a situation in which they had to decide a “famous” person to include in their Scratch project. They went to Facebook.com in order to decide which person would draw the most attention and interests from the audience.

I was making a scratch where I had to choose actual people or famous people in it. And I went around to people like who was your favorite famous person, actor, putting them in our Scratch. And then there was a tie between the top favorite famous persons, so we sort of looked at the bio of the people, and we saw who had more favorites on Facebook, like their pages of them, who more people liked. And we went on the Internet after asking people around in person and figured out – we added the tallies of how many people overall that we’ve researched had more fans, and that helped us. We chose the top one from there.

**Sense of Empowerment.** Phase I identified a Sense of Empowerment in the information behavior context as creating greater ownership over information activities as a result of new and innovative behaviors and the nature of the information environment in the digital age. Phase II interviews produced several examples of when and how the youth felt empowered in working with Scratch. Interactive information seeking for learning discussed earlier contributed to young people’s sense of empowerment by enabling self-taught and autonomous problem solving when they encounter a difficulty. Other than information seeking, other examples included the young people’s freedom to choose and explore topics of their interest, the way they can actively produce any type of project they like, and allowing their voices to be heard and accepted by adults (e.g., MIT Scratch development team).

The interviewees pursued topics of their own interests and had access to information from various perspectives. For instance, IJIMS students engaged in information activities to produce interactive articles with various topics, e.g., fantasy football legacy, TV shows, music, fashion, politics, and bully prevention—the topics chosen by students themselves based on their own interests.

We put ideas into Scratch when we first had to come up with the project this year in IJIMS. We had to throw ideas, bounce it off of each other because it was our group. So we all knew about Fantasy Football from the start. We made a league
together before IJIMS. We decided to base our project off the football season this year. And this helped us because it gave us our topic and what to start with, what to work on, and it was something we all knew and enjoyed.

Also, an individual interviewee’s description of why he likes Scratch showed his feeling of empowerment while working with the digital media:

What I like about Scratch is how it’s not just passive. We’re actively working with media and it allows everyone to do so. And, that’s important. The longer I use Scratch, the more I start to hate TV. It’s very weird. But, I mean, TV is just such a passive medium. You just look at it. You’re looking at the television and it just comes to you for a long time. And, I guess, I can still watch a nice movie, but it has to be nice. Just this annoying television shows, well, it’s really annoying, just so passive and you just lose your time sitting without doing anything, and I sort of like to be productive. And, I like how Scratch allows me to do it, but I bet there are more people who like to be productive, and it also allows them to be. With script you can basically do whatever you want. You can make a very big diversity of projects, and you can use it to make PowerPoint like presentations with some graphics. I already did for school. That’s very cool. But, you can make games, information about yourself, and that’s what I like about it. You’re not really restricted to games or whatever, you just start and do whatever you want.

In the Scratch community, the MIT Scratch Team’s support contributes to enhancing young Scratch members’ sense of empowerment. Members share their opinions and suggest ideas for the Scratch community on the Scratch Forums, a part of the Scratch website, and the MIT Scratch Team actually engage in the discussion and incorporate suggestions when desirable. A Scratch Wiki administrator described how Scratch Wiki developed by youth migrated to the official Scratch website.

So, yeah, I was actually emailing [the name of one of the MIT Scratch Team members] because I was, like, arguing about something on the forums, and, like, I was wondering, like - because I was kind of fighting for my opinion, and I kind of changed the topic, like, and said, hey, do you like the Scratch Wiki? Do you think
maybe we could migrate it to your website? Because they kind of felt like, you know, it didn’t get that much attention because it wasn’t really official or anything. And he actually said- [the name of one of the MIT Scratch Team members], he said that the wiki was a really great accomplishment and that he’d love to have it on the scratch website. So that kind of made my day.

**Type Three: Social Interactions.** Type Three suggests that youth in the digital age expand the boundaries of information behavior by connecting to diverse resources, people, and communities to meet their information needs. Phase II interview data support the characteristics discovered during Phase I concerning Type Three, such as Networking, Collaborative Problem Solving, Access to Collective Knowledge, and Socio-emotional Support.

**Networking.** Phase I defined Networking in the context of information behavior as the act of reaching and connecting resources, people, and communities to meet one’s information needs through technological networks, such as the Internet or mobile networks. As Phase I findings suggested that today’s youth interact with diverse people with negligible external common ground, the Scratch community consists of diverse users in terms of age, gender, and culture. The young Scratch members work with peers as well as adults from different parts of the world, and Scratch creates common ground.

Individual interviewees reached several online resources and communities, which they often access to find information needed to develop and maintain Scratch Wiki and Scratch Resources. The founder of Scratch Resources mentioned that the development of the online media library “was possible just because there were a lot of useful sites out there,” especially since he had not taken an IT (Information Technology) lesson in school or elsewhere. His favorite web resource was W3Schools.com (http://www.w3schools.com/):

Yeah, W3 Schools dot com. And, they have very good summaries and just references for like all web development languages, because when making a site you need just the HTML to form at the site and CSS for the styles. And, then the programming for the server, and everything together, it’s sort of difficult. You have to learn like four new languages to make a web application.

**Access to Collective Knowledge.** Phase I identified Access to Collective Knowledge as accessing and contributing to the aggregated information that is developed by individuals, especially on the Web such as Wikipedia, online forums, and expert communities. Phase II
interviews found that the study participants regularly use and contribute to Collective Knowledge, “the sum total of information held individually by the members of a knowledge community that can be accessed in response to a specific question” (Jenkins, 2006b, p. 282).

Interviewees seek out and create information on a specialized area through an expert community, where the members share and collectively build the aggregated information on the specific area. Scratch members use and contribute to developing Collective Knowledge through Scratch Wiki. It is a community effort to generate a knowledgeable source on Scratch, as an interviewee mentioned, “well, if anyone has a question, like they wondered something, it’s a spot where hopefully they’ll be able to find an answer.” A Scratch Wiki administrator indicated another example of Collective Knowledge he participates in. RuneScape Wiki (http://runescape.wikia.com/wiki/RuneScape_Wiki) is a Wiki on various features of RuneScape, one of the most popular online multiplayer games: “I remember when I was working on the Scratch programming wiki, I looked up to the RuneScape Wiki, which is really one of my other hobbies, and they have the community, and I wanted the Scratch wiki community to – the Scratch wiki community to be similar. Yeah.”

**Collaborative Problem Solving.** In Phase I, Collaborative Problem Solving was defined as “working together in teams to complete tasks and develop new knowledge” (Jenkins, 2006). Phase II found that Scratch members actively collaborate with one another to create projects or information together. Scratch members who want to produce projects together create a group, referred to as a Company in the Scratch community, and they upload collaborating projects in a gallery, a place where users can upload multiple projects. Scratch Forum provides a discussion board dedicated to collaboration, and users often communicate to recruit a member with specific skills or knowledge for their Company. An interviewee explained the ways Scratch members collaborate from different parts of the world in spite of the physical distance.

[The Scratch members use] Comments and sharing projects and downloading and remixing projects, or they use a forum on Scratch to discuss, or they use a gallery to discuss, or they have their own personal space, you make a gallery and call it Hamburger, Pro-Creation, and I can discuss over there about - some people use outside tools like chat groups to collaborate, or some even make personal sites for their company and this goes over there. Chat rooms, personal forums. They just
use whatever’s available and there are like an infinite different ways of collaborating on the Internet. You just have to be willing to use them.

In fact, Scratch does not provide many communication tools other than public forums and comments; this fact reveals Scratch members’ strong need for collaboration according to an interviewee:

Well, the weird about people collaborating on Scratch is that except for remixing, there is really nothing that helps you collaborate. And, people just find their way of doing it. So, there are Scratch Companies you might have heard of. So, people form a group using a gallery. They usually all just use technologies that were not intended to be used as a collaborative platform. So, I suggested something collaboration platform to the Scratch team a long time ago, and they want to implement it, but they don’t have enough time or resources or whatever. And, that also makes collaboration on Scratch cool. People seem to be, they really want to do it and they don’t just do it because it’s there. They find their own way of collaborating. That’s really cool.

All interviewees in Phase II engaged in collaborative problem solving or knowledge creation activities—i.e., collaborative creation of an online magazine in IJIMS and development of Scratch Wiki and Scratch Resources. Scratch Wiki itself, in particular, is where youth collaboratively create knowledge on Scratch. The Scratch Wiki administrators mentioned that they liked Scratch Wiki because it is a community effort by youth themselves: “It’s quite cool how people can share information over there, because before you had just the Scratch Support on the website. And, only the [MIT] Scratch Team could upload content to there. And, it’s kind of cool, how now all this help and support is provided by the community, other than the Scratch Team.” Also, the nature of Wiki, i.e., being edited by anyone and the ability to see previous versions, enhances the collaborative/collective aspect of Wiki as an information resource: “As far as collaboration, what’s really nice on the Wiki is that you can of course compare the text from the previous revisions I think is one of the helpful things about collaboration, which you can’t always do, like, maybe you’re in a collaboration and you remake a project. You can’t really see directly what changed.” “The good thing about the Wiki is that it can be edited by
everyone. And, still always stores older versions. So, when someone does something wrong, they don’t have to feel shy or whatever, you can just revert the edit.”

IJIMS participants also work in a collaborative setting. They work in groups to brainstorm ideas, create interview questions, organize and conduct interviews, write articles, and create various digital media projects to be included in the magazine. Each person is in charge of a different part of the journalism project based on his or her strengths and interests. The students work together face-to-face in the school computer lab, and also use email, phone, and CAFÉ (Collaboration And Facilitation Environment), the website developed to manage the content and workflow to support IJIMS. While some group members had participated in the Summer IJIMS workshop and were already familiar with Scratch, others were first introduced to Scratch in the after school club in the Fall. With the different levels of skills and knowledge between members, peer teaching and learning occurred in a group:

Well, a situation where we had to work as a team was when we first started Scratch this year, where we went into groups we knew each other. We were friends, and it was our group. But then some of us were new at it. Some of us were experienced already at it. So we had to teach the new ones how to work with Scratch and learn how to do it, make what we want happen. And then this helped us fix each other’s mistakes and sort of bounce ideas off each other, make the best Scratch project we could make.

Finally, all interviewees answered that they liked working together compared to working independently due to several reasons, such as (a) having different opinions and perspectives, (b) division of labor based on one’s strengths and interests, and (c) helping to make ideas and fun. Above all, many IJIMS students stated that they benefited from having different opinions and perspectives in working together to create the interactive magazine:

Interviewee: Okay. So one of the times I worked as a team member was making questions for an interview and then working on the scratch program. Working as a teammate helps my project and myself greatly because I got to hear other people’s ideas and my teammates’ points of view on our project and how they thought the scratch should work out, where the setting would be, or who the characters would be, or what they’d say.
Interviewer: How do you like working as a group versus working individually when you create articles or some other creative projects?

Interviewee: I like working in a group because you can get more elaborate because you have not just one mind but maybe two or more minds working together to create something that could be really, in the end, really good because you have more ideas, more information, more thoughts. So yes, I like working in a group.

Besides having diverse perspectives, the students liked working in a group because people have different abilities needed to create a project. That is, the division of labor based on one’s strengths and interests made their work much easier: “We did a lot of work, and I was proud of what we did as a group. But I thought if I did it by myself, and I had to do it alone, then I knew I wouldn’t be able to do it in the time that I was supposed to.”

We have to first find out what each person is going to do, whether going to make the Scratch or do some research or create interview questions. And I think it’s really good to work in a group so that you don’t really have all the pressure on you to finish all of these things so that you can kind of spread out the work within a bunch of people, so it’s easier. And as well, if you have more than one person doing research, then they can kind of look up different things and put them together to make a really good article.

…We most likely have a person that is more interested in doing research, and then there’s another person that’s more interested in doing scratch. So if there are two people that want to do research, then they can go and work together to do the research. And then the people that want to like – like if there was someone that wanted to do scratch by themselves, they can go make a scratch based on the article that the researchers would be creating. So they would just pretty much be spread out based on your interest, what you wanted to do. And then you would put everything together to make one good article.

In addition, a student commented that working together is particularly helpful in making ideas:

It’s fun working together because it’s sort of like if you’re alone and stuck – like usually, the hardest part for me working in Scratch is thinking of ideas of what to
make. It’s like Scratch is fun, but it’s hard to make ideas. And then with each other, with friends, we know what to do, like ideas we can put and tell each other what to put into it. Something that will make it more fun with us working together.

Data from individual journals revealed that interviewees corroborated with the strong preference for Collaborative Problem Solving: “‘two or more minds’ really describes what a group is about. It is nice to have different perspectives,” “liking working together.”

**Socio-emotional Support.** In Phase I, Socio-emotional Support indicated exchanging non-task related comments or actions to build rapport or trust during collaborative problem solving and knowledge creation. Also, sharing this form of support can lead to developing trust between participants. Phase II findings in relation to the characteristic included the ways individual interviewees support each other and make friends while interacting in the online environment. Although they have never met physically, the individual interviewees mentioned they make “lots of good friends in Scratch”. Interviewees stated that there are many modern technologies that help them overcome the geographical distance and build relationships and trust each other: “There's stuff to help people talk online. It can help you make friendships and things, even without meeting, though it is kind of sad, like oh, you probably will never be able to meet this person”; “On Scratch, there are the forums. And as you use them, you start to see people and sort of generally become friends with some of them… If we share interest in something, then it helps. And the people that we were in with our collaboration group, they’re friendly.” Another interviewee concurred that they build relationships and trust online:

In the modern Internet, you know, here we use emoticons, you know, especially if you’re a kid, you understand, you know, like texting – you understand how to use abbreviations and kind of how people act. And, for example, you end up – people will exaggerate things of course, you know, but it’s all part of the process. Yeah. We also have to, like, when meeting new people, you know, we have to assume good faith. We never try to act – assume that they’re trying to do something bad or assume that they were trying to do a certain thing. So that’s kind of an important thing about being on the wiki.
New Characteristic Emerged in Phase II

Visualizing, a term coined to describe a new type of information behavior in the youth interviewed in this study, refers to digital age youths’ affinity for visual and graphical display of information as well as synergistic integration of the use of text, image, and multimedia in their seeking and creative information behavior. The characteristic was not identified in Phase I: content analysis of research literature; but emerged as a new pattern in Phase II. In fact, some discussions of youth information behavior suggest that information in graphic form and visual mode of learning are especially appealing to youth who have grown up with television, video games, and the Internet (Agosto, 2002; Dresang, 1999; Druin, 2005; Large, Beheshti & Rahman, 2002; Prensky, 2006). The interviewees in this study, however, not only articulated their affinity for visual information but also demonstrated the synergistic combination of converging information in different formats, e.g., texts, images, and multimedia, during their information behaviors.

The Scratch members in both group and individual interviews frequently addressed their appreciation of visual display of information and ideas. According to group interview participants, the most “powerful and memorable” nature of Scratch as a production tool was the visual aspect: “I like it [creating projects using Scratch] a lot because I think it can show what you want, but more in a creative way than just typing and writing words.” Also, a student answered that it is particularly engaging and appealing for young people:

I like how you can, instead of having words because I know, especially if your focus is younger kids, then they’re more interested in games that they could play or more interested in colorful videos that they can watch. And it would really grab their attention to be able to see that. I mean, they can hear what you’re saying instead of reading difficult words that they may or may not understand what they’re actually reading. Then you can really get the message across of what you’re trying to say but through Scratch.

IJIMS participants provided specific examples in which visualization through digital media strengthened their ability to convey their messages. For example, a group created a fashion show project, and Scratch helped the group express the means and looks of fashion. One of the group
members said, “it was fun and easier for me to put how kids show what they wear and stuff in school.” Another interviewee described a project, which simulated a debate between companies:

Interviewee: Well, one time I used Scratch to express my ideas was a couple of summers ago. My group did a project on Google and Viacom. If we just did an article, we couldn’t have done what we did because we had little Sprites [characters in Scratch] of Google and Viacom arguing, and that would have been a lot harder to do in an article. So it was really helpful to use Scratch.

Interviewer: Why do you think it would be a lot harder if you did it in an article?

Interviewee: Well, when you make an article, you’re usually telling someone something, but we were more showing them something through Scratch.

Also, information projects the interviewees produced seamlessly integrate text, graphic, and multimedia. The interactive online magazines created by the IJIMS participants include text-based articles, images, and Scratch or other multi-media projects to convey contents effectively. Scratch Wiki also consists of text and graphic. The youth who are Scratch Wiki administrators explained that one of the goals in the future is intensifying the visual elements of Scratch Wiki, from simple formatting elements (e.g., bullets), pictures and multimedia, to developing a parser with JavaScript that enables users to type in a script and it turns into a picture of the script.

Data Analysis Conclusion

Phases I and II data analyses developed a typology of digital age youth information behavior that operationalizes Radical Change Theory’s major concepts—Interactivity, Connectivity, and Access. In Phase I, content analysis of research literature allowed the researcher to create an initial typology by identifying characteristics of digital age youth information behavior reported in previous research literature. Most of the characteristics identified were exploratory in the field of Information Behavior research. The subsequent Phase II, group and individual interviews with youth, tested the characteristics identified in Phase I and added new insights from the perspective of digital age youth themselves. Phase II data supported most of the characteristics discovered in
Phase I. They also revealed various aspects of the characteristics with concrete examples from actual youths’ experiences and thoughts. Moreover, a new theme, Visualizing, emerged during the interviews with Scratch members. The next chapter will present the final typology and interpretations of the data provided in Chapter Four.
CHAPTER FIVE

INTERPRETATION AND CONCLUSION

The purpose of this dissertation study was to understand digital age information behavior of youth (ages 5-18) by applying and further developing Radical Change Theory. Youth information behavior has experienced significant transformation in the contemporary changing information environments; however, relatively little empirical research exists and there is no theoretical framework that can adequately explain digital age youth information behavior across contexts. In order to bridge the empirical and theoretical gaps in the field, the study was conducted with two-phase qualitative research to answer the following research questions (RQ):

RQ1. What are the key characteristics of information behavior of youth in the digital age?
   1.1. How do youth act independently?
   1.2. How do youth form identity and perceive others?
   1.3. How do youth interact socially with others?

RQ2. How can Radical Change Theory be applied and further developed to explain youth information behavior in the digital age?

This concluding chapter begins with a review of the findings, followed by interpretation of the findings and presentation of answers to the study’s research questions. The chapter also discusses contributions and implications of the study, limitations, and future research areas.

Study Findings

The primary result of the study is the development of a typology of digital age youth information behavior, which presents innovative and nontraditional behaviors from a holistic perspective. The typology identifies three aspects of youth information behavior (Type One: Intrapersonal Processes, Type Two: Identity and Perspectives, and Type Three: Social Interactions) and characteristics of each type. Table 5.1 presents the final typology created in this study. Also, Table 5.2 provides definitions of each characteristic and indicates pages for substantiating data analyses in Chapter Four. The final typology and definitions are enhancements of the initial ones developed in Phase I (Table 4.2 and 4.3) with insights from Phase II.
Table 5.1. Typology of Digital Age Youth Information Behaviors [Final]

<table>
<thead>
<tr>
<th>Type One: Intrapersonal Processes</th>
</tr>
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<tbody>
<tr>
<td><strong>Proposition:</strong> Digital age youth engage in nonlinear and interactive information seeking, use, and creation activities with an increasing sense of ownership.</td>
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<tr>
<td><strong>Characteristics</strong></td>
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<table>
<thead>
<tr>
<th>Type Two: Identity and Perspectives</th>
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</thead>
<tbody>
<tr>
<td><strong>Proposition:</strong> Digital age youth form identity and negotiate value systems while they interact with a range of information from different, often conflicting, information.</td>
</tr>
<tr>
<td><strong>Characteristics</strong></td>
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<table>
<thead>
<tr>
<th>Type Three: Social Interactions</th>
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</thead>
<tbody>
<tr>
<td><strong>Proposition:</strong> Digital age youth expand the boundaries of interpersonal information behavior by connecting to diverse resources, people, and communities to meet their information needs.</td>
</tr>
<tr>
<td><strong>Characteristics</strong></td>
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Table 5.2. Definitions of the Characteristics [Final]

<table>
<thead>
<tr>
<th>Radical Change Types</th>
<th>Characteristics</th>
<th>Definitions</th>
<th>Pages for Substantiating Data</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type One: Intrapersonal Processes</strong></td>
<td>Personalizing</td>
<td>The design of one’s own information environment to facilitate access to and use of information concerning personal interests.</td>
<td>57, 69</td>
</tr>
<tr>
<td></td>
<td>Interactive seeking</td>
<td>Dynamic, fortuitous, and self-controlled information seeking behaviors.</td>
<td>57-59, 69-71</td>
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<tr>
<td></td>
<td>Squirreling</td>
<td>The way youth extensively gather and keep information in the digital environment in the form of downloading.</td>
<td>59, 71</td>
</tr>
<tr>
<td></td>
<td>Remixing</td>
<td>The creative reuse of information in order to produce new information or expressive materials.</td>
<td>59-60, 71-73</td>
</tr>
<tr>
<td>Radical Change Types</td>
<td>Characteristics</td>
<td>Definitions</td>
<td>Pages for Substantiating Data</td>
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<tr>
<td>Type One: Intrapersonal Process</td>
<td>Tinkering</td>
<td>Interactive mode of information production, which starts as an idea and the idea evolves by continual modification, trials and errors, and experimentation.</td>
<td>60, 73-76</td>
</tr>
<tr>
<td></td>
<td>Visualizing</td>
<td>Affinity for visual and graphic display of information and synergistic integration of the use of text, image, and multimedia in their information behavior</td>
<td>89-90</td>
</tr>
<tr>
<td>Type Two: Identity and Perspectives</td>
<td>Self-expression</td>
<td>The ways youth express themselves by producing and publishing information that reflect their identity and perspectives to the connected information world.</td>
<td>60-61, 76-77</td>
</tr>
<tr>
<td></td>
<td>Seeking Identity-related Information</td>
<td>Information seeking regarding identity issues such as gender, race, and sexuality.</td>
<td>61, 77</td>
</tr>
<tr>
<td></td>
<td>Negotiating Value Systems</td>
<td>The ways youth process diverse perspectives and deal with ambiguity when interacting with various information, people, and communities.</td>
<td>61-62, 77-81</td>
</tr>
<tr>
<td></td>
<td>Sense of Empowerment</td>
<td>A greater ownership and a sense of agency over information activities as a result of new and innovative behaviors and the nature of the information environment in the digital age.</td>
<td>62, 81-83</td>
</tr>
<tr>
<td>Type Three: Social Interactions</td>
<td>Networking</td>
<td>The act of reaching and connecting resources, people, and communities to meet one’s information needs through technological networks, such as the Internet or mobile networks.</td>
<td>63, 83</td>
</tr>
<tr>
<td></td>
<td>Access to Collective Knowledge</td>
<td>The ways youth access and contribute to the aggregated information that is developed by individuals, especially on the Web</td>
<td>63-64, 83-84</td>
</tr>
<tr>
<td></td>
<td>Collaborative Problem Solving</td>
<td>Information behavior performed by two or more people working together in order to complete tasks or develop new information.</td>
<td>64, 84-88</td>
</tr>
<tr>
<td></td>
<td>Socio-emotional support</td>
<td>The ways youth exchange non-work related comments or actions to build rapport and trust during collaborative/collective information behavior.</td>
<td>64-65, 88</td>
</tr>
</tbody>
</table>
The study findings comported with Radical Change Theory, which suggests that contemporary information resources and behaviors experience transformations in ways that reflect the properties of the digital age, i.e., Digital Age Principles of Interactivity, Connectivity, and Access. Youth information behaviors observed in this study reflected the Digital Age Principles. A total of 14 characteristics in the typology present representations of the concepts in digital age youth information behavior. The development of the typology in this study is an original contribution to the expansion of Radical Change Theory, therefore, the study results elaborate and further develop the original Radical Change Theory.

**Interpretation of the Findings**

The study findings are interpreted in terms of the research questions. The findings are substantial since they are (1) supported by Radical Change Theory, (2) based on systematic analysis of cross-disciplinary research literature that covers a range of contexts in Phase I, and (3) tested with carefully selected purposeful samples in Phase II. In the context of the literature and theories, the study findings concur with or expand upon the existing body of knowledge on youth information behavior. All findings and conclusions are substantiated by data presented in Chapter Four, but not generalizable to all contemporary youth information behaviors due to the nature of qualitative study.

**Research Question (RQ) 1. What Are the Key Characteristics of Information Behavior of Youth in the Digital Age?**

The findings on the first research question deepen understanding of how today’s youth, who have grown up immersed in digital media culture, interact with information in the changing information environment. The main question consists of three research sub-questions, suggesting a holistic perspective for observing youth information behavior—interplay between various factors such as young people’s (1) intrapersonal processes, (2) identity formation and perspective/value negotiation, and (3) interpersonal processes. Each sub-question opens with a brief status of the current knowledge on the topic. Subsequently, the interpretation of the findings presents a synthesis of the key characteristics of digital age youth information behavior (See Table 5.2 and 5.3) and explains what makes the digital age behaviors new and innovative.
RQ 1.1. How do youth act independently?²

The study findings suggest that digital age youth engage in nonlinear and dynamic information seeking, use, and creation behaviors with an increasing sense of ownership. From fact-finding, serendipitous information encounters, open-ended exploration of the area of interest, to researching on a curriculum-based subject, young people’s independent information behaviors are an integral part of their life. Since research and theories, however, predominantly concentrate on information seeking, less knowledge exists concerning a variety of other digital age information behaviors such as information creation. As an attempt to expand current knowledge, the exploratory findings of the study on youth independent information behavior include Personalizing, Interactive Seeking, Squirreling, Remixing, Tinkering, and Visualizing.

Seeking and Beyond: A Variety of Digital Age Youth Information Behaviors. Today’s young people participate in a range of independent information behaviors such as seeking, gathering, managing, circulating, using, and creating information. The series of behaviors are closely related to one another and often create an iterative process. As an illustration, digital age youth conduct fortuitous and self-controlled information seeking (Interactive Seeking), and extensively gather and keep the information they encounter in the form of downloads (Squirreling). The information or digital content they squirrel away provides a basis for creative reuse in order to produce new information or expressive projects (Remixing). Information or expressive materials building process (Tinkering) is simultaneously accompanied by information seeking, use, and circulating behaviors, as they seek out information in the forms of manuals, tips, and examples, and use and build upon existing information or media assets. They particularly demonstrate their affinity for visual and graphic display of ideas in seeking, using, and creating information (Visualizing). In addition, digital age youth can customize their own information environment to facilitate the series of information behaviors (Personalizing).

Alternative Patterns Emerged from New Perspective. Independent information behaviors of digital age youth proposed in the study are new because they not only extend the types of information behavior from seeking and use to creation, but also exhibit alternative patterns from the traditional step-by-step, linear, and sequential approach. For instance,

² In this study, independent information behavior refers to interactions between individual youth and information, e.g., information seeking, processing, use, management, and creation. These are behaviors that can be done alone, although they can also occur collaboratively with others.
Interactive Seeking describes dynamic, serendipitous, and self-controlled information seeking behaviors. Youth predominantly use search engines and browse online. They move from link to link in nonlinear and nonsequential manners, and information they serendipitously encounter often leads to the evolution of a different exploration path. Also, Tinkering, an interactive mode of information creation, differs from a structured and defined approach with meticulous pre-planning that has been taught in schools. Tinkering starts as an idea and the idea grows and evolves by continual modification, experimentation, and trial and error. From the traditional perspective, the scattered approach of Interactive Seeking or Tinkering could be viewed as unorganized, unsystematic, or even a skill failure. Understanding new ways of youth information behavior, however, calls for breaking old paradigms and exploring new ones. In parallel with the traditional structured and hierarchical style, the alternative pattern is particularly well suited for the behaviors of digital age youth with immediacy and breadth of information access.

Creative Information Behaviors in the Digital Age: Remixing and Tinkering. The study found various information creation behaviors conducted by digital age youth, such as creating school magazines, tutorials, or answers to the social Q&A/ Wiki websites. Among the variety of independent information behaviors, two characteristics particularly stand out in terms of the creative nature—Remixing and Tinkering. Remixing, the creative reuse of information in order to produce new information or expressive materials, embodies several patterns including creative, educational, and ethical aspects. First, Remixing is a method of collaborative creation. Creativity becomes a social process as young people build upon, alter, and transform others’ ideas or projects. Also, Remixing provides a learning opportunity, i.e., learning by example. Exploring and scrutinizing examples, in the form of existing work which is meant to be remixed, accelerate young people’s learning, and encourages them to create more difficult, intricate, and creative projects. In addition, the ethical aspect of Remixing concerns practicing ethical issues in creative production. In terms of ownership, it is an integral part of remixing to use other’s work creatively but legally by giving the original information or projects credit, if applicable. As today’s youth increasingly become creators, they also learn how to disseminate their own creation through an appropriate path and license, e.g., Creative Commons License.

Information creation is one of the most innovative and complicated behaviors, where intensive information seeking and use occur and specific issues emerge such as development of content, organization, and presentation of information. In order to create and publish reliable
content, digital age youth seek information from multiple sources and determine its accuracy. Organization of the information content follows discovery. Creating information on the web particularly includes identifying relationships between information pieces, connecting them with links, and developing categories of the information so that people can navigate interactively. In terms of presentation, digital age youth particularly demonstrate their preference for showing information in a visually engaging way and presenting it in various forms such as texts, images, and links.

**Visualizing Information: Newly Suggested Theme in Phase II.** The study’s interviewees who engage in digital media production using Scratch frequently used and created information as forms of image or multimedia, and they seamlessly integrated the use of information in different formats in their information behavior. Therefore, the study proposes Visualizing as a new type of information behavior to explain digital age youths’ affinity for visual and graphical display of information as well as synergistic integration of the use of text, images, and multimedia. According to the study participants, Visualizing is a powerful and memorable way of processing and conveying information for digital age youth, who are exposed to rich graphic resources in both print and multimedia formats, e.g., graphic novels, video games, mobile device interfaces, and several Web2.0 presentation tools. They are attracted by visual representation of information when they seek and use information, and they present information in a visually engaging way, especially when the topic can be delivered more effectively by using graphics or simulations. Moreover, as the original Radical Change Theory proposed “graphics in new forms and formats” and “words and pictures reaching new levels of synergy” (Dresang, 1999, p. 19) in digital age information resources, contemporary youth information behavior seems to incorporate different modes of information, e.g., text, images, sound, and video, in the digital environment of Media Convergence, where multiple media systems coexist and content flows fluidly across them (Jenkins, 2006b).

**Youth Information Behavior as Interaction between Youth and Resources.** Independent information behavior of digital youth can be best explained by interaction between today’s youth and digital age information resources. In that sense, the key characteristics of information behavior correspond to the nature of information resources in the digital age. For instance, patterns of Interactive Seeking reflect the nature of search engines and information organization on the Web. As hypertext requires processing information in a nonlinear fashion and on multiple
dimensions, digital age youth find personal exploration paths and create individualized sequences to seek information. Also, Squirrelning explains the ways youth extensively gather and keep information in the digital environment, such as copy and paste, downloading, e-mailing, and printing. Squirrelning is facilitated by the easy, immediate, and free access to information online as well as the nature of digital information, i.e., easy reproduction and duplication.

Information resources that comply with the patterns of digital age information behavior gain a growing popularity among contemporary youth. For example, the customization capability that today’s information systems offer is one of the primary attractions for digital age youth as it gives them more choice and makes their experience more personally meaningful. Visually engaging information resources particularly appeal to young people. In addition, digital age youth prefer the dynamic, flexible, and interactive nature of information resources or technologies, which support the patterns of Remixing and Tinkering with continual modification and experimentation. In sum, the relationship between youth and information resources is reciprocal. The nature of information resources and technologies has an impact on shaping youth information behaviors. On the other hand, digital age youth can choose and repurpose information resources based on their needs, and their behavior patterns lead to the development and thriving of the resources that fulfill the needs.

RQ 1.2. How Do Youth Form Identity and Perceive Others? The study findings suggest that digital age youth form identity and negotiate value systems while they interact with a range of information from different, often conflicting sources. Youth is an uncertain period of coming-of-age, and the developmental tasks of adolescence include shaping identity, worldview, and perspectives. Information plays a role in the maturation process, when digital age youth engage in various information activities including seeking and creating information about themselves and learning information that addresses diverse perspectives on the world. Due to a lack of research on the topic, however, the current knowledge on young people’s identity formation and value negotiation in the information environment is very limited. This research characterizes the processes in which today’s youth understand themselves and the world during information behavior through Self-expression, Seeking Identity-related Information, Negotiating Value Systems, and Sense of Empowerment.

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The second question specifically focuses on the issue of youth identity. The information behaviors of the second type have a particular impact on youth identity formation and value negotiation.
**Shaping Identity: Seeking and Creating Information on the Self.** Young people develop their identity during information behavior by seeking and creating information on the self. Seeking Identity-Related Information defines the behaviors of youth who seek information associated with identity issues including gender, race, and sexuality. Sometimes it is a personal and private behavior, especially when the information addresses sensitive topics such as sexuality or health issues. Access to information about a range of topics on the web provides youth with an increasing opportunity to learn about themselves by including information previously unavailable.

Self-expression indicates the ways digital age youth express themselves by producing and publishing information that reflects their identity and perspectives to the connected information world. For instance, personal web pages maintained by digital age youth reveal a range of information and opinions of youth, such as photos, daily experiences and thoughts, favorite music, sports, and more. In order to express themselves, young people draw on a variety of sources and then piece together and personalize items in several formats, such as self-images, favorite music, and notes—the process that can be captured by the concept of Identity Bricolage. Nevertheless, it is not an entirely new phenomenon for youth to express themselves by choosing, compiling, and creating words or images that reflect on themselves. Youth in the print culture produced scrapbooks or other collections, including diaries, photograph albums, or collages. Considering this, what are the differences between digital age bloggers and scrapbook compilers in the print culture in terms of self-expression and identity construction, other than that youth predominantly in the past used scissors to cut pictures from magazines or newspapers, and nowadays many more youth use copy and paste and digital tools, such as Photoshop?

The biggest difference in youth self-expression online versus in print materials stems from the publishing of personalized information to the connected information world. When they post personal information to individual web pages or social network sites, their identity is shaped not only by solitary self-exploration and reflection, but also by how others perceive them, i.e., social validation of the self by an audience. In contrast, young people’s self-expression in the print culture was a private archive, and the primary functions included keeping memories, self-reflection, and catharsis, but not necessarily shared display. In that sense, one of the roles of digital technologies in the construction of youth identity involves allowing youth to speak for themselves to the connected information world, in contrast to the selective and restrictive
transmission of information in the print culture. In sum, in terms of youth identity formation by seeking and creating information on the self, the digital environment provides youth with a personal experience of accessing identity-related information as well as an increasing opportunity for developing identity in a social context.

**Understanding Others and the World: Processing Information from Diverse Perspectives.** Along with self-exploration and expression, youth information behavior includes a process of understanding others and exploring the world around them. Negotiating Value Systems explains that digital age youth encounter and process information from diverse, and often conflicting perspectives on the world. They also need to handle different opinions and disagreements among other people during collaborative information behavior. Two major patterns emerge concerning how digital age youth resolve conflicting facts, different opinions, and disagreements: autonomous problem solving by seeking information independently and, in contrast, asking for help from others. It is innovative that digital age youth seek information from multiple sources for decision-making and resolve disagreements among others based on the information they find. The ability to solve problems by themselves has increased through Interactive Seeking with the aid of improved access in the digital age. At the same time, information judgment and handling disagreement can be a social process, as youth frequently ask for help from other people in the local area, e.g., parents, teachers, mentors, or leaders.

**Sense of Agency during Information Behavior.** Despite the previous research reporting anxiety and confusion during youth information behavior in the digital environment, the study suggests that digital age youth feel a sense of agency as they are in control of their information-related behaviors. Sense of Empowerment in the information behavior context defines having greater ownership over information activities as a result of new and innovative behaviors and the nature of the information environment in the digital age. For instance, youth nowadays have the freedom to pursue a range of topics of interest, since they have access to information from various perspectives. As noted above, Interactive Seeking, in which youth can choose what to explore in what order, allows them self-taught and autonomous problem solving. Beyond seeking and use, engaging in productive and creative information behaviors seems to provide digital age youth with an enhanced sense of empowerment. Finally, youth feel a sense of agency during their social interactions, especially when their voices are accepted and they can make a meaningful contribution to the information world to which they belong.
**Solitary and Social Processes.** Overall, young people’s identity formation and value negotiation during information behavior require both private experiences and social practice. While digital age youth enjoy the capability of seeking private and sensitive information online, they express themselves in public forums and seek social validation of their identity by audience. Moreover, the ways digital age youth understand the world from diverse perspectives include both autonomous problem solving through Interactive Seeking and asking for help from others. Finally, young people can be fully empowered only when they are in control of their own independent behaviors as well as when they are socially accepted and engaged in various social interactions.

**RQ 1.3. How Do Youth Interact Socially with Others?**

The study findings propose digital age youth expand the boundaries of interpersonal information behavior by connecting to diverse resources, people, and communities to meet their information needs. Information sources are not limited to static resources, such as books or web sites, but include other people and communities. Apart from search engine use, interpersonal information seeking, i.e., turning to other people to meet their information needs, has been the most frequently and preferentially used approach among youth. A few existing studies discuss young people’s interpersonal information behaviors and explain how youth seek and share information from their peers, family members, teachers and librarians in their local communities. Although peer interactions and turning to local people for help still prevail in the digital age, the study identifies new ways of social interaction in the digital age, including Networking, Access to Collective Knowledge, Collaborative Problem Solving, and Socio-emotional Support.

**Social Nature of Youth Information Behavior.** Youth have a strong desire and need for social interactions. They seek information from other people, are willing to share what they know, and increasingly, create information collectively or collaboratively. While networked or collaborative technologies facilitate youth interpersonal information behavior, digital age youth observed in the study were eager to use available tools and repurpose what’s available based on their needs for their social interaction. They also demonstrated an affinity for working together on various information tasks because they understand the benefits of having different opinions.

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4 Different from the first and second sub-questions which can be done both individually and socially, the behaviors concerning the third question, as referred to in the context of interpersonal information behavior, must be performed socially with others.
and perspectives, division of labor based on one’s strengths and interests, and creativity stimulated by social interaction.

Collaborative Problem Solving, an information behavior performed by two or more people working together in order to complete tasks or develop new information, requires one of the most engaged social interactions. Digital age youths’ continuous engagement in Collaborative Problem Solving is facilitated by Socio-emotional Support, i.e., exchanging non-work related comments or actions to build rapport or trust. Although forming relationships and trust have been a vital aspect of interpersonal information sharing in the past, it is distinctive that digital age youth in the study build trust even when they only know each other through exchanging and sharing information online.

**Expanding Boundaries beyond Local Connections.** Digital age youth benefit from networked technologies, e.g., the Internet or mobile network, which enable them to broaden the horizons of interpersonal information behavior by reaching and connecting to resources, people, and communities (Networking). Networking allows today’s young people to interact increasingly with diverse people with few commonalities such as age, gender, and country. When needed, Networking supports global interactions and exclusively online communication. In spite of the negligible external commonalities and considerable geographical distance, the information concerning similar interests that they share creates common ground.

In a specific version of Networking, the study found that digital age youth access information resources created collectively online such as Wikipedia, online forums, or Social Q&A (Access to Collective Knowledge). They also seek out information on specialized areas through interest-based expert communities online, where the members share and collectively build the aggregated information of the specific area, e.g., fansub, manga, online video gaming, and other online recreational or learning topics.

**Making Participatory Contributions.** Besides access to and use of collective knowledge as a type of Networking, a more innovative aspect of digital age youths’ social information behavior evolves when they contribute to the development of collective knowledge and participate in various interest-based communities on the Web. A number of rich information behaviors occur during digital age youths’ online community participation; youth are motivated since most of the activities are voluntary and based on their interests, and working with others is an intrinsic need of young people. For instance, digital age youth observed in the study interact
with diverse people who have similar interests in online communities and connect to information resources including people and communities to meet their information needs (Networking). By sharing information with one another, members of the online communities contribute to creating collective knowledge in a specialized area (Access to Collective Knowledge). Community effort to solve a problem or create new information is often more deliberate and collaborative (Collaborative Problem Solving). In addition, it is an essential part of Collaborative Problem Solving that digital age youth build relationships and trust by exchanging non-work related comments or actions (Socio-emotional Support).

Research Question 1 Concluding Remarks

Interplay between Intrapersonal Processes, Identity Formation, and Social Interactions. By presenting interpretations of the findings in terms of the three research sub-questions, the study proposes a holistic perspective for understanding youth information behavior as an interplay between (1) intrapersonal processes, (2) identity formation and perspective/value negotiation, and (3) social interactions. The aspects are not mutually exclusive categories but, rather, are closely interrelated. As an illustration, the characteristics of independent behavior are behaviors that can be performed individually, but also can be conducted with others. Some of the characteristics are particularly difficult to segregate from interpersonal behaviors, such as Remixing of someone else’s projects, or Interactive Seeking that results in the retrieval of information in a Wiki or online forum, i.e., collective knowledge. Meanwhile, interpersonal information behaviors always require individual commitments of various independent behaviors. Also, young people’s identity formation and value negotiation during information behavior require both private experiences and social practice, and young people feel a sense of agency when they are in control of their own independent behaviors as well as when they are socially accepted and engaged in various social interactions.

Opportunities and Challenges. The characteristics of digital age youth information behavior are descriptive in nature—i.e., how contemporary youth interact with information. The characteristics provide alternative patterns that reflect the properties of the digital society and have the potential to lead innovative outcomes for their academic, recreational, social and personal growths. Yet, while existing methodologies with opposing perspectives view digital
technology as either a hope or a threat for young people’s development with little research-based evidence, the empirically tested characteristics of this research potentially display both opportunities and challenges in young people’s lives.

The benefits of the digital information behaviors suggested here include young people’s sense of empowerment in terms of learning, creative, and social aspects of their life. Digital age information behaviors offer a new type of learning opportunities, which support both autonomous and social learning. As information creators, digital age youth have a growing chance to be powerful and express their creativity and identity. They also create information collaboratively and contribute to the development of collective knowledge. Moreover, the expanding boundaries of digital age youth information behavior provide an increasing opportunity to learn diverse perspectives by interacting with various information, people, and communities beyond their local connections.

Digital age information behaviors also present challenges, since the behaviors particularly require youth to be motivated and engaged as well as to think critically and creatively. Processing various perspectives, such as conflicting facts and opinions, demands a high level of thinking skills, including information credibility judgment. Also, digital age youths’ creative information behaviors raise an ethical issue. Although the Web2.0 culture celebrates sharing, participation, and social creativity, the issues concerning ownership create a gray area in the current information environment, where copyright, fair use, commercial, and open culture co-exist often in an unspecified manner. Youth-created information can raise quality concerns, such as reliability, especially in the case of collective knowledge that anyone can edit. Furthermore, the constant connectivity and increasing online interaction bring up the issues of privacy and online safety. When youth are always connected online, they also might lose a solitary opportunity for honest self-reflection to develop their identity and perspectives. In addition, the availability of diverse perspectives does not always lead to a broadening perspective or high tolerance when young people’s social interaction is deliberately limited to a circle of like-minded people.

**New But Rooted in Traditional Behaviors: Radical Change.** The proposed characteristics are new and innovative representations of the Digital Age Principles of Interactivity, Connectivity, and Access—the major concepts of Radical Change Theory—in youth information behavior. According to the theory, Radical Change indicates fundamental
changes, which depart from but still are related to traditional information resources and behaviors. In that sense, the study has discussed what makes the digital age characteristics new and innovative, compared to the behaviors in the past when applicable, and also mentioned traditional behaviors that remain pervasive nowadays, e.g., youth turning to local people to meet their information needs. Some of the characteristics also existed in the past, but they have become more pronounced, widespread, and easily observed as a result of the development of the digital culture. The interpretation of the findings on the second research question stimulates more discussions on the Radical Change Theory concerning youth information behavior in the digital age.

**RQ 2. How Can Radical Change Theory Be Applied and Further Developed to Explain Youth Information Behavior in the Digital Age?**

The research demonstrates the Theory-Research-Theory strategy, where “theory drives the research questions and the results that answer these research questions inform and modify the theory” (Meleis, 2007, p. 202). Throughout the entire inquiry process, the study applied and further developed the theory of Radical Change, which explains changing youth information resources and behaviors through the Digital Age Principles (See Table 5.3). The theory spurred the research questions of the study, and it is applied during Phase I and II to facilitate systematic data analyses. Also, the results of the research refined and further developed Radical Change Theory.

Table 5.3. Concepts of Radical Change Theory: Digital Age Principles (Dresang & Koh, 2009)

<table>
<thead>
<tr>
<th>Digital Age Principles</th>
<th>Definitions</th>
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<tbody>
<tr>
<td>Interactivity</td>
<td>Dynamic, nonlinear, nonsequential, and multimodal information behavior and representation, with an increasing sense of control by end-users</td>
</tr>
<tr>
<td>Connectivity</td>
<td>A sense of community or a construction of social worlds that emerge from changing perspectives and expanded associations</td>
</tr>
<tr>
<td>Access</td>
<td>Breaking of longstanding information barriers, bringing entrée to a wide diversity of formerly largely inaccessible opinions</td>
</tr>
</tbody>
</table>

The interpretation of the findings regarding the second research question consists of (a) Radical Change Theory application, (b) further development of Radical Change Theory, and (c)
evaluation of the theory. The first part places the use of Radical Change Theory in this research in the existing body of literature that applies the theory. It also provides an explanation of how the theory was applied throughout the entire inquiry process. Then, the process of the theory’s further development and its benefits are addressed. Last, evaluation of the theory discusses opportunities and challenges that Radical Change Theory provides for research studies.

**Radical Change Theory Application**

**Brief History of the Theory Application.** Since developed in the 1990s, the theory of Radical Change has been applied in various disciplines, such as Library and Information Studies, Education, and English, and plays a significant role in guiding investigative studies. Radical Change Theory was initially developed to explain handheld literature for digital age youth and with its development came a set of assumptions, the major concepts of Digital Age Principles, a typology of digital age literature for youth, and a list of information resources with Radical Change traits. Previous studies applied the theory in several ways from observing and interpreting a phenomenon under study through the lens of Radical Change perspective, selecting information resources that exhibit Radical Change characteristics as research instruments, to using the theory as an analytical framework. In particular, the studies largely benefited from a typology of digital age literature for youth, because the typology clearly manifests representations of the Digital Age Principles in handheld literature for youth.

Later, the theory’s applicability was expanded beyond the print materials for youth by several research studies, which demonstrated the explanatory power of Radical Change Theory for digital age information behavior. Those studies employed different types of information resources such as books, visual arts, or films with Radical Change characteristics and applied the theory to observe people’s responses to the digital age resources (Abele, 2003; Pantaleo, 2008). Furthermore, versatility of the theory’s potential applications was suggested in order to explain a range of contemporary information behaviors (Dresang, 2005a, 2005b; Dresang & Koh, 2009), although more research studies are needed to explore and validate the usefulness of Radical Change Theory in various situations.

**Theory Application in the Study.** The study applied Radical Change Theory to explain youth information behavior in the digital age throughout the whole research process. From the early stage of the study, the theory provided the perspective to identify a problem and generate research questions. Assumptions were made from the Radical Change perspective, i.e., young
people’s predominant exposure to and participation in digital culture influence many aspects of their lives, resulting in fundamental changes in their information behavior. An inquiry began with the realization that little is known about the exact changes or new characteristics of digital age youth information behavior from research-based evidence. Another problem identified included the need to further develop the theory of Radical Change in order to bridge a gap in the Information Behavior field—i.e., a lack of holistic but detailed theoretical framework regarding digital age youth information behavior.

Radical Change Theory was applied during the data analysis of Phase I: content analysis of research literature. The goal of Phase I included identifying and categorizing key characteristics of digital age youth information behavior. The study adopted the directed qualitative content analysis approach, in which initial coding starts with an existing theory and researchers immerse themselves in the data and allow new themes to emerge from the data. The concepts of Digital Age Principles—Interactivity, Connectivity, and Access—provided a predetermined list of codes for qualitative content analysis, while all instances of characteristics of digital age youth information behavior were coded from the data itself.

Application of the theory in Phase II: interviews with youth builds upon the result of the Phase I research, i.e., a typology of digital age youth information behavior, which provides operationalizations of the Digital Age Principles. The directed qualitative content analysis used for the interview data analysis was further enhanced, since the typology provided an analytical framework for easy and systematic organization and analysis of the interview data. In addition, the approach was still open to discovery of emerging new themes. In sum, throughout the study Radical Change Theory provided a lens to identify a problem as well as an analytical framework for systematic data analyses. The study particularly suggested the directed qualitative content analysis approach as a method to apply and extend the theory.

**Further Development of the Radical Change Theory**

**Typology Building Processes.** The study results contributed to elaboration and further development of Radical Change Theory through the development of a typology of digital age youth information behavior. The typology is a result of the sequential and iterative process of two-phase qualitative research, including Phase I: content analysis of research literature and Phase II: interviews with youth. Phase I initially identified characteristics of digital age youth information behavior based on systematic analysis of cross-disciplinary research literature that
covers a range of contexts. Phase II began after the Phase I was completed in order to test the findings from Phase I with purposefully selected information-rich samples.

The iterative process indicates that Phase II findings contributed to further modifications of the Phase I results. Phase II data supported most of the characteristics discovered in Phase I and disclosed various aspects of the characteristics with concrete examples from actual youth experiences and thoughts. In addition, a new theme, Visualizing, emerged during Phase II and provided a previously undiscovered characteristic to add to the initial typology.

On the other hand, Phase II interviews elicited little data on Seeking Identity-related Information, a characteristic identified in Phase I to indicate information seeking regarding identity issues such as gender, race, and sexuality. Because Phase II interviews particularly focused on the interviewees’ experiences and thoughts on their Scratch projects, such as interactive journal creation, and Scratch Wiki and Scratch Resources activities, the interview questions could not delve into the specific characteristic. Yet, the characteristic was not removed from the initial typology, because findings in Phase II generated context-bound knowledge, e.g., information behaviors of 12 young adults ages 12-15 in the Scratch community, while Phase I findings embraced diverse contexts and were found repeatedly across the research studies.

**Benefits of the Typology Development.** The typology of digital age youth information behavior established in the research is concomitant to the typology of digital age literature for youth initially provided by the original Radical Change Theory. As previous studies that applied the theory largely benefited from the literature typology, the goals of the new typology development included facilitating and expanding the theory’s applicability to information behavior research in general.

Phase II of the study demonstrated advantages of having the typology in conducting research: (1) easy identification of new and innovative youth information behaviors, to which Radical Change Theory is applicable, and (2) creating an analytical framework for data analysis. Each characteristic identified in Phase I served as an indicator for facilitating easy identification of the digital age information behaviors that operationalize the concepts of Interactivity, Connectivity, and Access. Also, the typology provided an analytical framework for systematic analysis of the data that were collected through interviews with youth. Therefore, it is expected that future applications of Radical Change Theory to information behavior research will be facilitated by the newly created typology in this study.
**Evaluation of the Theory.** Interpretations of the findings of the study suggest both opportunities and challenges that Radical Change Theory provides for research studies. Above all, applying Radical Change Theory has several strengths for understanding and explaining youth information behavior in the digital age. The theory offers a unique point of view to interpret changing information behaviors and resources. Behaviors that were previously interpreted as a lack of skills or failures, e.g., Interactive Seeking and Remixing, can now be understood as new types of thinking and learning, which reflect the properties of the era. Application of the theory is particularly appropriate when exploring innovative behaviors, which will lead to implications for 21st century literacies, skills, and education for youth.

Owing to its focus on both people and resources, applying Radical Change Theory to information behavior research allows researchers to conceptualize human information behavior holistically as interactions between people and information. It should be noted that the major concepts of the theory are referred to as principles of the digital age—i.e., the concepts of Interactivity, Connectivity, and Access represent not only properties of technology, but also features and inclinations of human behaviors. By understanding human information behavior in relation to the characteristics of resources, information behavior research can generate more direct implications for the design of information systems and resources and have an explanatory power to investigate the role of technology during people’s information behavior, overcoming the flaws of technology determinism.

In addition, the comprehensive and flexible concepts of the Digital Age Principles allow the theory’s application in a range of information behavior situations, although the degree of intensity to which youth information behavior reflects the Digital Age Principles will differ by contexts. A strong representation of the Digital Age Principles is likely to be observed when digital age youth are motivated and voluntarily engaged in diverse information activities, such as interacting with rich resources in print, digital, or multimedia formats, creating information or expressive projects, working with others collaboratively or collectively, or participating in interest-based online communities whose members include diverse people.

On the other hand, challenges of applying the Radical Change Theory stem from the constraint of its applicability in a rigidly structured information environment, e.g., limited access to information resources, imposed information tasks, or little social interaction. Also, as different learning styles exist among students, individual youth show different approaches to processing
information. Youth whose style follows more traditional and rule bound behaviors are likely to exhibit fewer Radical Change characteristics. Therefore, a minimum level of the Digital Age Principles might be observed depending on circumstantial factors and individual differences.

**Research Question 2 Concluding Remark.** The study provided an exemplary case of how Radical Change Theory can be applied and further developed in a research study, using the Theory-Research-Theory strategy. The theory of Radical Change guided the study, and the study results further developed the original theory by offering a new typology, which includes operationalizations of the theory’s concepts in digital age youth information behavior. Still, potentials for the theory’s further application and evolution abound, as theories are constantly being tested and revised according to the results of research. Future studies can explore more possibilities.

**Contributions and Implications**

The study bridges several gaps in the field of Information Behavior as well as related areas. Demonstrating dynamic interactions between research, theory, and practice, the study informs researchers, educators, and information professionals including librarians working with youth in formal and informal environments. The potential areas of impact are overarching, including Information Behavior, Library and Information Services for Youth, and Digital Media and Learning across a number of academic disciplines.

**Contributions and Implications for Scholarly Fields**

**Theoretical Contributions.** The development of theories unique to Information Studies is essential to the growth of the discipline, and theory use in scholarly research is a distinguishing characteristic of a discipline’s academic maturity (McKechnie & Pettigrew, 2002). The major significance of the study includes its theoretical contribution; the study demonstrated how the theory of Radical Change led to research questions and guided research procedures. Moreover, the study findings further developed the theory and generated a typology of digital age youth information behavior.

Until now, no overall theory that explains digital age youth information behavior from a holistic perspective had been fully developed. Traditional models concerning youth are primarily interested in information-seeking behaviors and information literacy skills regarding academic or
any other problem-oriented tasks in formal environments, such as schools (Kuhlthau, 2004; Lowe & Eisenberg, 2005). No theoretical frameworks or models explain a variety of information behaviors, such as information seeking, use, sharing, and creation, that are embedded in young people’s personal or social practices at home, schools, public places, and online.

The study suggests that the enhanced Radical Change Theory with the newly added typology serves as such a holistic framework that explains increasingly multi-faceted and complex patterns and characteristics of digital age youth information behavior. In particular, the typology created in this study will become an instrument that can be utilized in future research. Due to the holistic but detailed nature, the typology can be easily applied to research studies on a range of youth information behaviors in the digital age.

**Methodological Contributions and Implications.** The study also provides methodologically significant contributions and implications by applying well-established, yet innovative qualitative research methods, such as Sense-Making Methodology (SMM) group interview, SMM individual interview in the online environment, and the Directive Qualitative Content Analysis technique. The primary methodological contributions of the study include applying the newly developed SMM group interview technique with young adults. Since developed in 1972, Dervin's SMM has been one of the most influential and widely applied methodologies in information behavior research. The SMM group interview, however, was recently developed and pilot tested on undergraduate informants by Dervin and Devakos (2010).

To the best knowledge of the researcher, this research is the first attempt to apply the method to a young adult population.

As explained in Chapter Three, the application of the SMM group interview method with 8th graders revealed unique strengths and resulted in the efficient acquisition of rich data. The participants provided in-depth and quality answers, since they had the opportunity to reflect on their experiences concerning major interview questions during their completion of a pre-questionnaire prior to the group interview. Also, the structured and disciplined group interview method helped the researcher efficiently obtain focused data in a relatively short amount of time. The SMM group interview technique retains the strengths of traditional group or focus group interviews where participants have the social experience of listening and building upon others’ ideas. The study participants reported in their journals that listening to and sharing with others
about their experiences were beneficial and helped them learn about improved ideas to implement in the future.

Overcoming drawbacks of the traditional group or focus group methods, on the other hand, each SMM group interviewee had a sufficient chance to present their thoughts on the individual journaling sheet, without feeling peer-pressure for disagreeing with others’ ideas. The study found that the SMM journaling is a particularly strong data collection technique to discover exceptions or minor opinions, since interviewees might not disagree with one another or express their confusions in public, or even in a small group of already familiar peers. In the second group interview in this study, two people mentioned that they went to Facebook to find personal background information. Although the researcher did not notice any verbal or non-verbal cues from the other two participants during the interview, both expressed written confusion about the idea of using Facebook for information seeking. Also, responding to others’ remarks that information in the Wiki format is not reliable, a participant mentioned in the journal: “why not used Wiki?” SMM journaling was also effective in identifying major themes agreed upon by participants or consensus on the most salient patterns.

The study, however, also suggested that special considerations are needed in applying the technique with young people, since the method largely depends on participants’ verbal and analytical thinking skills with substantial cognitive effort. During the SMM group interview, interviewees engage in multitasking including presenting their answers, listening to others’ answers, and recording their analytical reactions in the individual journals. It turned out that the young people in the study managed to record only brief notes in the journal, though still informative, rather than thorough reactions to others’ answers to each interview question. Therefore, it is necessary to provide clear instructions on journaling and continuous reminders throughout the interview in order to apply the method with young people successfully.

Also, the study provides implications for conducting online interviews with digital age youth. Although conducting interviews using digital technologies was not a conventional method in the past, the importance and necessity of online interviews is increasing in the digital age. This research successfully collected quality data on information behavior in the digital environment from digital age youth who live in different parts of the world. Therefore, researchers might consider using online interview methods when (a) the research questions address online phenomena, (b) online communication is one of the preferred methods of the subject, and/or (c)
there is a need for overcoming a considerable geographical barrier to locate the most information-rich subjects.

In addition, the study applied a data analysis method that tests and extends a theory or relevant research findings. While quantitative content analysis often indicates counting words or rating responses on predetermined scales, types of qualitative content analysis vary depending on the degree of involvement of inductive reasoning. By applying the directed qualitative content analysis method, this research not only benefited from an existing theory, but also attempted to minimize potential bias by the pre-selected theoretical framework. Therefore, implications of the study for qualitative research include the methodological soundness of the dialectic and reciprocal relationship between a theoretical framework and data.

**Youth Information Behavior Research.** The research particularly contributes to deepening current knowledge on how today’s youth, who have grown up immersed in digital media culture, interact with information in the changing information environment. The study proposes a holistic perspective for observing youth information behavior as interplay between independent behaviors, identity and value negotiation, and social interactions. Considering that the majority of previous studies on youth information behavior tended to focus on task-based information seeking and use, the study extends the territories of youth information behavior research, e.g., creative information behaviors, identity and value negotiation, and collaborative and collective interpersonal behaviors in online communities.

Although Phase I of the study covers youth information behavior in both formal and informal contexts, Phase II especially provides new knowledge and insights to the area of youth everyday life information behavior. Only a small number of existing research studies located have investigated youth engagements in a variety of everyday life information behaviors beyond curriculum-related academic needs (Agosto & Hughes-Hassell, 2006a; Meyers et al., 2009; Reuter, 2007a). In addition, this is one of the very few studies that situate youth information behavior in everyday life as a social practice. The study findings suggest social interactions as an integral part of digital age youth information behavior.

The study particularly provides a contribution to an existing body of literature on youth information behavior in the digital environment from a new perspective. Previous studies predominantly focused on barriers in the digital information environment or young people’s lack of information seeking skills online (Dresang, 2005b). The study findings, however, propose
alternative patterns in youth information behavior that reflect the properties of the digital society, instead of a lack of skills or failures. Also, many of the study findings are highly exploratory, because until now little research observed such dynamic and innovative youth information behaviors in the digital environment.

The study is an addition to a body of research that attempts to capture the phenomena of youth information behaviors from the perspective of youth themselves. The study concurs with previous studies that suggest youth not only are capable of providing rich data, but also are enthusiastic to express themselves (Agosto & Hughes-Hassell, 2006b; Druin, 2002; Large et al., 2007; Meyers et al., 2007). The interview design of Phase II considered developmental characteristics of youth. For example, the interview durations were set up by considering the relatively short attention span of youth. The interview questions were crafted in plain English and the researcher used iterative probing questions in order to help young interviewees’ articulation. Also, the application of the SMM group methodology successfully resolved the issue of peer-pressure in conducting group interviews with youth, since the participants reported any disagreements with their peers in personal journals. As a result, the interviewees provided authentic and quality data that deepen understanding of youth information behavior in the digital age.

**Information Literacy.** Information behavior has an inseparable and reciprocal relationship with information literacy, i.e., the ability to recognize when information is needed and to locate, evaluate, and use the needed information (AASL & AECT, 1998). Desirable information behaviors constitute a driving force toward acquiring information literacy; at the same time relevant 21st century skills and literacies (AASL, 2009; Partnership for 21st Century Skills, 2009) lead to productive behaviors. Also, the physical dimension of young people’s information behavior can also be viewed as a representation of their information literacy. Since literacy itself is not observable or measurable, it needs to be inferred through physical behaviors. Therefore, youth information behavior can be studied as an indicator of their information literacy and skills. The study findings revealed that digital age youth exhibit various innovative information behaviors, which provide new learning opportunities and implications for information literacy. As information behaviors identified in the study often exist as pre-requisites for participating in other activities, such as learning or engaging in entertainment, the
significance of information literacy in the digital age is increased for many aspects of young people’s lives.

**Standards for 21st century School Libraries.** This research also contributes to the lack of research demonstrating information behavior aspects of the standards for 21st century school libraries (AASL, 2007, 2008, 2009a, 2009b). Those standards suggest that school library programs contribute not only to school-based learning but also to lifelong learning and personal and aesthetic growth of 21st century students. While the guidelines adequately provide a vision for 21st century students, few existing studies observed if and how contemporary youth actually demonstrate the standards in their information behaviors. Although conducted with a few youth who are heavily immersed in the digital environment, the current research provides evidence of the existence of innovative information behaviors that are congruent with the goals of the 21st century school library standards. Using the study as a basis, more research can further investigate representations of information literacy and visions of 21st century students in actual information behaviors of digital age youth.

**Related Scholarly Fields.** The research provides insight into the cross-disciplinary field of Digital Media and Learning, which involves a number of academic disciplines such as Education, Media, Journalism, and Literacy studies. The emerging field aims to “determine how digital technologies are changing the way young people learn, play, socialize, and participate in civic life” (The MacArthur Foundation, 2006). Compared to other aspects of youth engagement in digital media, there is a lack of research that focuses on the role of information in the lives of digital age youth. The current research bridges this gap by illuminating changing patterns of youth interaction with information as a way of learning, playing, forming identity, and socializing in the digital environment.

The study results concur with several key concepts and findings in the field of Digital Media and Learning; the concepts can be interpreted from the Information Studies point of view and further substantiated with empirical findings from the study. For instance, Participatory Culture is a term that indicates the “culture in which fans and other consumers are invited to actively participate in the creation and circulation of new content” (Jenkins, 2006b, p. 290). From the perspective of Radical Change Theory, the emergence and prosperity of the participatory culture are grounded in the Digital Age Principles, i.e., the ever-increased Connectivity, Interactivity, and Access in the digital information environment. Characteristics in
Type Three: Social Interaction (Table 5.1), for instance, represent the Participatory Culture in the information behavior contexts. Access to Collective Knowledge explains the ways youth access and contribute to the aggregated information that is developed by individuals, especially on the web such as Wikipedia, online forums, and expert communities. Also, Collaborative Problem Solving indicates information behaviors performed by two or more people working together in order to complete tasks or develop new information.

Also, Ito et al.’s ethnographic research (2008) proposed a framework of Genres of Participation, including friendship-driven and interest-driven new media practices. Depending on varying degrees of commitment to media engagement, different modes of participation involve Hanging Out, Messing Around, and Geeking Out. A more friendship-driven mode of Hanging Out practices create Information Grounds (Fisher, 2005) for digital age youth. The innovative behaviors explored in this study, however, are to a great extent associated with the interest-driven participation, where digital age youth use the online world to explore interests and seek information that goes beyond what they have access to at school or in their local communities. For example, the Tinkering behaviors of Phase II interview participants in the study demonstrate Messing Around with Scratch and other digital technologies. The four individual interviewees who developed Scratch Wiki and Scratch Resources particularly show the Geeking Out mode of participation, because their information behaviors are highly social and engaged, and their networking behaviors extend far beyond their local friendships.

Everyday life information behavior of digital age youth reported in the study has a particular relevance to informal learning for youth. For instance, Affinity Space proposed by Gee (2007) explains a space where informal learning takes place by the sharing of knowledge and expertise based on voluntary affiliations. In Affinity Space, the learning process occurs outside of the classroom and beyond direct adult control. The study found that the Scratch online community including Scratch Wiki and Scratch Resources creates Affinity Space for digital age youth, where youth and adults are apparent partners, and the members are engaged in self-directed and social learning.

The study provides a particular contribution to the Scratch project that is based on research in the Lifelong Kindergarten group at the MIT Media Lab. In spite of the growing popularity of the Scratch program and research efforts, the information aspect of youth Scratch practices has not been studied. This is the first research study that investigates information
behaviors embedded in Scratch Wiki and Scratch Resources, which are voluntarily developed and maintained by digital age youth themselves.

The study also informs the field of Journalism by studying youth who participate in a journalism research project that incorporates Scratch, Interactive Journalism Institute for Middle Schoolers (IJIMS). The study showed that IJIMS participants are heavily engaged in information behaviors that directly affect their successful performance within the journalism project. In sum, the study findings inform other scholarly fields that information behaviors are embedded in many aspects of young people’s lives and often create a prerequisite for successful participation in digital media practices.

**Implications for Information Professionals.** The study findings provide an empirical basis for the development of relevant library and information services for youth in the changing information and educational environments. The study findings highlight information credibility judgment as one of the most challenging aspects of digital age youth information behavior. Youth frequently ask for help from other people in the local area, e.g., parents, teachers, mentors, or librarians. Therefore, fostering young people’s critical thinking skills creates a vital role for information professionals working with digital age youth who must navigate a wide array of information in the digital age.

Digital age youth engage in a variety of youth information behaviors, including information seeking, use, sharing, and creation. Information professionals can more completely meet digital age youths’ needs by providing diverse information resources and services that support not only information seeking and use but also information sharing or creation behaviors. For instance, it is desirable for information professionals to support youth information production in order to meet young people’s intrinsic needs for creative and productive activities. Concerning youth creative production, it is an increasingly important role of information professionals to provide education and guidance concerning various ethical issues—i.e., building upon others’ work creatively but legally, as well as helping youth learn to disseminate their own creations through an appropriate path such as Creative Commons.

Finally, the study reveals that young people have a strong need and affinity for sharing information and working together during various information activities. Digital age youth engage in information behavior more actively and consistently when they feel a sense of community. Therefore, libraries and other information environments for youth can provide youth with a
community or forum to speak for themselves, share information, or practice other types of social interaction.

**Limitations**

Certain limitations must be recognized concerning the two-phase qualitative research, including Phase I: content analysis of research literature and Phase II: interviews with youth. In Phase I, it was not possible for the researcher to review every existing piece of research literature related to digital age youth information behavior across disciplines. An effort was made to obtain and analyze all of the relevant literature that met the collection criteria. Yet, there might be literature that was excluded from the Phase I pool. The data collection of Phase I stopped in May 2010 when the content became repetitious; therefore, studies published after June 2010 were not analyzed in this study regardless of their relevance to the topic. Future studies may incorporate studies that were conducted after this research was completed.

Due to the nature of the qualitative interviewing, one characteristic of which emphasizes depth over breadth, the number of participants was limited and a total of 12 young adults were recruited in Phase II. Using a purposive sampling approach, the researcher carefully selected the most information-rich participants in a highly interactive online environment with thousands of youth participants. Also, deep and rich data were obtained efficiently by applying the recently developed Sense-Making group interview technique. Nevertheless, the small number of samples creates a limitation of the study and Phase II findings produced context-bound knowledge, i.e., information behaviors of 12 young adults in the Scratch community. Replicated studies, more comprehensive studies or studies with more of a quantitative emphasis might serve to extend these findings.

Another limitation of the interviewing in Phase II includes its heavy reliance on the subjects’ self-reporting. The interview methods were selected in order to collect authentic data from the perspective of digital age youth themselves. Also, the interview method allows learning inclusion of a variety of youth experiences and thoughts, which cannot be obtained through observation in a single or a series of research sessions. The quality of the obtained data, however, largely depends on the participants’ self-reporting skills.

Although Phase I and II data covered youth information behavior in various contexts, such as schools, after-school clubs, everyday life, and digital environments, a comparative
analysis that delineates commonalities and diversity across contexts was not conducted. Age, gender, nationality, or cultural differences in youth information behavior were also not analyzed, since it is beyond the scope of the research. Instead, the current study provides a basis for conducting future research that further investigates those specialized topics.

**Future Research Areas**

Possibilities for future research abound due to the exploratory nature of the study. First, the theory of Radical Change with the newly developed typology in this study can be tested further in various contexts in order to prove its usefulness and explanatory power. Future studies can apply Radical Change Theory with various populations, e.g., diverse ages, gender, culture, and socio-economic status, and different resources, e.g., interactive books using emergent reading technologies, digital and multimedia resources, and online communities, in both formal and informal contexts.

Also, in-depth studies on each type (Type I: Independent Process, Type II, Identity and Perspectives, and Type III: Social Interaction) or characteristic can be conducted to deepen understanding of each specific behavior. Therefore, each characteristic proposes an area for further investigation.

Future research can further explore dynamic interactions between information resources and information behaviors in the digital age. One of the significant study findings included the reciprocal relationship between information resources and behaviors; prominent patterns of information behavior lead to the development and thriving of the information resources that support the behaviors, at the same time the nature of resources or technologies has an impact on shaping behaviors. The current study, however, particularly focused on identifying the behavioral patterns. Future research can further investigate specific correspondences between key characteristics of information behavior and the nature of information resources.

Assessment of the quality and effectiveness of digital age information behaviors is a challenging task but creates an important future research area. The current study discussed the inseparable relationship between information behavior and information literacy. The patterns of digital age information behavior identified in the study offered several implications about information literacy that allows performance of the innovative behaviors. Beyond implications, however, formative assessment of the quality of digital age information behaviors will be an
essential task to inform educational approaches and to promote information literacy and other related skills of digital age youth.

Ultimately, a long-term research agenda that builds upon the dissertation study will explore potential associations between digital age information behavior, as an interaction between information and people, and 21st century literacies and skills—i.e., how the digital age information resources and innovative behaviors promote or hinder the development of 21st century skills or literacies. The area of Information Studies will make an essential difference in society and people’s lives when the field brings together the allied areas of information behavior, information literacy, and information impact (Kuhlthau, 2008). In that sense, the current study lays the groundwork for the holistic investigation. The diagram in Figure 5.1 proposes an overarching conceptual framework for future research direction.

Figure 5.1. Future Research Agenda that Builds on the Dissertation Study
Conclusion

This research explored new and innovative youth information behaviors in the digital age by applying and further developing Radical Change Theory. The study findings deepened understanding of how digital age youth, who have grown up immersed in digital media culture, interact with information in the changing information environment. From a holistic perspective for observing youth information behavior, the study proposed youth information behavior as an interplay between factors of intrapersonal process, identity formation and value negotiation, and social interaction. Theoretically, the research demonstrated a reciprocal and dialectic relationship between theory and research. The primary result of the study included the development of a typology of digital age youth information behavior, which is an original contribution to the expansion of Radical Change Theory. Methodologically, the study attempted innovative approaches including the newly developed Sense-Making group interview and online interviews with young information creators who live in different parts of the world. Also, the directed qualitative content analysis method successfully supported the theory expansion in the study. In addition, the study offered empirically grounded implications on information services and educational approaches for practitioners working with digital age youth. Finally, the findings of the study are not an end in themselves; rather, the study proposes a number of areas for further investigation and a future research agenda. It is a strength of the study to provide a theoretical framework as an instrument to spur and be utilized in further research.
APPENDIX A

LIST OF LITERATURE ANALYZED IN PHASE I


### APPENDIX B

**NATURE OF LITERATURE ANALYZED IN PHASE I**

<table>
<thead>
<tr>
<th>Studies</th>
<th>Ages (5-18)</th>
<th>Contexts</th>
<th>Methods</th>
<th>Types</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bowler, L. (2010).</td>
<td>16-18</td>
<td>School/curriculum-based</td>
<td>Qualitative (Think aloud and think after verbal protocols; interviews; written/audio journals, visualizing exercise)</td>
<td>Peer-reviewed article</td>
</tr>
<tr>
<td>boyd, d. (2008).</td>
<td>Teenagers (mostly 14-18)</td>
<td>Everyday life; Digital environments</td>
<td>Qualitative (ethnography)</td>
<td>Book chapter</td>
</tr>
<tr>
<td>Dresang, E. T. (2005).</td>
<td>All</td>
<td>All</td>
<td>Review of research meta-analyses</td>
<td>Peer-reviewed article</td>
</tr>
<tr>
<td>Enochsson, A. (2005).</td>
<td>6-17</td>
<td>Schools; digital environments</td>
<td>Qualitative (ethnography)</td>
<td>Peer-reviewed article</td>
</tr>
<tr>
<td>Studies</td>
<td>Ages (5-18)</td>
<td>Contexts</td>
<td>Methods</td>
<td>Types</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>-------------</td>
<td>---------------------------------------------</td>
<td>----------------------------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>Ito, M., Baumer, S., Bittanti, M., boyd, d. m., Cody, R., Herr-Stephenson, B., et al. (2009).</td>
<td>All</td>
<td>Everyday life; Digital environments</td>
<td>Qualitative (ethnography)</td>
<td>Book</td>
</tr>
<tr>
<td>Jenkins, H., et al. (2006).</td>
<td>All</td>
<td>Everyday life</td>
<td>Qualitative</td>
<td>White paper</td>
</tr>
<tr>
<td>Julien, H., &amp; Barker, S. (2009).</td>
<td>15-17</td>
<td>Schools</td>
<td>Qualitative (interviews, and in-class task analysis)</td>
<td>Peer-reviewed article</td>
</tr>
<tr>
<td>Kim, S. U., &amp; Todd, R. J. (2008).</td>
<td>11th graders</td>
<td>Schools</td>
<td>Qualitative (questionnaire, surveys, journals, observations, and interviews)</td>
<td>Conference paper</td>
</tr>
<tr>
<td>Livingstone, S. (2008).</td>
<td>All</td>
<td>Digital environments</td>
<td>Qualitative</td>
<td>Book chapter</td>
</tr>
<tr>
<td>Meyers, E. M. (2009).</td>
<td>7-13</td>
<td>Everyday life; Digital environments</td>
<td>Qualitative</td>
<td>Peer-reviewed article</td>
</tr>
<tr>
<td>Studies</td>
<td>Ages (5-18)</td>
<td>Contexts</td>
<td>Methods</td>
<td>Types</td>
</tr>
<tr>
<td>------------------------------</td>
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</tr>
<tr>
<td>Monroy-Hernandez, A.</td>
<td>All</td>
<td>Everyday life</td>
<td>Mixed method</td>
<td>Conference paper</td>
</tr>
<tr>
<td>(March 2009).</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Palfrey, J., &amp; Gasser, U.</td>
<td>All</td>
<td>Everyday life</td>
<td>Qualitative (existing research + focus groups and interviews)</td>
<td>Book</td>
</tr>
<tr>
<td>(2008).</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pantaleo, S. (2008).</td>
<td>Grade 1, 5</td>
<td>School</td>
<td>Qualitative (read-aloud sessions, observation, interviews, project analyses)</td>
<td>Book</td>
</tr>
<tr>
<td>Reuter, K. (2007).</td>
<td>Elementary students</td>
<td>Everyday life</td>
<td>Qualitative (multiple case studies)</td>
<td>Peer-reviewed article</td>
</tr>
<tr>
<td>Rowlands, I., &amp; Nicholas, D.</td>
<td>All</td>
<td>All</td>
<td>Analysis of literature, log analysis</td>
<td>Report</td>
</tr>
<tr>
<td>(2008).</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shenton, A., &amp; Dixon, P.</td>
<td>All</td>
<td>School</td>
<td>Qualitative (focus groups and interviews)</td>
<td>Peer-reviewed article</td>
</tr>
<tr>
<td>(2003).</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shenton, A., &amp; Dixon, P.</td>
<td>All</td>
<td>School</td>
<td>Qualitative (focus groups and interviews)</td>
<td>Peer-reviewed article</td>
</tr>
<tr>
<td>(2003).</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tapscott, D. (2009).</td>
<td>13 and up</td>
<td>Everyday life</td>
<td>Qualitative (interviews, online questionnaires, survey, ethnography)</td>
<td>Book</td>
</tr>
<tr>
<td>Todd, R. J. (2008).</td>
<td>All</td>
<td>Schools</td>
<td>Research synthesis</td>
<td>Peer-reviewed article</td>
</tr>
<tr>
<td>Weber, S., &amp; Mitchell, C.</td>
<td>11-16</td>
<td>Everyday life; Digital environments</td>
<td>Qualitative (multiple case studies)</td>
<td>Book chapters</td>
</tr>
<tr>
<td>(2008).</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zhou, N., &amp; Stahl, G.</td>
<td>6-12 graders</td>
<td>Schools; digital environments</td>
<td>Qualitative (Ethnomethodology)</td>
<td>Book chapter</td>
</tr>
</tbody>
</table>
APPENDIX C
HUMAN SUBJECTS COMMITTEE
APPROVAL MEMORANDUM

From: Human Subjects <humansubjects@magnet.fsu.edu>
Subject: Use of Human Subjects in Research - Approval Memorandum
Date: April 5, 2010 9:04:20 PM EDT
To: [Redacted]
Cc: [Redacted]
Keywords: IRB

Office of the Vice President For Research
Human Subjects Committee
Tallahassee, Florida 32306-2742
(850) 644-8673 · FAX (850) 644-4392

APPROVAL MEMORANDUM

Date: 4/5/2010

To: Kyungwon Koh

Address: [Redacted]
Dept.: INFORMATION STUDIES

From: Thomas L. Jacobson, Chair

Re: Use of Human Subjects in Research
Proposing a Theoretical Framework for Digital Age Youth Information Behavior Building upon Radical Change Theory

The application that you submitted to this office in regard to the use of human subjects in the research proposal referenced above has been reviewed by the Human Subjects Committee at its meeting on 03/17/2010. Your project was approved by the Committee.

The Human Subjects Committee has not evaluated your proposal for scientific merit, except to weigh the risk to the human participants and the aspects of the proposal related to potential risk and benefit. This approval does not replace any departmental or other approvals, which may be required.

If you submitted a proposed consent form with your application, the approved stamped consent form is attached to this approval notice. Only the stamped version of the consent form may be used in recruiting research subjects.

If the project has not been completed by 3/16/2011 you must request a renewal of approval for continuation of the project. As a courtesy, a renewal notice will be sent to you prior to your expiration date; however, it is your responsibility as the Principal Investigator to timely request renewal of your approval from the Committee.

You are advised that any change in protocol for this project must be reviewed and approved by the Committee prior to implementation of the proposed change in the protocol. A protocol change/amendment form is required to be submitted for approval by the Committee. In addition, federal regulations require that the Principal Investigator promptly report, in writing any unanticipated problems or adverse events involving risks to research subjects or others.

By copy of this memorandum, the Chair of your department and/or your major professor is reminded that he/she is responsible for being informed concerning research projects involving human subjects in the department, and should review protocols as often as needed to ensure that the project is being conducted in compliance with our institution and with DHHS regulations.

This institution has an Assurance on file with the Office for Human Research Protection. The Assurance Number is IRB00000446.

Cc: Kathleen Burnett, Other
HSC No. 2010.4074
APPENDIX D

INVITATION TO PARTICIPATE IN

INDIVIDUAL INTERVIEWS

Interview opportunity about Scratch Resources & Wiki!!

Hi, I am a PhD student at Florida State University School of Library and Information Studies. As part of my dissertation research, I’d like to interview Scratch Resources Team and Wiki administrators about the "information" aspects of Scratch in Dec. 2010. The interview would be by Instant Messaging, phone or Skype (whichever tool you like best) and take no more than an hour. I will give you a small reward to thank you for your participation. You should be between 5-18 years old in order to participate in the interviews. If you'd like to participate, please have your parents/guardian email me at ***@fsu.edu so we can set up a time and date for an interview. Thanks so much!

Best,

Kyungwon Koh
APPENDIX E

YOUTH ASSENT FORM (GROUP INTERVIEW)

Dear students,

My name is Kyungwon Koh, a doctoral candidate in the School of Library and Information Studies at Florida State University. I am conducting a dissertation research study to explore how kids seek, use, share, and create information. I am inviting you to participate in the study, because I was very impressed by the interactive newspaper (F.I.L.M) you create and I’d like to learn more about your experiences with it. Please talk this over with your parents before you decide whether or not to participate.

WHAT YOU WILL DO:
All of you will be asked to complete a questionnaire that asks your experiences with creating F.I.L.M. If selected, some of you will participate in a group interview, and during the interview you will be asked to keep reactions to what you hear from the other students. The group interview will be conducted during an afterschool club session, which is Thursday 3:15-4:00 p.m. in December 2010. I might ask some of you follow-up questions after the group interview, if needed. The interview will be recorded for further analysis and only I will access the recording.

BENEFITS:
Because your participation is valuable, I will offer a gift card of your choice from either Amazon or iTunes to thank you for your willingness and availability to participate: $10 if you turn in (1) the Parent/Guardian Consent Form, (2) Youth Assent Form, and (3) Questionnaire, and another $10 if you are chosen to participate in the group interview. Also, it will be a good opportunity for you to reflect upon what you have learned and how you can become a better information seeker. The study results will contribute to informing educators and information professionals to better help today’s young people. The participation in this study is, however, completely voluntary and there is no penalty or disadvantage if you decide not to do it. Even if you parents said “yes” to this study, you can still decide to not take part in the study, and that will be fine.

PRIVACY AND POTENTIAL RISKS:
Your privacy is very important to me; therefore, I am not going to reveal any individually identifiable data, such as your name or contact information to anyone. I know of no risks when you participate in the interview. However, if you feel uncomfortable during the interview you may leave the interview at anytime, even though you already agreed with this consent form.

QUESTIONS/COMMENTS?
If you have any questions, feel free to contact me, Kyungwon Koh (e-mail: ***@fsu.edu, cell phone: ***-***-****). I am conducting the study under the direction of Professor Eliza T. Dresang, and you may want to talk to her (e-mail: ***@uw.edu, cell phone: ***-***-****).

If you have any questions/concerns regarding the study and would like to talk to someone other than the researchers, you are encouraged to contact the Florida State University Human Subject Committee. You can reach them at 850-644-8633 or humansubjects@magnet.fsu.edu.

Thank you very much. I look forward to meeting you soon!

Best wishes,
Kyungwon Koh

By signing below, I agree with participating in the study.

Sign: ___________________________ Date: ___________________________

My gift card choice: □ Amazon.com  □ iTunes
APPENDIX F

YOUTH ASSENT FORM (INDIVIDUAL INTERVIEW)

* Please read the following Youth Assent Form.

If you’d like to participate in this research project, please reply to this email saying,
   a. “I, (your name), read and agree with the Youth Assent Form.”
   b. Interview tool choice: (either IM, Skype, or Phone)
   c. Gift card choice (either Amazon.com, iTunes, or any other online book or music store: please provide URL)

Thank you so much!

Youth Assent Form

Dear [NAME],

My name is Kyungwon Koh, a doctoral candidate in the School of Library and Information Studies at Florida State University. I am conducting a dissertation research study to explore how kids seek, use, share, and create information. I am inviting you to participate in the study, because I was very impressed by Scratch Resources/Scratch Wiki, and I’d like to learn more about your experiences with it. Please talk this over with your parents before you decide whether or not to participate.

WHAT YOU WILL DO:
The interview will be conducted using Instant Messaging, Skype, or phone, whichever tool you prefer. It will take no more than 1 hour. The interview will be recorded for further analysis, but only I will be able to access to the recording.

BENEFITS:
Because your participation is valuable, I will offer a $20 gift card of your choice from either Amazon.com, iTunes, or any other online book or music store, to thank you for your time and efforts. Also, it will be a good opportunity for you to reflect upon what you have learned and how you can become a better information seeker. The study results will contribute to informing educators and information professionals to better help today’s young people. The participation in this study is, however, completely voluntary and there is no disadvantage if you decide not to do it.

PRIVACY AND POTENTIAL RISKS:
Your privacy is very important to me; therefore, I am not going to reveal any individually identifiable data, such as your name or contact information to anyone. I know of no risks when you participate in the interview. However, if you feel uncomfortable during the interview you may leave the interview at anytime, even though you already agreed with this consent form.

QUESTIONS/COMMENTS?
If you have any questions, feel free to contact me, Kyungwon Koh (e-mail: ***@fsu.edu, cell phone: 1-***-***-****). I am conducting the study under the direction of Professor Eliza T. Dresang, and you may want to talk to her (e-mail: ***@uw.edu, cell phone: 1-***-***-****).

If you have any questions/concerns regarding the study and would like to talk to someone other than the researchers, you are encouraged to contact the Florida State University Human Subject Committee. You can reach them at 1-850-644-8633 or humansubjects@magnet.fsu.edu.

Thank you very much. I look forward to talking with you soon!

Best wishes,
Kyungwon Koh
APPENDIX G

PARENT/GUARDIAN CONSENT FROM (GROUP INTERVIEW)

Dear Parent or Guardian:

My name is Kyungwon Koh, a doctoral candidate in the School of Library and Information Studies at Florida State University. I am conducting a dissertation research study to explore how today’s young people seek, use, share, and create information in the digital age. I am inviting your child to participate in the study, because I was very impressed by the interactive newspaper (F.I.L.M) your child created and I’d like to learn more about his or her experiences with it. Your child’s teacher, Ms. Laura Fay, identified you as the person who could give permission for your child to participate. Your child will also be asked to give assent.

WHAT YOUR CHILD WILL DO:
Your child will be asked to complete a questionnaire that asks his or her experiences with creating F.I.L.M. Some students will be selected to participate in a group interview, and during the group interview they will be asked to keep reactions to what they hear from the other students. The group interview will be conducted during an afterschool club session, which is Thursday 3:15-4:00 p.m. in December 2010. I might ask some of the participants follow-up questions after the group interview, if needed. The interview will be recorded for further analysis and only the researcher will access the recording.

BENEFITS:
Because your child’s participation will be valuable, I will offer a gift card of your child’s choice from either Amazon or iTunes to thank your child for his or her willingness and availability to participate: $10 if your child turns in (1) this Parent/Guardian Consent Form, (2) Youth Assent Form, and (3) Questionnaire, and another $10 if your child is chosen to participate in a group interview. The research will provide an opportunity for your child to reflect upon what they have learned and how they can become a more critical and effective information seeker. The study results will contribute to informing educators and information professionals to better help today’s young people. The participation in this study is, however, completely voluntary and there is no penalty or disadvantage if you decide to decline your child’s participation.

PRIVACY AND POTENTIAL RISKS:
Your child’s privacy is very important to me; therefore, I will not reveal any individually identifiable data, such as your child name or contact information to anyone. The study results will be anonymous or reported in aggregates only. I know of no risks when your child participates in the interview. However, if you or your child feels uncomfortable during the interview, your child may leave the interview at anytime, even though you already agreed with this consent form.

QUESTIONS/COMMENTS?
If you have any questions, feel free to contact me, Kyungwon Koh (e-mail: ***@fsu.edu, cell phone: ***.***.****). I am conducting the study under the direction of Professor Eliza T. Dresang, and you may want to talk to her (e-mail: edresang@uw.edu, cell phone: ***.***.****).

If you have any questions/concerns regarding the study and would like to talk to someone other than the researchers, you are encouraged to contact the Florida State University Human Subject Committee. You can reach them at 850-644-8633 or humansubjects@magnet.fsu.edu.

If you agree with your child’s participation in this research project, please sign and print date below, and have your child bring this form back to Ms. Laura Fay. Thank you very much. I really appreciate it.

Sincerely,

Kyungwon Koh

By signing below, I agree with my child participating in the study.

Sign: Date:
APPENDIX H

PARENT/GUARDIAN CONSENT FORM

(INDIVIDUAL INTERVIEW)

* Please read the following Parent/Guardian Consent Form.

If you agree with your son’s participation in this research project, please reply to this email saying, “I, parent/guardian of (your child’s names), read the Parent Consent Form and agree with my child’s participation in the study.”

Thank you so much!

Parent/Guardian Consent Form

Dear Parent or Guardian:

My name is Kyungwon Koh, a doctoral candidate in the School of Library and Information Studies at Florida State University. I am conducting a dissertation research study to explore how today’s young people seek, use, share, and create information in the digital age. I am inviting your son to participate in the study, because I was very impressed by Scratch Resources/Scratch Wiki your son developed and I’d like to learn more about his experiences with it. I have consulted MIT Media Lab, who developed the Scratch program, to recruit Scratch members for the interviews. Your son will also be asked to give assent.

WHAT YOUR CHILD WILL DO:
The interview will be conducted using Instant Messaging, Skype, or phone, whichever tool you and your son prefer. It will take no more than 1 hour. The interview will be recorded for further analysis, but only I will be able to access to the recording.

BENEFITS:
Because your son’s participation is valuable, I will offer a $20 gift card of his choice from either Amazon.com, iTunes, or any other online book or music store, to thank him for his time and efforts. Also, the research will provide an opportunity for your son to reflect upon what he has learned from the Scratch activities and how he can become more critical and effective information seekers. The study results will contribute to informing educators and information professionals to better help today’s young people. The participation in this study is, however, completely voluntary and there is no disadvantage if you decide to decline your son’s participation.

PRIVACY AND POTENTIAL RISKS:
Your son’s privacy is very important to me; therefore, I will not reveal any individually identifiable data, such as your child’s name or contact information to anyone. The study results will be anonymous or reported in aggregates only. I know of no risks when your son participates in the interview. However, if you or your child feels uncomfortable during the interview, he may leave the interview at anytime, even though you already agreed with this consent form.

QUESTIONS/COMMENTS?
If you have any questions, feel free to contact me, Kyungwon Koh (e-mail: ***@fsu.edu, cell phone: ***-***-****). I am conducting the study under the direction of Professor Eliza T. Dresang, and you may want to talk to her (e-mail: ***@uw.edu, cell phone: 1-***-***-****).

If you have any questions/concerns regarding the study and would like to talk to someone other than the researchers, you are encouraged to contact the Florida State University Human Subject Committee. You can reach them at 1-850-644-8633 or humansubjects@magnet.fsu.edu. Thank you very much. I really appreciate it!

Sincerely, Kyungwon Koh
APPENDIX I

GROUP INTERVIEW INSTRUMENT 1: PRE-QUESTIONNAIRE

FOCUS GROUP: Date

Your name

INFORMATION SEEKING, USE, SHARING, AND CREATION

- Please select a time since you started working on F.I.L.M. this fall that stands out in your mind about each question.
- Include resources you referred to (e.g., books, Internet, friends, family, librarians, or online communities).

1. Think of a time when you had a situation where you needed to find information (e.g., facts, opinions, manual, answers, etc) in order to create F.I.L.M. (Fisher’s Interactive Learning Magazine). How did you find and use the information?

<table>
<thead>
<tr>
<th>Describe the situation briefly:</th>
<th>How did it help (or did NOT help) you to make F.I.L.M?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Think of a time when you used Scratch to express your ideas or feelings (you may name another multimedia or digital product if you cannot think of a Scratch example).

<table>
<thead>
<tr>
<th>Describe the situation briefly:</th>
<th>How did it help (or did NOT help) you to make F.I.L.M?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. Think of a time when you worked as a team member (versus working individually) to create F.I.L.M.

<table>
<thead>
<tr>
<th>Describe the situation briefly:</th>
<th>How did it help (or did NOT help) you to make F.I.L.M?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. Think of a time when you encountered conflicting information while working on F.I.L.M. (e.g., different facts, contradictory opinions or point of views) during your information seeking or sharing.

<table>
<thead>
<tr>
<th>Describe the situation briefly:</th>
<th>How were you helped or NOT helped?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. Think of a time while working on F.I.L.M. when you needed specialized/expert information that was hard to find in your local communities including family members, friends, teachers, or local libraries.

<table>
<thead>
<tr>
<th>Describe the situation briefly:</th>
<th>How were you helped or NOT helped?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX J

GROUP INTERVIEW INSTRUMENT 2:
INDIVIDUAL JOURNAL

<table>
<thead>
<tr>
<th>FOCUS GROUP: Date</th>
<th>Your name:</th>
</tr>
</thead>
<tbody>
<tr>
<td>THINGS I HEARD THAT WERE LIKE MY EXPERIENCE OR I AGREE WITH:</td>
<td></td>
</tr>
<tr>
<td>THINGS I HEARD THAT WERE DIFFERENT FROM MY EXPERIENCE OR I DISSAGREE WITH:</td>
<td></td>
</tr>
<tr>
<td>THINGS THAT CONFUSED OR CHALLENGED ME:</td>
<td></td>
</tr>
<tr>
<td>THINGS THAT HELPED ME:</td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX K

INDIVIDUAL INTERVIEW QUESTIONS

Scratch Wiki

• What made you become involved in Scratch Wiki so deeply?
• What do you most like about Scratch Wiki? or Why do you think you enjoy Scratch Wiki?
• Can you describe the Wiki article creation or editing processes?
• Why do you think Wiki is a great way to find and share information, or to learn about Scratch?
• What did you learn most from your experiences with Scratch Wiki or Scratch in general?

Scratch Resources

• How did you initially develop Scratch Resources?
• Why did you think you need Scratch Resources?
• What is the most rewarding part of working on Scratch Resources?
• What is the most difficult part to develop and maintain Scratch Resources? Did you have any problem or difficulty?
• Did you have any issues concerning copyright, when you share your music, sound, or Sprites in Scratch Resources? If so, how would you handle the copyright issue in the Scratch community?
• What would you like to improve concerning Scratch Resources? Where do you think Scratch Resources should go in the future?
• Where did you learn all the skills, e.g., programming, technical skills, or other production skills? Did you learn them at school, or did you self-taught?

Scratch Programming Projects

• Were you originally interested in creative projects using digital media or programming before you knew Scratch?
• How does Scratch help you express your thoughts or feelings?
Social Interactions

• How do you work with other Scratchers who live in different parts of the world?
• How did you become friends with other Scratchers? How do you communicate each other?
• If you mainly talk in text-based chats, how do you share emotions and supports from one other?
• What features or what aspects of Scratch most help you collaborate? What does not help?
  What would you wish for to facilitate more effective collaboration?

Negotiating value systems

• Have you encountered any conflicting information while working on Scratch Wiki? (e.g.,
different facts, contradictory opinions, arguments, or points of views)? I’d like to hear what it was and what you did.

Probing Question list: Sense-Making Methodology Questions

• What happened? What did you do?
• What made you do it?
• What made it difficult to complete the task(s)?
• How were you helped or not helped?
• How did you feel when you do it?
• Is there anything you wished for that would have helped you?
REFERENCES


Lenthart, A., & Madden, M. (2007). Teens and Social Media: The use of social media gains a greater foothold in teen life as they embrace the conversational nature of interactive online media: Pew Internet & American Life Project


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BIOGRAPHICAL SKETCH

Kyungwon Koh was born in Seoul, South Korea. She received her Bachelor’s degree in Yonsei University in Korea with a major in Library and Information Science [LIS] and the completion of a teacher-librarian certificate course. Kyungwon received her Master's degree (2007) and doctoral degrees (2011) at Florida State University [FSU] School of Library and Information Studies.

During her doctoral program, Kyungwon's major was Youth Information Behavior and her minor was Educational Psychology and Learning Systems. She participated in several research projects including studies on assessment of 21st century skills, school library transformation in the 21st century, media and ICT literacies in higher education, LIS students’ online learning, and her dissertation research on digital age youth information behavior. She is a recipient of several awards and scholarships, including a 2010 Eugene Garfield Doctoral Dissertation Fellowship and the 2010 ALISE Research Grant Competition Award. Her research endeavors led to referred presentations and publications.

Kyungwon served as a teaching assistant for various LIS Master’s courses at FSU between 2007 and 2011. The courses included Digital Media: Concepts and Production, Information Needs of Young Adults, Information Needs of Children, Multicultural Literature for Youth, Leadership in Reading, School Collection Development and Management, and Information Organization. She also provided guest lectures in several courses at FSU and the University of Washington about Asian-American multicultural literature for youth, youth information behavior, and learning and management in the Web 2.0 era.

She gained professional experiences in several different types of libraries. She was a graduate assistant at the Goldstein Library at FSU in 2006 and 2007, a student teacher librarian at the Ewha Girl’s High School in 2004, and an intern at the Korean National Assembly Library in 2003.