Social Media Use and Media Literacy in Relation to Adolescents' Understanding of the Internet

Kasey L. Powers

The Graduate Center, City University of New York

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SOCIAL MEDIA USE AND MEDIA LITERACY IN RELATION TO ADOLESCENTS’ UNDERSTANDING OF THE INTERNET

Kasey L. Powers

A dissertation submitted to the Graduate Faculty in Psychology in partial fulfillment of the requirements for the degree of Doctor of Philosophy, City University of New York

2017
Social Media Use and Media Literacy in Relation to Adolescents’ Understanding of the Internet

by

Kasey L. Powers

This manuscript has been read and accepted for the Graduate Faculty in Psychology in satisfaction of the dissertation requirement for the degree of Doctor of Philosophy

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THE CITY UNIVERSITY OF NEW YORK
Abstract

Social Media Use and Media Literacy in Relation to Adolescents’ Understanding of the Internet

by

Kasey L. Powers

Adviser: Patricia J. Brooks

Digital media has permeated American culture among users of all ages. By early adolescence, youth are using and consuming media at unprecedented rates. While the majority of content consumed remains largely television and movies, often streamed through new channels like Amazon and YouTube, video games and apps also comprise a portion of the media diet. As youth enter adolescence, their usage of social media, defined as any platform that allows interactive communication in response to online posting, becomes more prevalent.

In this study, I explore Internet and social media use and its impact on adolescents’ understanding of media in three areas: media literacy, understanding of the technical (functional) complexity of the Internet, and understanding of the social complexity of the Internet. Media literacy research and education has been approached from protectionist or empowerment perspectives subsuming three core domains: 1) authors and audiences, 2) messages and meanings, and 3) representation and reality (Hobbs, 2006). Research as to how well children and adolescents understand the technical complexity of the Internet has shown that children have a limited understanding of how the Internet works and the complex interconnectedness of the network system (Yan, 2006). Research as to how children and adolescents understand the social complexity of the Internet shows that they are able to develop and maintain social relationships through digital media and navigate the social complexity in sophisticated ways (Livingstone et al., 2011).
The current study builds on Yan’s works and captures snapshots of children’s understanding of the complexity of the Internet in relation to the current digital landscape. Students were recruited and interviewed at a rural middle school (N=78, range 11-15 years). They were given a survey with questions about their Internet and social media use and media literacy. In an interview students were asked to produce drawings and respond to vignettes to explain what the Internet looked like, how files traveled through the Internet, and potential real world consequences of online actions. In a second session, small groups of students were shown an animated instructional video about how files are shared and saved on the Internet. They were given time to update their drawings of the Internet to include newly learned information.

Results suggest that media literacy is not a well-structured conceptual domain for children. The media literacy scale showed only moderate internal validity with factor analyses revealing three distinct clusters of questions, suggesting that media literacy may be domain specific rather than a specific variable. Media literacy correlates with self-reported grades; both media literacy and grades were negatively associated with multi-tasking.

Students’ drawings of the Internet indicated a lack of knowledge of the technical complexity of the Internet. Additionally how adolescents depicted the technical complexity of the Internet and their depictions and explanations of how files are transferred through the Internet were highly context specific. Responses to vignette questions about the social complexity of the Internet showed that most students were aware of potential risks to putting things online; however, how they characterized the risk was largely context specific.

Analysis of student drawings after they were revised showed a significant shift to a more sophisticated level of understanding of the technical complexity of the Internet. From these findings, I conclude that adolescents do benefit from explicit instruction but do not learn about
the technical complexity of the Internet through experience with social media and the Internet alone.

*Keywords:* media literacy, Internet, social media, concept development
Acknowledgements

I dedicate this work to my family Rob, Simon, and Caleb, who have sacrificed so much time so that I can pursue this degree. Rob, you have always believed in me and supported me in this endeavor. To my boys, whose early childhood memories will be peppered with school meetings and playing at 4S. Thank you for your love and support.

I am forever thankful to my adviser Dr. Patricia Brooks for her mentorship over the years. Thank you for seeing something in me when I was starting this program, and I wasn’t sure I believed in myself. Thank you for always pushing me to be the best that I could be.

To Dr. Fran Blumberg, thank you for all of your help in developing this project and providing guidance and a listening ear along the way. Thank you, Dr. Anna Stetsenko, Dr. Bruce Homer, and Dr. Kristen Gillespie-Lynch for your time, support and expertise.

I truly appreciate the students and staff at Southwestern Middle School for welcoming me into their school to conduct this research, especially Katie Matthews and Patti Frazier, who answered my call in recruiting schools. Thank you to Principal Jason Watson for giving me a room to conduct interviews. I want to thank all of the students who were a part of this study. I could not have done this without them.

I am grateful to my research assistant, Jessica Cain, who spent her January term helping me interview students, and thanks to my transcribers, Yoni Hochstein, Nicole Volper, and Elena Rivera-Salvitelli.

I would like to thank my peers at the Graduate Center who have supported me over the years especially to my Developmental Cohort, Naja Berg-Hougaard, Svetlana Jovic, Rachel Manes, and Bianca Vidal who provided years of social and academic support. In particular, thank you to Anna Schwartz and Rita Obeid for being my sounding boards as I worked out coding schemes and an analysis plan and for giving feedback on early drafts of this work and for being there when I thought I’d never finish. Without them I could not have done this.

Finally I want to thank three people who inspired me to embark on this journey to a doctorate degree. Thanks to Dr. Tasha Tropp-Laman, my undergraduate instructor in teaching methods. Thank you for teaching me inquiry and discovery and for encouraging me to grow and change how I thought about learning and pedagogy; to Dr. Natascha Crandall who took a chance hiring me as a Researcher when I had no research experience and allowed me to prove I could learn the skills for the job. Thank you for encouraging me to advance my career and supporting me professionally as we’ve become friends and colleagues. And to my mother, Dr. Connie Ables-Rigsbee who has supported me always, thank you for reading drafts and listening when things were hard. I am grateful we went through part of our PhD programs together, and I had you as someone who really understood what I was feeling.

Portions of this work were presented at Technology, Media, & Child Development, UC Irvine, October 2016 and Society for Research in Child Development, Austin, TX, April 2017.
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CHAPTER 1

Introduction

Children and adolescents in today’s world spend an unprecedented amount of time engaged with digital media via the Internet (Lenhart et al., 2015; Rideout, 2015). The current generation of children and adolescents has never known a time when digital networks and social media did not exist. Adolescents, defined as youth of ages 10 to 19 (UNICEF, 2010, 2011), are accustomed to interacting in a digitally mediated social world, where the pervasiveness of digital media impacts nearly all aspects of social interaction.

While children as young as one and two years are using mobile devices competently, parents are the gatekeepers of the apps, platforms, and content accessed (Broekman, Piotrowski, Beentjes, & Valkenburg, 2016; Rideout, 2013). Adolescence is the age at which young people are most likely to begin engaging in interactions with others via the Internet without strict parental oversight. In addition to using the Internet for schoolwork, adolescents are able to have their own social media accounts, officially at age 13 (COPPA, 1998). There are four questions that arise from this use: First, what do adolescent’s understand about the accuracy of information in the form of images, video, and text that they access via the Internet? Second, are adolescents developing media literacy skills through their Internet use? Third, what do adolescents understand about the technical complexity of the Internet, including what the Internet is and how it works as a network? Finally, how are adolescents learning to use the Internet and how are they grasping its social complexity with respect to posting text and images along with managing their digital footprint and thinking about potential consequences of their online interactions?

With increased access to the Internet, social media, and other digital forms of communication, it remains unclear how children and adolescents learn to navigate these outlets
in either the social or technical domains. There is little evidence that explicit instruction about the Internet and social media use exists in U.S. schools despite documents like the Social Media Guidelines provided by the New York City Department of Education (NYC DOE, 2013). Indeed, the NYC DOE does not require that their document be used in schools, and they do not collect data on its impact (J. Pook, personal communication, August 20, 2015). At home parents may employ a variety of mediation strategies to monitor their children’s media use. Some of these strategies act as a gatekeeper by employing rules that restrict what children are allowed to do online. Other strategies involve talking about and experiencing media together, employing a more child-directed approach for online interactions. While parental mediation has shown to reduce the amount of time spent on media overall it has not affected the amount of social media use (Len-Ríos, Hughes, McKee, & Young, 2015). The literature examining parental involvement is rich, but it does not necessarily address the question of what type, if any, of direct instruction is taking place at home to teach children how the Internet works how to determine accuracy or trustworthiness of information and the complexities of online interactions (Lee & Chae, 2012 Livingstone & Helsper, 2008; Uhls, 2015). Children and adolescents could be learning how to use the Internet primarily through their own experience of using digital technologies and from their interactions with peers. Learning through social interaction may not be optimal to provide experiences leading to accurate understanding (Fischer & Bidell, 1998; Yan & Fischer, 2002).

As the use of personal mobile devices by children and adolescents has grown, so has the number of social media networks — defined as any platform that allows interactive communication in response to online posting (NYC DOE, 2013). Sites such as Facebook, Instagram, and YouTube were once used primarily by college students and adults, but increasingly are used by children and adolescents to connect with their friends. These sites
provide a vehicle for youth to become producers and consumers of media content. As of 2012, 90% of American teens had reported experience with social media, with 75% reporting at least one current social media profile and 23% reporting use of two or more social media networks daily (Rideout, 2012).

**Statement of the Problem**

The Internet offers a wealth of information with news, blogs, and websites; it also has many outlets for entertainment and socialization through social media, chat rooms, video streaming, and video games. Students are using more and more media and many report going on the Internet “almost constantly” (Lenhart et al., 2015). Research exploring the relationship of this near constant use and multi-tasking with students’ academic outcomes has found small to moderate negative correlations (Rosen, Carrier, & Cheever, 2013; van der Schur, Baumgartner, Sumter, & Valdkeburg, 2015). Relationships of academic achievement and media literacy are also of interest. Media literacy skill are necessary in order to learn to safely navigate content on the Internet, to evaluate content as accurate or inaccurate, and be aware of the potential dangers associated with sharing information online, in addition using the Internet to access all the good it has to offer. However, in the U.S. there is no consensus yet on how best to teach or measure media literacy.

Media literacy skills are important in understanding how to interact with and evaluate content on the Internet. Research on media literacy often adopts either a protectionist or an empowerment perspective (Hobbs, 1998). The protectionist perspective builds on the idea that youth are at risk of exploitation as consumers of digital content and suggests that training in critical thinking can reduce potential encounters with negative influences while helping youth make informed “good” choices about their online actions. Empowerment skills are those that
give the user a sense of agency to gain autonomy and craft their own identity online to become active creators of digital content as opposed to passive consumers of it. Within the construct of media literacy three core components are seen as necessary for critical evaluation of digital media and information: The first, authors and audience, involves understanding that authors create messages for profit or influence and target specific audiences. Author applies to any type of content creator. The second, messages/meanings involves understanding that messages express points of view that affect attitudes and behavior and may be interpreted differently by different people. Finally, representations/reality involves understanding that media messages are representations of reality and may omit important information. Content is inherently biased and is always created for a reason and it may or may not be interpreted by the audience as the authors intended (Hobbs, 2006).

Understanding the Internet empowers adolescents to be intelligent users and helps protect them from potentially harmful content and engagement in risky behaviors. Two components of this are the ability to expertly navigate the social complexity of the Internet and understanding how content is created. It is important for adolescents to understand what they are seeing on the Internet, including the author’s intent, which may at times be different from the user’s purpose. Adolescents are using the Internet and social media almost continuously in their daily lives, yet it is unclear how well they understand the technical complexity of the Internet and potential consequences of their actions, especially with regards to the public sphere of social media. It is only through understanding the purpose of a platform (e.g. a social media site) and how it works that people can really begin to understand the potential social consequences. In the last decade alone we have seen a shift in digital platforms from shared desktop computers with dial-up connectivity through phone-lines to individual transportable devices such as smartphones,
laptops and tablets that are connected through high-bandwidth Wi-Fi, satellites, and fiber optics and broadband.

Previous research exploring how children and adolescents develop a concept of how computers and the Internet work was completed in a technological landscape that is quite different from the one experienced today. Only in the past decade have smartphones and tablets been a part of children’s lives and the current generations of adolescents are the first to grow up with touch screens literally at their fingertips. Previous work has shown that children show a greater understanding of the technical and social complexities of this Internet as they get older and have more years of experience using the Internet (Yan, 2006, 2009). How might this change today when experience often begins in toddlerhood?

Adolescents are heavy users of the Internet and social media. They watch videos, play games, use social media, and use Internet search engines. They are able to do the things they want to do and often conduct these activities with ease. However, I ask if adolescents are able to critically evaluate the media they consume. Do they understand the social complexity of the Internet or that the Internet is a complex networked system that stores any shared information posted to it?

**Organization of the Study**

The current study examines adolescents’ media literacy skills in relation to their understanding of the social and technical complexity of the Internet with the ultimate goal of informing media literacy instruction. This study focused on middle-school students with an age range of 11 to 15 years as prior research has shown this age range to depict the technical complexity of the Internet at levels similar to adults, although not achieving a scientific level of
understanding (Yan, 2006). At this stage they are in a zone where they are most likely to benefit from direct instruction to achieve higher levels of understanding.

In what follows, I will first review the existing literature on children and adolescents as consumers and producers of media, the development of media literacy, and conceptual development in relation to understanding of the Internet. After presenting the relevant literature, I will provide a summary of my research questions. I will then outline the methods used in the dissertation with an overview of the participants as well as materials and procedures. This study first provides an overview of the media diet of children and adolescents in the current digital environment as it relates to the Internet and social media use.

Second, this study examines children’s understanding of the technical complexity of the Internet through drawings and interviews, by asking participants to draw pictures in response to a series of prompts (Denham, 1993; Yan, 2005). In prior work using this methodology, Denham (1993) examined children’s understanding of how a computer works and Yan (2005, 2006, 2009) examined understanding of the social and technical complexities of the Internet with participants ranging from age 9 to adults. Denham’s research was conducted before the Internet was widely used and Yan’s research was conducted before widespread adoption of Internet-enabled mobile devices (i.e. smart phones and tablets). Given that children now have almost continuous access to the Internet via intuitive platforms on hand-held devices, it is possible that the current generation of children may have more sophisticated knowledge about the Internet than participants in prior research.

Third, this study explores children’s understanding of the social complexity of the Internet using vignettes (hypothetical scenarios) with prompts to discuss potential social effects of posting or sharing information (photos or homework) on the Internet. The vignettes provide a
way to begin exploring what adolescents understand about potential consequences of using the Internet and social media, as well as how they may or may not be thinking about risk in their everyday online actions and managing their own digital footprint.

Finally, the study tests whether direct instruction in the form of an animated video is an effective way to extend understanding of the Internet to this age group. To determine if students’ conceptions of the Internet can be changed through direct instruction, a video was specially developed for this project. This video is an easily accessible, entertaining, and informative tool that could potentially direct future curriculum efforts to teach students about using the Internet safely. After presenting a summary and discussion of the findings, I consider how a targeted curriculum with explicit instruction could be beneficial to children’s understanding of the Internet.
CHAPTER 2
The Internet Diet and Media Literacy

Adolescents as Consumers and Users of Media

The technology adolescents have available today to access the Internet is drastically different from what was available in the past, even 10 years ago. In the early 2000s, Blackberry devices, used primarily for business email, dominated the smartphone market (i.e., cell phones with Internet access). It was not until 2007, when Apple launched the iPhone with its touch screen and an application store (the “App Store”) that mobile technology arguably entered wide personal use (Friedman, 2013). With a range of smartphones and tablets (e.g. Samsung Galaxy and iPad, both introduced in 2010) now available at relatively low prices, children and adolescents increasingly use mobile technology to communicate and socialize with a potentially infinite number of online contacts. Indeed, recent reports indicate that 75% of children aged 0-8 years have access to a mobile device (Rideout, 2013), and 88% of adolescents aged 13-17 own or have access to a mobile device (Lenhart et al., 2015). The smaller size of these devices creates portability and also allows children and adolescents to have greater privacy in their media use. Hence today’s children may experience less parental oversight than children of a previous generation who accessed the Internet via a shared desktop computer in a shared living space.

A recent Pew Research Report (Lenhart et al., 2015) highlights smartphone use among American teenagers. Not only do a majority of younger teens (13-14 years) report accessing the Internet daily (92%) regardless of device (phone, tablet, laptop, or desktop computer), 68% report owning or having access to a smartphone (an additional 14% reported access to a basic cell phone). Specifically, smartphone use has facilitated a change in how teens communicate by providing near constant access to the Internet via cellular networks. Although teens had access to
texting via cell phones before smartphone technology, current access to the Internet allows teens to communicate via social networks, which enable sharing of photos, videos, and other diverse media content. With public Wi-Fi on the rise and national chains such as Starbucks and McDonalds, touting free Wi-Fi to customers (Miller, 2010; Ziobro, 2009) increased access the Internet in many locations outside of home have allowed the Internet to integrate so seamlessly into people’s lives that it seems hard to envision living without it. In fact, the present-day lexicon has changed. Instead of asking someone to “Look something up” one may ask them to “Google it”. Google, often used a verb, was added to the Oxford English Dictionary in 2006, and is now often used generically to mean “look something up” and not necessarily on Google (although Google remains among the most popular search engines: Choney, 2013).

Though there are many different types of content available with apps and games and surfing the web, watching television remains the number one type of content children consume; it is just that the format of watching has changed (Buckingham, 2010). Instead of watching television on a television set at a particular time when a show is on, children have access to any number of streaming services and digital downloads. TV is mobile and on demand. With multi-platform entertainment, even very young children can engage in simple online games with their favorite characters. Television and digital media is social, and this social engagement starts at a young age (Richards & Calvert, 2017). Schools may also be facilitating the trend of early technology use by seeking a one-to-one technology ratio where each student is provided with a tablet or laptop for use in and out of school. A recent meta-analysis of 65 one-to-one laptop programs conducted in grades K-12 found positive effects in multiple subject areas (Zheng, Warschauer, Lin, & Change, 2016). Children are learning to use computers for schoolwork, but these Internet capable devices can also be used for entertainment and social media. So while
schools may have supplied these 1-to-1 devices in order to help students achieve academically, it needs to be understood that children are using these devices for entertainment and social media as well.

Like adults, adolescents and pre-adolescents use technology to connect with friends by posting photos and comments on others’ posts, and through online messaging. Nearly two-thirds of younger teens (68%) have at least one social media account, most notably with Facebook (57%), Instagram (44%), or Snapchat (31%) (Lenhart et al., 2015). With the growing number of younger teens creating social media accounts, it is important to remember that while most of the time social media is used for entertainment and keeping up with friends, there are real social concerns to keep in mind as teens learn to navigate an online social world (Ito et al., 2009a, Ito et al., 2009b; O’Keeffe & Clarke-Pearson, 2011), although a narrative review of 43 research studies reported that most studies have shown mixed effects or no effect of social technology and adolescent wellbeing (Best, Manktelow, & Taylor, 2014). Lenhart and colleagues (2015) found 43% of teens reported that they sometimes felt left out or excluded when seeing photos of others, 35% worried about getting tagged in photos where they were unattractive, 27% felt stressed about how they looked in photos they posted, and 22% felt bad when they didn’t get enough “likes.” While wanting to be liked and included are common emotions for teens, they may be heightened in a social media saturated world, as the relationships are now playing out in a public forum where people not directly involved can observe. The lines between teens’ private lives and their public ones may become blurred (Baym & boyd, 2012; Davis & James, 2013). When people post to social networks, while they may know posts are public, the audience they are imagining may be quite small. This discrepancy in conceptualization may affect decisions made when deciding what to post (Litt & Hargittai, 2016). For better or worse, teens admit to acting
differently and saying things they normally wouldn’t via social media, potentially because of the feeling of anonymity that can come with an Internet persona. They may believe their online actions are untraceable through this false sense of safety. In an era of data collection, more information about a person, including pseudonyms, is available than ever before. A related concern with posting on social media is the potential for cyberbullying. While primarily a platform for communication and connection, teens can be vulnerable to abuse and harassment due to something they or someone else may post, like when tagged in an unattractive photo (Dredge, Gleeson, & de la Piedad Garcia, 2014; Lenhart et al., 2011; Wang, Ianotti, & Nansel, 2009).

It is notable that while technology and social media allow the opportunity for people to create their own content, teens spend far more time consuming (e.g. reading posts or watching videos) than posting content (Buckingham, 2010; Len-Ríos et al., 2015). However, digital communication is embraced through text messaging, especially by younger teens as found in the 2015 Pew Report which stated that on a typical day, younger teens (13-14 years) send or receive an average of 20 text messages (Lenhart et al., 2015). The majority of text messages are sent through cellular service providers, and nearly one third (32%) of teens now use technology applications (i.e., “apps”) to send text messages (e.g., Kik, WhatsApp). One change in using digital technology is that while the behaviors and emotions are natural, they are now being expressed in ways that can be saved. In face-to-face conversation the only record is memory, with digital communication conversations are recorded. They are leaving a digital footprint that doesn’t really go away.

The Internet, Cognition, and Literacy
There are many facets of the Internet. On one hand it serves as a repository of knowledge of the world, where a person could, in theory, connect to this shared system to share and learn all there is to know. The Internet is designed to be a place to hold information to be consumed and a place where individuals can contribute what they know. In some ways the Internet is an invisible tool; everyone has it and many forget a time when they did not. This great repository of distributed intelligence enables a process whereby people can off-load their knowledge and add a bit of information that another user can then build on (Pea, 1993). On the other hand, the Internet is simply the fastest tool to get a bit of information immediately needed, perhaps an address, an important historical date, or a funny clip from last night’s television programming. Another part of the Internet is social media, a place for people to connect with their friends and things they like. Social media is also a data collection machine, able to collect preferences in shopping, entertainment, restaurants, and all sorts of personal information about the user and their friends (Rushkoff, 2013). The Internet and social media specifically are changing ways in which people communicate with each other and how they interact with information. Content is no longer merely consumed or ideas exchanged in synchronous discussion.

Olson (1996) proposed that the development of writing changes the way people process and conceptualize language as a medium for communication and in their conceptualization of information sharing. Although he did not write explicitly about the Internet, the idea is prominent that the Internet is a giant repository for written and recorded multimedia information that shares the affordances of writing, but also builds on them. As a result of heavy Internet use and the way people use and consume media content, people may develop a different sort of knowledge: rather than learning facts, they learn to sift through information with the idea that they can now know anything via the Internet.
The new modalities and affordances of the Internet are like a new writing system (a new symbolic system) that is changing our models of language and thought in the way that writing did (Olson, 1996). In developing a concept of the Internet, children may rely on core domains of knowledge to generate ideas about how it works (Spelke & Kinzler, 2007; Spelke, Lee, & Izard, 2010), e.g., how technology is used for social interactions and the interplay of real and virtual worlds. However, the Internet is a cultural tool and it is more complex than the bounds of core domains of object, shape, number, and action; moreover, the concepts to be learned for expert use of the Internet may be too unfamiliar to be readily incorporated with existing knowledge (Bordoff & Yan, 2017; Spelke, Breinlinger, Macomber, & Jacobson, 1992; Wellman, & Gelman, 1998).

The Internet makes sharing information easy and fast, and essentially free. It is not only professionals who can share information, anyone with a computer and Internet connection can share an opinion or represent oneself as an expert. This is the power of the Internet. It also can be a problem if people engage with content without commensurate media literacy. If children use only what they know from their own Internet use to explain the Internet, they may be lacking a full understanding of the vastness of the virtual world because their own Internet use is likely to be quite limited. How can they explain what they do not know exists? Similarly, even if children use their non-digital experience to explain virtual places, key elements may be missing because there is not a 1-to-1 mapping of the physical to the virtual world and children may rely on language and experience from the physical world to explain a virtual world that is actually quite different (Wegerif, 2015).

**Media Literacy**
Children and adolescents’ increasing access to the Internet enhances their exposure to content designed to educate (e.g. news articles or factual websites) and persuade them (e.g. advertisements, opinion pieces, or sponsored posts), see Lenhart, et al. (2015). For instance, content can include advertisements for high fat, sugar, or salt foods (see Blades, Oates, Blumberg, & Gunter, 2014; Alvy & Calvert, 2008) and/or unsubstantiated information about achieving physical attractiveness or psychological wellbeing (see Boyar, Levine, & Zensius, 2011; Gasser Cortesi, Malik, & Lee, 2012). One safeguard against youth exposure to such potentially harmful and/or inaccurate content is engaging them in media literacy education.

Media literacy education is intended to prompt people’s awareness of the goals of media messages and teach them to critically evaluate their veracity (see Hobbs & Jensen, 2009). Much of the existing research on media literacy has focused on teaching and assessing media literacy skills within a single subject area for which there may be negative effects such as media violence (Scharrer, 2009) or thinking about the news (Maksl, Ashley, & Craft, 2014). Other research suggests that media literacy could be an innovative tool for tobacco prevention (Bier et al., 2011). What makes the work of Bier and colleagues somewhat unique is that they incorporated general media literacy into a subject-specific curriculum. The study found that the media literacy based anti-tobacco curriculum led to increase scores on a general media literacy scale as well as on a smoking media literacy scale. The scale included items in the three domains of media literacy, authors and audiences, messages and meanings, and representation and reality (Primack et al., 2006).

Though there is a growing body of research on media literacy, U.S. middle and secondary students may lag behind their peers in other industrialized nations in safely managing their digital footprints, a task that requires increasingly sophisticated media literacy skills to keep pace
with increasingly sophisticated media. Direct instruction in media literacy is not a required component of the curricula of many American schools as it is in other nations (Hobbs, 2004; Hobbs, Cabral, Ebrahimi, Yoon, & Al-Humaidan, 2011; Hobbs & Frost, 2003; Hobbs & Jensen, 2009); e.g., the U.K. has incorporated media literacy education into secondary schools for more than 60 years.

While many elementary and secondary schools use blocking or filtering software to prevent students from viewing inappropriate content, they are not necessarily instructing students how to make decisions about selecting reputable websites as news sources or how to avoid risky Internet activities. Most state governments acknowledged a need for media literacy curriculum more than a decade ago, and it had been expected that the inclusion of such instruction would be rapidly deployed (Kubey & Baker, 1999; McCan non, 2002; Scharrer, 2009). However, nearly two decades later media literacy instruction is not universally implemented in quantity or quality. The New York City Department of Education (NYC DOE), arguably one of the largest school systems in the U.S. released social media guidelines and lesson plans focusing on issues pertaining to cyber-bullying and academic integrity in 2013. However it is unclear how far reaching this effort was as there was no tracking of the dissemination of the material and no requirement that it be taught. There is a growing awareness in education that the concept of literacy has expanding to encompass media (Capello, Felini, & Hobbs, 2011; Felini, 2008), yet it is notable that media literacy education remains sparsely incorporated within U.S. school curricula. According to Hobbs (2011), the 2010 National Education Technology Plan included a section on media literacy. The 2017 update of this document (U.S. Department of Education, 2017) does not include media literacy specifically.
These limitations are reflected in findings demonstrating that pre-adolescents and adolescents often fail to grasp the fact that information such as images or files remains available on the Internet indefinitely, even if deleted from one’s own device (Yan, 2009). Additionally, they may fail to grasp that the appropriation of content from the Internet may constitute plagiarism (e.g., using text without citing its source) or blatant cheating (e.g., turning in a paper downloaded from the Internet) (Obeid & Hill, 2017).

When it comes to evaluating content a key curricular concept is recognition that media messages are constructed using creative tools to express a point of view, often with the aim of gaining profit or power, and with different people tending to interpret messages in different ways. Of societal concern are children’s difficulties in distinguishing reputable from disreputable information sources and sponsored content from legitimate news sources. For example, in a recent large-scale study of 7,804 middle school, high school, and college students in the US, students at all ages struggled in judging the credibility of information accessed via the Internet, as in distinguishing sponsored content from news articles (Stanford History Education Group, 2016). Similarly, OFCOM (2016) reported that children and adolescents in the UK often failed to recognize advertisements, even when the word Ad was written in a box with the sponsored content. In the context of widespread concern about fake news, dishonesty, and deception in a “post-truth” world, thinking about what messages are presented in content is important in a media environment where trust is hard to find. Instructors tell students to research topics, and that their own research is better than using Wikipedia, but they don’t teach them that the first result in a Google search is potentially no more accurate (and maybe less so) than Wikipedia (boyd, 2017; Pariser, 2011a, 2011b), and often is Wikipedia. Curricular materials addressing these points need to be developed for elementary as well as secondary education to ensure that
young people have the media literacy skills necessary to become informed citizens. One study that examined news media literacy found that teens who were highly news media literate were more likely to seek out news, were more skeptical, and more knowledgeable about current events (Maksl et al., 2014). This suggests that targeted media literacy education can be effective in improving how content is evaluated.

Despite ubiquitous access to various digital media, such as social networking websites, today’s youth may show limited understanding of the affordances of the various technologies they use and ultimately the ramifications of their digital footprint (O’Keefe & Clarke-Pearson, 2011). Particularly when using the Internet (Yan, 2005; 2006), the limited understanding of the lifeline of information posted on the Internet puts them at risk for the consequences of sharing inappropriate content (e.g., hateful speech, racy photographs) or documents online (e.g., completed homework) (Christofides, Muise, & Desmarais, 2012), and which may contribute to cyber-bullying and academic dishonesty. Despite this lack of awareness or understanding among youth, social media platforms provide an array of regulations for users to protect their company and their users, yet remove user rights regarding full ownership of their content. With a lack of direct instruction providing support for children and adolescents, how then are they learning about the Internet?

By the time they reach middle school, children are adept users of digital technology. They know which buttons (or part of the screen) to tap to make the game, app, text, or website do what they want it to do. They can play a game, post a picture, send an email – but the question remains as to how well do they understand the potential consequences (positive and negative) of their actions. It is important to examine how children develop a concept of the Internet as a
digital artifact that is beyond the interface of the computer and extends to the larger context of
the virtual world.
CHAPTER 3

Concept Development and Understanding of the Internet

In addition to research examining how children and adolescents understand the content they consume, there is an interest in how children and adolescents develop a concept of how computers work. One method of researching how children’s relationship with technology is understood is through mental models. An early paper on children’s conception of computers used drawings as a way to capture these models (Denham, 1993). In this work Denham (1993) explored how children understood the internal mechanisms of a computer. In the pilot, 38 first year students in secondary school in the U.K. (M=12 years) were asked to draw what they would expect to see if they could shrink and crawl inside a computer. From the drawings 11 components were identified, with the five most prominent as: 1) communication links, 2) transport, 3) memory, 4) chip, and 5) input/output.

Denham further examined 132 students across three grades (ages 9-14). Across ages there was a relationship between the five prominent components depicted and order of priority in which they appeared: communication links, input/output, memory, chip, and transport. An age effect was evident with higher incidences of each component drawn by older children as compared to younger ones. To examine more closely communication links, drawings were categorized as; 1) Disorganized, a muddle of wires or components with no relationships or clear connections, 2) Combination, a drawing with some A to B connections and some un-connected components, and 3) Organized, clear connections between two or more components in a planned fashion. The relationship of age and type of communication links was significant. The youngest students (age 9-10) in year 1 at the school most often drew a combination (scored in the
intermediate category), although almost all of the responses in the disorganized category also came from this age group. In contrast, the oldest students most often drew organized links.

Denham’s (1993) then asked children to imagine that they were programming a computer to print their name on the screen and to draw that process. Drawings were coded as reflective of no solution (i.e. children could not explain the process), no process (i.e. children drew letters to screen with no intermediate connections), and process (i.e. children drew an intermediate step between keyboard and output on screen). Age and years of experience using computers were the primary factors in children’s ability to explain the complex process of what happens inside a computer between the keyboard and the screen, with older and more experienced students having a better understanding of how the computer works.

Today’s technology-rich environment is much more complex than understanding how a single computer works. With regard to the Internet, there are many types of devices that can connect, not only the desktop computers in Denham’s studies, but laptops, tablets, cell phones, and gaming systems to name a few. Today’s technology also differs in what children expect a computer or other digital device to accomplish. Communication links from input to output are still important, but arguably more important is the ability to connect to the Internet and use the device to communicate with others. So how do children develop mental models of complex systems? Denham’s research suggests that age and experience are contributing factors in children’s development of complex conceptual ideas such as how a computer works. However, at the time of the research computers were not in every household and the Internet was not something that children had ever encountered. A decade later, most children had access to computers in some form and the Internet was commonly available. One more decade later, with
the advent of mobile technology, children were using tablets and other types of digital technology from toddlerhood with no concept of computers without Internet access.

**Understanding Virtual Space**

It is important to consider what changes in conceptualization are necessary for a child to transition from understanding a tool like a computer that physically can be manipulated to understanding an invisible tool like the Internet. To understand a computer’s inner workings, a person could open it and break it down into its internal components of wires and circuitry, which is not something a person can do with a virtual space.

The Internet as a whole is not visible; it exists as an infrastructure of computers and relay stations with coding language traveling through wires and WiFi signals, and with data stored in network servers as well as personal computers around the world (Abbate, 1999). The inability to see the Internet directly and manipulate it makes it a uniquely complex concept. It is a special type of artifact because it can only be accessed via a device like a computer or smartphone. There are multiple levels of understanding to master from the communication protocols to physical connections to the websites and applications accessed (Bordoff & Yan, 2017).

The Internet can be experienced either perceptually or conceptually. On the perceptual side is a sensory-motor experience: the computer or the screen and the specific websites or applications being used are one way a person can perceptually experience it. From this concrete experience, the concept of the Internet can grow from a single device containing content to thinking about how content might travel between a tablet and phone and how connections might work. The conceptual understanding involves abstract reasoning. It includes understanding when the website or application ceases to be a thing experienced by you alone and when it becomes
part of a network where many people can access the same thing and information can be shared across great physical distance.

The Internet is a complex artifact made up of visible and invisible pieces. The network encompasses the computers and other devices used to access it, in other words, the part we physically interact with. The network also encompasses the structures needed to relay information, the social connectivity the Internet facilitates, and the wires and satellites and signals that make up the idea of virtual space. The Internet is a mix of technological and social complexity, making children’s understanding of the Internet challenging, as they must understand not only the both the technical and the social but how they interact.

**Children’s Understanding of the Technical and Social Complexity of the Internet**

To explore what children and adolescents understand about the technical and social complexity of the Internet, Yan (2005, 2006, 2009) conducted a series of three studies utilizing the same basic method and procedure as Denham (1993) examining what factors may predict children’s level of understanding. In each study, participants were asked a series of questions about the Internet and asked to draw a picture to show what the Internet looks like. They were asked a second series of questions about the social complexity of the Internet and asked to draw a picture of potential social consequences and risks of interacting online.

In the first study, Yan (2005) sought to describe age differences in children’s technical and social understanding of the Internet. Children ages 5-12 and adults were interviewed. The interviews were a series of questions about the experience of using the Internet followed by open-ended questions about the technical complexity of the Internet including, “What is the Internet?” “Where is the Internet?” and “How big is the Internet?” After answering questions participants were asked to draw a picture to show what the Internet looks like. Responses and the
picture were coded together and each was scored with a level of understanding as to the complexity of the Internet. The work was divided into four levels of understanding: minimal, partial, sophisticated/extended, and scientific/correct; this scheme was also used in the later studies (see Table 1).

Table 1

*Understanding of technical complexity from Yan’s studies (2005, 2006, 2009)*

<table>
<thead>
<tr>
<th>Code</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimal Understanding</td>
<td>A single computer Responses indicate the Internet is what is directly experienced.</td>
</tr>
<tr>
<td>Partial Understanding</td>
<td>Two or more computers not connected or that may have simple connections Responses indicate an understanding that there is more to the Internet than the device one person uses and that there is some connectivity where information can be sent and received, but still limited to known devices.</td>
</tr>
<tr>
<td>Sophisticated (2005, 2006) or Extended (2009) Understanding</td>
<td>A network of computers Responses indicate a more abstract understanding that the Internet is many connections to other computers or places.</td>
</tr>
<tr>
<td>Scientific (2005, 2006) or Correct (2009) Understanding</td>
<td>A network of networks Responses indicate a deep understanding of the Internet. The highest level of understanding indicated in each response was used as the score (e.g. the drawing was of a single computer, but in the interview a network was indicated; this is scored sophisticated) as the level of technical understanding.</td>
</tr>
</tbody>
</table>

In the second part of the session participants were asked a series of questions that explored their understanding of the social complexity of the Internet. Questions were about
potential positive and negative social consequences. Participants were again asked to draw a picture. Responses and pictures were coded into the same four levels of social understanding.

- Minimal understanding indicated little consideration given to the social consequences of the Internet and students were not worried about safety.
- Partial understanding indicated a general but limited understanding of social consequences and a vague sense of safety precautions.
- Sophisticated/Extended understanding indicated a clear understanding of social consequences and specific societal concerns about Internet safety.
- Scientific/Correct understanding indicated a comprehensive understanding of social consequences and thoughtful attitudes about Internet safety.

The results showed significant differences among age groups in online experience with older children and adults reporting more involvement than younger children. Results showed overall age changes in regard to understanding the complexity of the Internet. There was a significant difference between the 9- to 10-year-olds and the 11- to 12-year-olds, with the older group of children more often depicting the technical complexity of the Internet at a partial or sophisticated level of understanding. Similar results were found in understanding the social complexity of the Internet with the addition of a difference between the older children (11-12 years) and adults, where adults showed a higher level of understanding. The changing conceptions could indicate a natural developmental change in cognitive and social domains, or it could indicate changing conceptions as a result of online experience.

Yan’s (2006) second study outlined a theory for understanding children’s conceptual development of the Internet. He developed steps to create a framework from which one could research effects of children’s Internet use and pathways to their understanding of the Internet.
Knowledge about the technical complexity of the Internet could impact how children use the Internet. Knowledge of the social complexity and privacy concerns could affect what children choose to post to the Internet, and help them to better determine the reliability of information they retrieve from the Internet. This study not only examined multiple factors that may be associated with the development of children’s technical and social understanding of the Internet, it also sought to determine different paths by which age and experience may affect development of a more sophisticated understanding of the technical or social complexity of the Internet.

Yan’s (2006) results showed a shift in understanding where the group of 7th and 8th grade students displayed a more sophisticated understanding than the group of 5th and 6th grade students. Frequency of Internet use did not have a direct effect on technical understanding, but did have a small effect on social understanding. Age had a direct positive effect on both technical and social understanding. There were no gender differences in this study. The relationship between technical and social understanding was unidirectional where technical understanding led to increased social understanding but social understanding failed to predict technical understanding. Yan offered the possible explanation that children who had a better understanding of the technical complexity of the Internet were better able to navigate communication and content on the Internet.

In a third study, Yan (2009) set to establish what is a baseline level of understanding of the Internet with children and adolescents with the hypothesis that all groups operate with a limited understanding of the Internet. In this study Yan used adults as the reference group, and found that 15- to 17-year-olds possessed an adult like technical understanding of the Internet but that 9- to 14-year-olds did not. Using correctness of understanding as the reference point all participants showed a generally limited understanding of the technical complexity of the Internet,
with the oldest group showing a mean understanding between partial and extended (see Table 1 for descriptions of Yan’s codes). Similar results were found for social understanding of the Internet. Yan’s studies are an important contribution to understanding how children, adolescents, and adults conceptualize the Internet.

Denham completed her studies at a time when computers were still somewhat of a novelty. They were available in schools and homes, but there was no expectation that a child would have their own computer. Computers operated with floppy disks, and if they did have Internet access, it was through a dial-up connection and slow. When Yan conducted his first study high-speed Internet access was common and most schools and households had computers, however these were desktop and laptop computers. In 2007 there was a great change in how people, including adolescents accessed the Internet. With the introduction of smartphones and personal mobile technology the Internet was now at one’s fingertips. Children and adolescents today have grown up in a vastly different technological landscape than the participants of the Denham and Yan studies. They have grown up with mobile technology and wireless Internet access integrated into their everyday lives.

**Conceptual Understanding of the Internet**

Children are adaptable and open to learning and exploring new concepts. They understand that how information is conveyed changes in new environments. For example, children primarily communicate in face-to-face interaction; however, when the in-person element is removed, children change their communication style to fit the new form. Cameron and Lee (1997) found that 3- to 8-year-old children used more specific descriptive language when giving instructions over the telephone than in person, where they relied on facial expressions and other visual cues to determine if the listener understood. Children’s communicative language
changes in different contexts, which creates different kinds of interactions. In recent years some new formats of communicating are via texting, chat rooms, and social media. The act of using digital media and experiencing immediate consequences (even if not immediate responses) allows children the opportunity to make adjustments in their strategies for future online interactions.

Children learn through their experiences with an activity or an environment and may develop a working concept of the computers and Internet through use and experimentation. The ability to come up with a basic understanding put together through experience – push a button to input information, which may yield some other information as output – may be constrained to a basic concept bound to specific use and more sophisticated explanations may be riddled with misconceptions (Hammond & Rogers, 2007). It may be that children need adult (or expert) mediation or direct higher-level instruction to understand the Internet.

Studies have shown that children learn better through guided instruction than through exploration of material with no directed goals (Alfieri, Brooks, Aldrich, & Tenenbaum, 2011). Children no doubt are learning something through free play, but it is procedural knowledge and not necessary conceptual (or verbally accessible). This leads to questions of what constitutes expert knowledge and what might be the objectives for a media literacy curriculum to enhance understanding of the Internet. Gone are the days when knowledge of code is necessary to use a computer or access the Internet. Advancement of the graphical interface has made it so that almost anyone can comfortably surf the web from very young children to elderly adults. If adults can navigate the social aspects of the Internet without a scientific understanding of how it works, then is that sufficient for today’s youth? Does the ability to successfully navigate constitute expert knowledge in using the Internet?
There may be an upper limit of conceptual understanding in some topics as Yan’s (2009) findings showed that adolescents exhibited an adult-like understanding of the technical complexity of the Internet; however, when criterion-referenced, only two adults in the adult sample exhibited the highest level of understanding of the Internet, so the term “adult-like” may not be how we should assess conceptual understanding. Limits on conceptual understanding in complex topics have been documented in other domains. For example, in a study of conservation of energy, students who specialized in the sciences outperformed other students, but still did not reach competence in all areas (Liu & McKeough, 2005).

Developing a concept of virtual space may begin with the experience of using a computer or mobile device and thinking about online interaction with websites and other people. Prensky’s (2001) has described children who grow up in a digital world and use digital technology adeptly as digital natives, which he contrasts with the digital immigrants (or those who were born before the pervasiveness of digital technology) who need to work to learn how to use the technology. While children are adept users of digital devices such as phones, computers, televisions, and video game consoles, these devices are not the Internet. The Internet is the network, the mechanism through which content is transmitted. The devices are portals to access the virtual space. Additionally, the software and applications used - website, video, email, games - are not the Internet; rather they are the content accessed or downloaded. When the Internet is “turned off,” the device does not cease to exist, rather it goes back to being a device with Internet capability, but also has its own set of offline functions. Thus, being an adept user may not lead to expert understanding of how the Internet functions.
CHAPTER 4

Research Goals and Questions

The current study assesses how adolescents understand the Internet as a function of their age, demographic background, and media usage, while evaluating the efficacy of a video-based curriculum, utilizing a short animation in the spirit of *School House Rock* (Dorogh et al., 2002) to provide direct instruction on how information is shared and saved across the Internet.

Using a mixed-methods design, relationships between the frequency and extent of middle school children’s social media use and their understanding of the durability of their digital footprint are examined. Middle-school aged children were selected as the target population, as findings indicate that adolescents are technologically savvy (Yan, 2009) and show high levels of social media use (Lenhart et al., 2015).

This study’s questions focus on the understanding of the technical complexity of the Internet as demonstrated through student interviews and drawings. In addition to students’ understanding of the hardware of the Internet (e.g. computers, tablets, phones), this study looks at students’ Internet and social media diet. Students today have high exposure and rich informal learning experience in using the Internet, so a better understanding of specific activities that may influence understanding is in order.

Findings from the Yan studies (2005, 2006, 2009) showed that students generally exhibited a minimal or partial understanding of the connectivity of the Internet and that experience alone did not improve understanding. One goal of the current study was to determine whether continuous access to the Internet afforded by smart phones and tablets from very young ages increases this understanding. A second goal was to teach about the connectivity of the Internet to determine if a media curriculum can effectively teach complex concepts. A five-
A minute animated video was created with the goal of expanding students’ ideas about the network connectivity of the Internet and their own digital footprint. To engage students, a script was written to present content in a story format. The story followed a fictional teen and a photo she posted on a social media site. Through this story, the goal was to teach specifically how an image might be shared and saved across the Internet. The video taught 1) the Internet is a network of connected computers and servers that go all around the world, 2) a social media website lives on a network of servers with back-up servers, 3) when you share something – in this case a photo – you don’t control what happens to it after you post it, and 4) even if you delete a post, you can’t know for sure that it has not been backed-up, saved, or downloaded by someone else and may still be somewhere on the Internet. The story ends with the teen deleting the photo from her social media page and shows some of the places where the photo might still be.

I hypothesize that pre-adolescent youth, regardless of social media use, will show 1) a limited understanding of the technical and social complexity of the Internet, and 2) a limited understanding of the consequences of posting and sending files on the Internet. Furthermore it is hypothesized that after viewing and discussing the instructional video pre-adolescent youth will 1) show an increased understanding of the how photographs and files travel and are stored on the Internet, and 2) exhibit a more sophisticated understanding of the technical complexity of the Internet.

To examine understanding of the complexity of the Internet, I administered an online survey and then interviewed 78 middle-school students between the ages of 11 and 15, using multiple tasks, including drawing and vignettes. Tasks are discussed in detail in the next chapter. These data allowed me to address the following research questions regarding children’s understanding of the Internet.
• **Research Question 1: Media Literacy**

To what extent will students show adeptness in media literacy skills and are there specific areas in which students are more adept than others? Will relationships exist between media literacy skills and social media use or academic achievement?

• **Research Question 2: Technical Complexity of the Internet**

Will student drawings correctly depict the technical complexity of the Internet as a network? What relationships exist between student characteristics (age, gender, academic achievement, and social media use) and their understanding of the technical complexity of the Internet?

• **Research Question 3: Social complexity of the Internet in regard to posting pictures**

When asked to explain the path of a photograph that has been posted to and deleted from the Internet, will students explain the social complexity of the Internet in a sophisticated manner and understand that even that which is deleted may still be on the Internet? Do students understand potential risks of using social media to “get back at” someone by posting an embarrassing picture?

• **Research Question 4: Social complexity of the Internet in regard to homework sharing**

When asked to explain the path of a file sent to a friend via Facebook, will students explain the social complexity of the Internet in a sophisticated manner? How do students talk about the potential risks of sharing homework or helping a friend via Facebook?

• **Research Question 5: Video Intervention**

Will students show a change in understanding of the technical complexity of the Internet after viewing an instructional video?
CHAPTER 5
Methodology

Participants

Participants (6th, 7th, & 8th graders) were recruited from a middle school in rural Indiana. Consent forms were sent home with all students in 8th grade social studies and with one period of 7th grade English and two periods of 6th grade math. Seventy-eight students participated in this study (44 girls, 34 boys) with a mean age of 13 years; 4 months (range 11;6-15;5). Half of the sample comprised students in 8th grade.

About the school and community. The district served a community of 9,400 residents, including students at a small liberal arts college. The community is primarily residential and agricultural with some small businesses and an annual median wage of approximately $45,715 (Southwestern Jefferson County Schools, 2017a; U.S. Census Bureau). The K-12 student population is approximately 1,500 students in two school buildings. The district employs a 1:1 technology model, in which each student is provided with a laptop or tablet. This is notable because the school embraces students utilizing digital tools and recognizes that the Internet can be a useful resource for learning. In this district, grants funded the implementation at the high school level (in the 2014-2015 school year) and at the elementary and middle school level (in the 2015-2016 school year). Each teacher and student received a Chromebook (a laptop computer) that they were able to use for schoolwork during classes and also take home for homework. The computers had Internet capability and students were able to access social media and entertainment websites. Because of the 1:1 program, we know that every student in this study had access to at least one device with Internet capability and had access to the Internet and their Chromebooks before and after school. While training and instruction in Internet safety and media
literacy was planned for students, it had not been implemented at the time of data collection (SWJCS, 2017b).

**School achievement and identity.** The majority of students reported high academic achievement, with 66.7% saying the received mostly As and Bs. Students reported having a lot of friends (84.6%), getting along with their parents (82.3%), and feeling normal compared to their peers (80.8%).

**Technology ownership and use.** Interestingly only 65.4% of students reported having their own desktop or laptop computer, despite the fact that the 1:1 model provided each student a Chromebook; one possible explanation may be that they viewed the device as belonging to the school. It is notable that 10.3% of students reported that they did not have Internet access at home. Students reported connecting to the Internet daily with 97.4% of students reporting having used the Internet on the previous day. The majority of students used computers daily with 87.2% reporting having used a computer on the previous day. Additionally most students (52.6%) reported that a smartphone was the most used device for connecting to the Internet. A full 98.7% of students reported owning at least one device that connected to the Internet and all reported that someone in their household had a device that connected to the Internet (see Table 2 for device ownership).
Table 2

Digital device ownership by students and in student households. Percentages equal more than 100% as students were instructed to check all that apply.

<table>
<thead>
<tr>
<th></th>
<th>Student owns</th>
<th>Household owns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smart phone</td>
<td>61.5%</td>
<td>84.6%</td>
</tr>
<tr>
<td>Cell phone (not a smart phone)</td>
<td>11.5%</td>
<td>24.4%</td>
</tr>
<tr>
<td>iPod or other MP3 player</td>
<td>23.1%</td>
<td>32.1%</td>
</tr>
<tr>
<td>iPod Touch or similar device</td>
<td>42.3%</td>
<td>55.1%</td>
</tr>
<tr>
<td>Tablet computer (like an iPad, Samsung Galaxy, or Kindle Fire)</td>
<td>64.1%</td>
<td>69.2%</td>
</tr>
<tr>
<td>Desktop or laptop computer</td>
<td>65.4%</td>
<td>79.5%</td>
</tr>
<tr>
<td>Gaming system like an Xbox, PlayStation, or Wii</td>
<td>74.4%</td>
<td>71.8%</td>
</tr>
<tr>
<td>None of these</td>
<td>1.3%</td>
<td>-</td>
</tr>
</tbody>
</table>

Diversity of sample. The children in the sample were predominately White (80.8%), followed by Hispanic/Latino (6.4%), Native American or Alaskan Native (2.6%), and Black or African American (1.3%). There were no significant differences between girls and boys in terms of ethnicity. In terms of socio-economic status, parents’ educational background was assessed in demographic questions answered by the students (Table 3). Mothers’ educational background ranged from completing some high school or less (2.6%) to having earned a graduate or professional degree (15.4%). Fathers’ educational background ranged from having completed some high school or less (9.0%) to having earned a graduate or professional degree (12.8%).
Table 3.

*Level of parental education completed. Percentage of students reporting.*

<table>
<thead>
<tr>
<th>Level of education</th>
<th>Mother</th>
<th>Father</th>
</tr>
</thead>
<tbody>
<tr>
<td>Some high school or less</td>
<td>2.6%</td>
<td>9.0%</td>
</tr>
<tr>
<td>Finished high school</td>
<td>17.9%</td>
<td>42.3%</td>
</tr>
<tr>
<td>Some college or special school after high school</td>
<td>12.8%</td>
<td>7.7%</td>
</tr>
<tr>
<td>Finished college</td>
<td>38.5%</td>
<td>16.7%</td>
</tr>
<tr>
<td>School beyond college (like doctor, lawyer, professor, social worker)</td>
<td>15.4%</td>
<td>12.8%</td>
</tr>
<tr>
<td>No one fills the role in my family</td>
<td>3.8%</td>
<td>2.6%</td>
</tr>
</tbody>
</table>

**Family structure.** In terms of family structure students were asked with whom they lived most of the time and were to check all adults that applied. The majority of students lived with at least one of their parents; 82.1% lived in a household including their mothers and 65.4% lived in a household including their fathers. Other adult household members were stepmothers (7.7%), stepfathers (19.2%), and other adults (7.7%). The “other adults” category included grandparents, an aunt, adult siblings, and the boyfriend of an adult sibling.

**Materials and Procedure**

**Survey questionnaire.** Students were asked to complete an online survey before beginning the interview activities. Teachers emailed a link to the survey to all students who turned in a completed consent form; students were able to complete the survey at home or during free periods at school. The survey asked students about their daily access to the Internet via computers and mobile devices. Specific questions focused on engagement via social media platforms. Survey questions were drawn from several national reports (Lenhart, et al., 2015; Rideout, Foehr, & Roberts, 2010; Rideout, 2012), which allowed for potential comparison of participant responses to those from a national sample. Additional media literacy questions were
adapted from a general media literacy scale (Bier et al., 2011) used to assess three domains of media literacy 1) authors and audience, 2) messages/meanings, and 3) representations/reality. Questions in the media literacy scale were randomized for each student to increase the validity of the scale. Other sections asked students to report Internet use and were presented in the same order to everyone.

Two additional media literacy questions were drawn from a Common Sense Media Literacy online assessment (https://assessments.commonsensemedia.org/). “Rachel is writing a report on the history of baseball. She found a lot of information on Wikipedia, but she’s not sure if it’s accurate. What should Rachel do?” and “Which websites are MOST LIKELY to be trustworthy for schoolwork? (check all that apply)”. Correct answers to these two questions were noted in the Common Sense Teacher Report accompanying the online test. Student demographic data were also gathered in this survey (see Appendix A for the full set of survey questions and frequencies of responses to each item).

Session One. After completing the online survey students were interviewed individually in a computer lab at their school. The individual interview included a drawing activity and vignettes.

Drawing. Students were given three prompts:

1) Draw a picture to show me what the Internet looks like.

2) Draw a picture to show me how a photograph travels through the Internet when you share it online.

3) Draw a picture to show me what might happen to a file after someone hits the send button to send a friend a homework assignment.
The first drawing prompt and following questions were directly from the Yan’s studies (2005; 2006); the other prompts about photo sharing and sending a file were original to this research. After completing each drawing, children were asked to explain their drawings and to answer questions about what the Internet entailed (see Appendix B). All interview sessions were audio recorded for accurate transcription. Students were not given a time limit on their drawings. Most spent more time on Drawing 1 compared to the others. All drawings were completed in less than five minutes.

**Vignettes.** Next, students were presented with two vignettes followed by questions to directly probe their understanding of the lifeline of information posted to the Internet. The first vignette involved a teenager posting an embarrassing photo to Instagram. The second vignette pertained to a teenager emailing a completed homework assignment to another student. Children were asked about the possible consequences of document sharing in relation to cyber-bullying and academic integrity.

*Vignette #1: Photo sharing.* Taylor purposely posts an embarrassing picture of Harper on a social network (like Instagram or Facebook) after they have an argument. A few days later, they make up and Taylor deletes the picture.

- Did Taylor do the right thing by deleting the picture?
- How do you think Harper feels about the picture getting posted?
- Do you think posting this picture will affect their friendship?
- Where did the picture go?
- Where is it now?
- Who might have the picture now?
- Is there a risk that something bad might happen with this picture?
Vignette #2: Homework sharing. Jamie and Riley are in the same Math class. Riley was out sick for a couple of days last week and is confused about some of the homework. Riley asks Jamie for help. Jamie sends a picture of completed math homework through Facebook.

- Where did the homework go?
- Where is it now?
- Who might have the homework now?
- Is there a risk that something bad might happen with the homework?
- Was it ok for Jamie to send the homework?
- Is this cheating?
- If a teacher finds out the homework was shared should Jamie or Riley be punished?
  - If so, who should be punished and why?
- Who is more at fault?

Session Two. After completing the individual interviews, students participated in a group session with 1 to 4 of their peers. The session consisted of watching a short, animated video, then making a drawing, and participating in a group discussion.

Video presentation. In small groups, students watched a 5-minute animated instructional video that illustrated the lifeline of a digital photograph as it is viewed and shared by users of social networks. The video tells the story of a teenage girl, Haley, who takes and posts a selfie to social media. The depicted social networks include individuals who actively engage with each other via downloading and posting information as well as individuals who only passively view
the image. The picture is shared and saved. Haley decides she doesn’t like the picture and deletes it. But is it really gone? (see Figure 1 and Appendix C: video file: https://howsocialmediaworks.commons.gc.cuny.edu).

![Image of four drawings](https://howsocialmediaworks.commons.gc.cuny.edu)

Figure 1. Still shots illustrative of content of the educational video.

**Drawing.** Following the video presentation students were given their picture from the first prompt, “*Draw a picture to show me what the Internet looks like,*” and they were asked if they would like to make any changes. Original drawings were returned for students to extend the drawing of their original conception rather than asked to start a new drawing to facilitate making a direct comparison and also to allow students to build on their original idea rather than re-draw images from the video. While making changes, students were also instructed to give their picture a title and write two sentences as to what, if anything, had changed for them. All students were instructed to write sentences and title their picture regardless of whether they chose to make changes.

**Guided Interview.** Then, using a guided interview method, group participants engaged in a 10-15 minute discussion of social media use with an emphasis on photographs and document sharing in their daily lives (see Appendix D for questions). At the end of the guided interview
students were asked to hashtag the conversation and to write the hashtag on their drawings. The guided interview and the hashtags were not analyzed.

**Coding and Scoring**

**Online Survey.** Questions were scored by the frequency of each response and analyzed to determine what youth did and did not know about the Internet, social media, and media literacy. Several variables were identified as potentially related to media literacy and understanding of the complexity of the Internet: age, gender, academic grades, social media use, and multi-tasking. These variables were used in the analysis of the drawings and vignettes from the interviews.

**Session 1.** The pre-test interview contained three parts: 1) three drawings and their explanations in relation to probe questions, 2) open-ended questions about the Internet, and 3) two Internet scenarios (vignettes) with questions. After viewing the video, the post-test interview allowed time for students to update their drawings from the first probe and explain their changes as well as title their drawings and write two sentences about what changed. Each interview was transcribed in its entirety in order for questions to be scored. Pilot data collected from seven students in New York City were used to create coding schemes for each question.

**Picture 1a.** The first picture, “Draw a picture to show me what the Internet looks like,” was scored based on the coding procedures developed by Yan (2005, 2006). The original schema of minimal (a single computer), partial (two of more computers), sophisticated (a network), and scientific (a network of networks), was updated to include new codes added to reflect more recent conceptions of the Internet. Second additional “sub-codes” were added, such as references to the cloud (images of WiFi signals or actual clouds). The final codes used are: level 1 minimal understanding (single device, website), level 2 partial understanding (multiple devices, cloud), and level 3 sophisticated understanding (network, people connecting). Each level included a code
with a hardware-based idea (computer, device) and an abstract or software based idea (website, cloud, communication). Codes in levels 1 and 2 show perception-based understanding and level 3 shows conceptual understanding (see Appendix E for coding manual). The post-test pictures, where students were asked to make changes, were coded using the same scheme.

The pictures from the first session were coded based on the drawing and the answer to the prompt, “Use your picture to tell me about what the Internet looks like.” Pictures from the second session (the updated drawings coded using the updated picture, the two sentences written on the picture, and answers to the prompt, “What has changed for you now? What did you draw?”) were coded as a single question and one code was used. In all coding schemes, the highest level of understanding explained was used. For example, Figure 2 shows a drawing of a computer/computer monitor with the Google webpage. From the picture alone, a code of single device may be assigned. However, when taking into account what the student says about the Internet, he talked about the Internet as something to be retrieved from a box via Wi-Fi, so this picture was coded as “Cloud” under partial understanding – the higher-level code was used.
Figure 2. Example of when student explanation provides more sophisticated detail than the drawing.

The interview questions were coded for level of understanding of the technical complexity of the Internet. In Yan’s (2005, 2006, 2009) procedure, interview questions came before the drawing and the questions and picture were coded as a whole. In this study, the order was flipped as some of the questions were potentially leading – for example “How many computers are there on the Internet?” implies there are many computers – which could lead to a higher level of understanding if the interview is coded as a whole. The interviews were coded into minimal, partial, and sophisticated understanding and the questions were coded in blocks. The first block was, “What is the Internet?” “Where is the Internet?” and “How big is the Internet?” The second block was “If you could walk inside the Internet, what would it look like?”
and “If you stood really far away from the Internet, what would it look like?” The highest level of complexity exhibited was used as the assigned code.

**Picture 2.** “Draw a picture to show me how a photograph travels through the Internet when you share it online,” was coded into two categories: 1) pictures where the photograph traveled to a single destination or followed a linear sequential path from one destination to the next, and 2) pictures where the path of the photograph travel branched to reach multiple destinations simultaneously.

**Picture 3.** “Draw a picture to show me what might happen to a file after someone hits the send button to send a friend a homework assignment” was coded as to where the file ended up. In this case almost all of the students described a linear path of friend A sending the file directly to friend B, but answers differed in where the file ended. Responses were coded as “with the friend,” “sent on to others,” and “with the teacher or principal.”

**Vignettes** Qualitative coding of the offline social consequences of the Internet scenarios was based on themes. Both vignettes asked the same questions (“Where did it (picture or homework) go?” “Where is it now?” and “Who might have it now?”) delving into the social complexities of file sharing on the Internet. Responses were coded as to where the file went and who might have it. In Vignette 1, the embarrassing photo the picture was coded as “still on the Internet” or “Screenshot” and in Vignette 2, the homework was coded as “with Riley” or “on Facebook/the Internet.” These coding schemes relate to the schemes used in the Picture drawing of a photograph traveling and the Picture drawing of a homework file being sent.

Each vignette also asked if there was a risk that something bad might happen and risk categories for each vignette were explored. In Vignette 1, the embarrassing photo, risks were stated as potential things that could happen to the photo (e.g. repost it, alter it) or a predator risk.
For Vignette 2, the homework, risk was stated around getting caught or cheating; see Appendix E for all risk codes.

Additionally, relationships between the interview and survey responses were examined; specific correlations between levels of understanding with the extent of reported social media use and demographic characteristics were considered.

**Reliability.** Inter-coder reliability was attained separately for each of the coding schemes (for pictures and vignettes) and was evaluated with kappa coefficients. To establish inter-rater reliability, for each coding scheme, the primary investigator and a trained research assistant independently coded 23% to 26% of the data set (with the primary investigator coding the full sample). Each coding scheme yielded substantial or almost perfect agreement (i.e. all coefficients were between 0.77 and 0.91; Landis & Koch, 1977). All disagreements were resolved through discussion and final codes were input by the primary investigator. Inter-rater reliability is presented in Table 4.
<table>
<thead>
<tr>
<th>Task</th>
<th>Measure</th>
<th>% of Data Set</th>
<th>Kappa Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Technical Complexity – Drawings and Interview</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Picture 1a</td>
<td>Picture 1 – Draw a picture to show me what the Internet looks like</td>
<td>26%</td>
<td>0.86</td>
</tr>
<tr>
<td>Interview 1a</td>
<td>What is the Internet? / Where is the Internet? / How big is the Internet?</td>
<td>26%</td>
<td>0.81</td>
</tr>
<tr>
<td>Picture 1b</td>
<td>What has changed for you?</td>
<td>26%</td>
<td>0.77</td>
</tr>
<tr>
<td>Picture 2</td>
<td>Draw a picture to show me how a photograph travels through the Internet.</td>
<td>26%</td>
<td>0.79</td>
</tr>
<tr>
<td>Picture 3</td>
<td>Draw a picture to show me what happens to a homework file if you send it to a friend on the Internet.</td>
<td>26%</td>
<td>0.82</td>
</tr>
<tr>
<td><strong>Social Complexity – Vignettes</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vignette 1</td>
<td>Where did the picture go? / Where is it now? / Who might have it now?</td>
<td>26%</td>
<td>0.88</td>
</tr>
<tr>
<td>Vignette 1</td>
<td>Is there a risk that something bad might happen with the picture?</td>
<td>23%</td>
<td>0.79</td>
</tr>
<tr>
<td>Vignette 2</td>
<td>Where did the picture go? / Where is it now? / Who might have the picture now?</td>
<td>26%</td>
<td>0.78</td>
</tr>
<tr>
<td>Vignette 2</td>
<td>Is there a risk that something bad might happen with the homework?</td>
<td>26%</td>
<td>0.91</td>
</tr>
</tbody>
</table>
CHAPTER 6
Results

Student Characteristics

Online Survey Internet Access and Use. Students were asked about the types of devices they owned, with a majority of students owning a gaming system (74.4%), desktop or laptop computer (65.4%), tablet computer (64.1%), or smart phone (61.5%). Of the students who reported owning a device, 52.6% reported a smart phone as the device used most often to access the Internet and 85.9% of students reported having access to a smart phone or tablet in their bedroom.

Students were asked about specific online activities in which they had engaged (see Figure 3) with the majority of students reporting watching videos, sending or receiving email, and creating a social network profile.

![Graph showing online activities](image)

Figure 3. Percentage of students who have engaged in each online activity

When asked about multi-tasking, the majority of students reported media multi-tasking some or all of the time both with multiple media activities and while doing homework (see Figure 4).
Figure 4. Percentage of students reporting media multi-tasking most or some of the time.

When asked about the frequency of different activities on a cell phone, a majority of students reported “often” for going to social media sites (70.5%), listening to music (69.2%), text messaging (56.4%), taking pictures (53.8%) and watching videos (53.8%). When asked specifically about sending or receiving text messages, 66.6% reported multiple times a day.

When asked about rules they had to follow regarding screen time per parental guidelines, 66.7% reported rules about what they were allowed to do on the computer, 60.3% reported rules about purchasing and downloading apps, and 57.7% reported rules about having a social media profile (see Figure 5). A smaller percentage of students reported rules about how much time could be spent on approved activities. When asked how often rules were enforced, about half said their parents enforced the rules at least some of the time (see Table 5).
Figure 5. *Percentage of students reporting rules about activities and time spent on digital devices*

Table 5.

*Student responses to “In general how often do your parents make sure you follow the rules they have about using media?”*

<table>
<thead>
<tr>
<th>Percentage of students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most of the time</td>
</tr>
<tr>
<td>Some of the time</td>
</tr>
<tr>
<td>A little of time</td>
</tr>
<tr>
<td>Never</td>
</tr>
<tr>
<td>My parents don’t have rules about using media</td>
</tr>
</tbody>
</table>

**Online Survey Social Media Use.** When asked about social media use, 64.1% of students reported visiting sites like Facebook, Instagram or Twitter multiple times a day and 51.3% reported sending or receiving messages through these sites multiple times a day. Students were asked specifically about seven social media sites (see Figure 6).
When asked to pick the one site used most often, Instagram was the favored site with 41.0% of students reporting it their most used. Facebook is a distant second with 24.4% followed by Snapchat at 11.5%. A majority of students (74.4%) reported checking their social networking sites at least once a day with 27% reporting posting something at least once a day.

However, despite their frequent online activities, 70.5% stated that “in person” was their favorite way to communicate with friends. Reasons given were “It’s the quickest,” “I can talk more seriously that way,” “I feel more comfortable talking about personal things that way,” “I can understand what people really mean better this way,” and “It’s more fun.”

Most students say that social media has affected their relationships with their peers, with 34.6% saying that it has both helped and hurt relationships and 20.5% saying it has helped their relationships. Only 25.6% said that social media has not made a difference in their peer relationships. Positive effects of social media use reported were that it helped students get to know other students better (66.7%), helped to stay in touch with friends they don’t see regularly.
(75.6%), helped to connect with new people who share a common interest (51.3%), and made them more aware of current events (69.2%).

I also looked at the total number of social media accounts students reported. The calculated range was zero to nine social media accounts ($M = 3.39, SD = 2.05$). I looked at the number of social media accounts by gender, girls showed a slightly higher number of accounts than boys with the difference trending to significance (Girls: $M = 3.76, SD = 2.16$; Boys: $M = 2.91, SD = 1.80$), $t(72) = -1.81, p=.08$.

**Media Literacy**

In the media literacy section of the online survey students were given two questions about accuracy and trustworthiness of information found on the Internet and 16 statements from a general media literacy scale. Student answers to the two questions showed that students had some understanding of how to evaluate a website (see Table 6). When asked about determining accuracy of information on Wikipedia, 80.8% of students said they checked the source links. When asked which websites were most likely to be trustworthy, all but two students (97.3%) were able to identify at least one of the correct answers. However, only 40.0% of students chose two correct answers and only 22.7% chose all three of the correct answers, and none of the false answers. There were no differences in age or gender. A composite score was created for the question “which websites were mostly likely to be trustworthy” with each answer choice marked as correct or incorrect, as noted in the Common Sense Teacher Report, to create a total from 0-5 for the question ($M = 3.81, SD = 0.85$).
Table 6.

*Media literacy questions (correct choices are in bold).*

<table>
<thead>
<tr>
<th>Percentage of students (n=76)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rachel is writing a report on the history of baseball. She found a lot of information on Wikipedia, but she’s not sure if it’s accurate. What should Rachel do?</strong></td>
</tr>
<tr>
<td>Edit the page’s content herself.</td>
</tr>
<tr>
<td>Assume it’s accurate because it is on Wikipedia.</td>
</tr>
<tr>
<td>Check the source links to determine if they are reliable.</td>
</tr>
<tr>
<td>Use the information and claim it is from a different site.</td>
</tr>
</tbody>
</table>

**Which websites are MOST LIKELY to be trustworthy for schoolwork? (student could select multiple answers)**

- a website with a .org domain | **67.1%**
- a website with lots of advertisements | 3.9%
- a website with many grammatical and spelling mistakes | 3.9%
- a website written by university professors that includes their contact information | **61.8%**
- a website that is frequently updated with news and with new sources cited | **57.9%**

General media literacy questions (Table 7) were scored from 1 (strongly disagree) to 4 (strongly agree). Overall students did well on the scale with a mean of 3.09 (range = 2.43 – 3.79). In response to the statements pertaining to representations and reality, 42.7% of students agreed or strongly agreed with, “Photos your friends post on social media are an accurate representation of what is going on in their life,” suggesting that students may have a misconception that social media is not curated like other spaces on the Internet and that their friends are not making decisions about what to post and share. In contrast, 90.7% of students disagreed or strongly
disagreed with, “When you see something on the Internet you can always believe that it is true,” which suggests some awareness that false information is conveyed via the Internet.

In response to statements about authors and audiences, 32.0% of students disagreed or strongly disagreed with the statement “People who advertise think very carefully about the people they want to buy their product” and 25.4% disagreed or strongly disagreed with the statement, “When you see something on the Internet, you look at the source before deciding if it is trustworthy.” This suggests that students may not understand that they are a targeted audience, nor do they understand that knowing who or what entity is paying for a site might sway the information.

In response to statements about messages and meanings, students did well with 94.7% agreeing or strongly agreeing with the statement “People are influenced by TV and movies, whether they realize it or not,” and 84% agreeing or strongly agreeing with the statement, “People are influenced by advertisements whether they realize it or not.” This suggests students understand that media can be used to persuade. However, 29.3% of youth indicated that they disagreed or strongly disagreed with the statement “When you see an ad, it is very important to think about what was left out of the ad,” suggesting that even in professionally curated spaces students are inclined to take what they see at face value.

To further examine the general media literacy scale I conducted a factor analysis. First I looked at correlations between the items. Two of the statements “When you see something on the Internet, the creator is trying to convince you to agree with their point of view,” and People who advertise think very carefully about the people they want to buy their product,” did not correlate with any other items and were removed from further analyses. A principal component analysis (PCA) was conducted on the 14 remaining items in the general media literacy scale with
orthogonal rotation (varimax). The Kaiser-Meyer-Olkin measure verified the sampling adequacy for the analysis, KMO = .58 (‘mediocre’ according to Field, 2009) which is above the acceptable limit of .5. The 14 items loaded onto six components with a cumulative 64.5% total variance explained. The scale showed moderate internal reliability (α = .677).

Table 7.

*General media literacy survey items (correct choices are in bold)*

<table>
<thead>
<tr>
<th>Media as representation that may differ from reality</th>
<th>Percentage of students (n=75)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strongly Disagree</td>
</tr>
<tr>
<td>1. Most of the time, when people advertise products they are more concerned about making a profit than giving correct information.</td>
<td>1.3%</td>
</tr>
<tr>
<td>2. When you see something on the Internet you can always believe that it is true.</td>
<td><strong>56.0%</strong></td>
</tr>
<tr>
<td>3. Photos your friends post on social media are an accurate representation of what is going on in their life.</td>
<td><strong>18.7%</strong></td>
</tr>
<tr>
<td>4. Sending a document or picture to one friend on the Internet means no one else will ever see it.</td>
<td><strong>46.7%</strong></td>
</tr>
<tr>
<td>5. Movies and TV shows don’t usually show life like it really is.</td>
<td>0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Media which is expressed and experienced from different points of view</th>
<th>Percentage of students (n=75)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strongly Disagree</td>
</tr>
<tr>
<td>6. Advertisements usually leave out a lot of important information.</td>
<td>1.3%</td>
</tr>
<tr>
<td>7. When you see an ad, it is very important to think about what was left out of the ad.</td>
<td>4.0%</td>
</tr>
<tr>
<td>8. When you see something on the Internet you look at the source before deciding if it is trustworthy.</td>
<td>2.7%</td>
</tr>
</tbody>
</table>
9. Two people may see the same movie or TV show and get very different ideas about it.  
0%  2.7%  65.3%  32.0%

10. Two people may see the same advertisement and get very different ideas about it.  
0%  4.0%  66.7%  29.3%

11. When people make movies and TV shows, every camera shot is very carefully planned.  
4.0%  9.3%  54.7%  32.0%

**Media as intended to persuade**

12. When people make advertisements, every camera shot is very carefully planned.  
1.3%  22.7%  57.3%  18.7%

13. People are influenced by TV and movies, whether they realize it or not.  
1.3%  4.0%  74.7%  20.0%

14. People are influenced by advertisements, whether they realize it or not.  
1.3%  14.7%  68.0%  16.0%

The 14 items were split into 3 groups (see Table 7 for items): media as representation that may differ from reality, media which is expressed and experienced from different points of view, and media as intended to persuade. Factor analyses conducted for each group separately showed moderate internal reliability with all KMO values greater than .62. For each of the three groups, the principal components analysis yielded a one-component solution (see Table 8).
Table 8.

*Factor analysis and internal validity of media literacy groups.*

<table>
<thead>
<tr>
<th>Media as representation that may differ from reality (Items 1-5)</th>
<th>KMO</th>
<th>Total variance explained (one component)</th>
<th>Cronbach’s alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Media expressed and experienced from different points of view (Items 6-10)</td>
<td>.73 (good)</td>
<td>46.1%</td>
<td>.69</td>
</tr>
<tr>
<td>Media as intended to persuade (Items 12-14)</td>
<td>.62 (good)</td>
<td>57.6%</td>
<td>.62</td>
</tr>
</tbody>
</table>

*note: Item 11 is not included in this table. Item loads with items 6-10 and 12-14 with total variance explained with two components.

Partial correlations, controlling for age and gender, showed that items were correlated primarily within the three groups (see Table 9). Only 24.2% of the correlations from the full scale were significant (p<.05), the percentage increased to 31.8% when including correlations that approached significance (p<.10). These findings suggest an overall weak relationship among the items of the media literacy scale. However, within each the three groups, at least 50% of the correlations were significant. Indeed, for the “media expressed and experienced from different points of view” items (6-10) all items were correlated with p<.10.

Because internal reliability was not significantly different between the total scale of 14 items and the three groups, the full scale was used for remaining analyses. A total media literacy score was created by taking the mean score of the 14-item scale for each student.
Table 9.  

*Partial correlations, controlled for age and gender, of general media literacy items*  

| 1 | 2     | 3       | 4 | 5     | 6     | 7 | 8     | 9     | 10    | 11    | 12    | 13    | 14    |
|---|-------|---------|---|-------|-------|---|-------|-------|-------|-------|-------|-------|-------|-------|
| 1. Making profits | 1 | .29* | .37*** | .18  | .17  | .39*** | .14  | .15  | .06   | −.02  | −.01  | .04   | .07   | .14   |
| 2. Believe the Internet | 1 | .31** | .39*** | .16  | .10  | .15  | .09  | .13  | .12   | .05   | −.01  | .03   |       |       |
| 3. Photo Friends | 1 | .33** | .11  | .08  | .16  | −.02  | −.10 | −.21† | −.18  | −.16  | −.10  | −.01  |       |       |
| 4. Sending Docs | 1 | .09   | .07   | .13  | .09  | .14  | .10  | .14  | .00   | −.04  | .06   | .05   |       |       |
| 5. Movies/TV not Real | 1 | .10   | .02   | .26* | .20  |       | .04  | .05  | −.09  | −.06  | .16   |       |       |
| 6. Ads leave out | 1 | .36** | .35** | .20  |       | .31** | .04  | −.13 | −.02  | .13   |       |       |       |
| 7. Think about Ads | 1 | .28*  |       | .21  | .25* | .17  | .18  |       | −.03  | .28*  |       |       |
| 8. Look at Source | 1 | .28*  | .46*** | .15  |       | .20  |       | .09  | .09   |       |       |       |
| 9. Movies/TV POV | 1 | .53*** | .29*  | .10  | −.00  | .10   |       |       |       |       |       |       |
| 10. Ads POV | 1 | .35** | .19   | .02  |       | .21   |       |       |       |       |       |       |
| 11. TV planned | 1 | .60*** | .11   |       | .21   |       |       |       |       |       |       |       |
| 12. Ads planned | 1 | .30*  | .32** |       |       |       |       |       |       |       |       |       |
| 13. Influenced by TV | 1 |       |       |       |       |       |       |       |       |       |       |       |
| 14. Influenced by Ads | 1 |       |       |       |       |       |       |       |       |       |       |       |

***p<.001, **p<.01, *p<.05, †p<.10
To examine what factors may relate to media literacy, a preliminary analysis examined the variables of interest in relationship to age and gender. Age correlated significantly with academic grades and sending messages via social media sites. Gender correlated significantly with going to social media sites and multi-tasking (see Table 10).

Table 10.

*Significant correlations of academic grades, social media use and trustworthy website with age and gender.*

<table>
<thead>
<tr>
<th></th>
<th>Grades</th>
<th>Send or receive messages via social media</th>
<th>Go to social media site</th>
<th>Multi-tasking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (in months)</td>
<td>-.48***</td>
<td>.25*</td>
<td>.09</td>
<td>.02</td>
</tr>
<tr>
<td>Gender (boys = 0; girls = 1)</td>
<td>.05</td>
<td>.17</td>
<td>.27*</td>
<td>.35**</td>
</tr>
</tbody>
</table>

***p<.001, **p<.01, *p<.05

Partial correlations, controlling for age and gender, were run with the total media literacy score and trustworthy Internet score (one of the media literacy items shown in Table 6), academic grades, multi-tasking, going to social media sites, and messaging via social media sites. Academic grades were positively correlated with media literacy scores and with the trustworthy Internet score. Negative correlations between both media literacy scores and grades with multi-tasking were trending to significant (see Table 11). Media literacy scores were not correlated with social media use, as all p-values were greater than .12.

Table 11.

*Partial Correlations of media literacy and multi-tasking (control for age and gender)*

<table>
<thead>
<tr>
<th></th>
<th>Grades</th>
<th>Trustworthy</th>
<th>Multi-tasking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Media Literacy</td>
<td>.32**</td>
<td>.26*</td>
<td>-.22†</td>
</tr>
<tr>
<td>Grades</td>
<td>.39***</td>
<td>-.21†</td>
<td></td>
</tr>
</tbody>
</table>

***p<.001, **p<.01, *p<.05, †p<.10
Technical Complexity of the Internet

**Drawing 1a – show me what the Internet looks like.** The first picture prompt to “Draw a picture to show me what the Internet looks like,” is the primary measure of children’s understanding of the technical complexity of the Internet. It is also used as a pre-test of children’s understanding of the Internet before viewing the animated video. In this first picture task, 65.4% of students showed a minimal understanding of the Internet. Minimal understanding encompassed the codes website (42.3%) and single device (23.1%). Only 11.5% of students showed a sophisticated understanding of the Internet as an information network through the codes people connecting (5.1%) and Network (6.4%). The remaining 23.0% of students showed a partial understanding of the Internet through the codes cloud (19.2%) and multiple computers (3.8%); see Figure 7 for examples of each code.

![Diagram of drawings for each code for Drawing 1](image)

Figure 7. Examples of drawings for each code for Drawing 1
To examine drawing responses in relation to variables of interest, I conducted chi-square analyses using the six picture sub-codes as the dependent variable. Responses did not vary by age $\chi^2 (10) = 8.93, p=.69$. There was a significant association between the level of technical understanding and gender $\chi^2 (5) = 10.25, p=.05$. Gender difference was seen in the sophisticated level of understanding with all drawings of a Network drawn by boys and all drawings of people connecting drawn by girls, so boys and girls displayed different ways of describing the Internet at the sophisticated level of understanding.

Students’ depictions of the Internet varied by number of social media sites (grouped high or low) $\chi^2 (5) = 12.93, p=.02$. Students with a high number of social media accounts (4 or more) were more likely to draw the Internet as people connecting or a network (both sophisticated). Students with a low number of social media accounts (0-3 accounts) were more likely to draw the Internet as a single device or multiple computers (both hardware based ideas).

When analyzing at the level of three primary code (minimal, partial, and sophisticated) there was no relationship between level of understanding and gender $\chi^2 (2) = 1.22, p =.54$. However, level of understanding and number of social media sites varied with marginal significance, $\chi^2 (2) = 5.51, p =.06$, where students showing a sophisticated understanding of the technical complexity of the Internet more likely to report a high number of social media accounts (4 or more).

**Interview questions.** The interview after children completed the first drawing prompt asked nine potentially leading questions about the Internet (Appendix B). The interviews were coded as a whole to minimal, partial, or sophisticated understanding. The interviews showed the same pattern of responses as seen in Drawing 1a, with the majority of students showing a minimal understanding of the technical complexity of the Internet and the smallest percentage
showing a sophisticated understanding. Some children who were able to draw a picture of the Internet as a network showed a lower level of understanding when asked to verbally explain the Internet (see Table 12).

Table 12.

*Understanding of the Technical Complexity of the Internet (percentage of students)*

<table>
<thead>
<tr>
<th></th>
<th>Drawing 1a</th>
<th>Interview</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimal</td>
<td>65.4%</td>
<td>56.4%</td>
</tr>
<tr>
<td>Partial</td>
<td>23.1%</td>
<td>39.7%</td>
</tr>
<tr>
<td>Sophisticated</td>
<td>11.5%</td>
<td>3.8%</td>
</tr>
</tbody>
</table>

**Drawing 1b – Post-test drawings and comparison**

In a second session students were interviewed in groups after first watching the animated video. After watching the video each student was given their first drawing and a chance to make any changes they wanted. The changed drawing was used as a post-test and was coded using the same scheme as Drawing 1a (see Figure 8).
Figure 8. Examples of drawings changed to a more sophisticated level of understanding. From top 348) Coded as “Website” at time one, coded as “Network” after change, 371) Coded as “Cloud” at time one, coded as “Network” after change, 326) Coded as “Cloud” at time one, coded as “Multiple computers” after change, 362) Coded as “Single device” at time one, coded as “Network” after change.

At post-test students showed a significant shift to a higher level of understanding about the technical complexity of the Internet (see Table 13). At pre-test, over half of students showed a minimal understanding of the Internet and at post-test only 30.7% showed a minimal understanding of the Internet. At pre-test 23.0% of students showed a partial understanding of the Internet and at post-test this increased to 37.2% of students. Finally, at pre-test only 11.5% of students showed a sophisticated understanding of the Internet increasing to 32.0% at post-test. Chi-square analyses at post-test showed that responses no longer varied by gender or number of social media sites at either the level of six sub-codes or three primary codes.
Table 13.

*Shifting conceptions of the Internet (percentage of students) based on drawings at pre- and post-test (columns sum to 100%) (N=78)*

<table>
<thead>
<tr>
<th></th>
<th>Pre-test</th>
<th>Post-test</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Minimal</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Website</td>
<td>42.3</td>
<td>17.9</td>
</tr>
<tr>
<td>Single Device</td>
<td>23.1</td>
<td>12.8</td>
</tr>
<tr>
<td><strong>Partial</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cloud</td>
<td>19.2</td>
<td>20.5</td>
</tr>
<tr>
<td>Multiple Computers</td>
<td>3.8</td>
<td>16.7</td>
</tr>
<tr>
<td><strong>Sophisticated</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>People Connecting (no devices)</td>
<td>5.1</td>
<td>3.8</td>
</tr>
<tr>
<td>Network</td>
<td>6.4</td>
<td>28.2</td>
</tr>
</tbody>
</table>

McNemar’s test showed that the shift from a minimal/partial understanding to a sophisticated understanding was significant at \((p < .001)\). McNemar’s test also indicated that the shift from a minimal understanding of the Internet as a website or single devices to a higher order conception including connections was significant \((p < .001)\).

**Drawing 2 – Show me how a photograph travels.** The second drawing prompt to “Draw a picture to show me how a photograph travels through the Internet when you share it online,” was coded into two categories: linear vs. branching (see Figure 9). Students’ drawings were split nearly even with 48.7% depicting a photograph traveling to one computer at a time and 51.3% depicting a photograph traveling to multiple computers at the same time.
Chi-square analyses showed that Drawing 1 and Drawing 2 were not related to one another, $\chi^2 (2) = 0.84$, $p = .66$, in that students who exhibited higher levels of technological knowledge in Drawing 1 were no more likely to draw branching paths in Drawing 2 than children who exhibited lower levels of technological knowledge in Drawing 1. For example, the following student drew a network in Drawing 1; and a linear path at Drawing 2.

**Drawing 1**

*INT: So can you use your picture to tell me what the Internet looks like?*

*CHI: Like, that's a website there.*

*INT: This first circle right here on the left?*

*CHI: And it kinda shows how it's connected to everything on the Internet.*

*INT: Okay. So what are the other circles?*

*CHI: Other websites and other things you can access on your computer.*
*INT: Like what?

*CHI: Like... settings maybe and that may be a website and some apps you can get on it.

*INT: Okay. And what are the lines?

*CHI: How it's connected all one together.

*Drawing 2*

*CHI: This first box is the picture and it shows if you like extend it or post it, how one person can see it or save it and send it to another or post it somewhere else and how they could get it posted or send it or yeah, to someone else and how that keeps working with a bunch of different people.

*INT: Okay. So then what happens to the picture as it travels through the Internet?

*CHI: More and more people see it.

*INT: Okay. What happens on these lines?

*CHI: That's the sending. It's going through the Internet.

*INT: How does it go through the Internet?

*CHI: I have no clue.

(Male, age 14)

Students who drew a linear path were split equally across minimal, partial, and sophisticated levels of understanding on Drawing 1 and the same for students who drew a branching path (see Table 14).

Table 14.

<table>
<thead>
<tr>
<th></th>
<th>Linear</th>
<th>Branching</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimal</td>
<td>29 (69.0%)</td>
<td>22 (61.1%)</td>
</tr>
<tr>
<td>Partial</td>
<td>8 (19.0%)</td>
<td>10 (27.8%)</td>
</tr>
<tr>
<td>Sophisticated</td>
<td>5 (11.9%)</td>
<td>4 (11.1%)</td>
</tr>
</tbody>
</table>
Drawing 2 did vary as a function of students’ grades, $t(76) = -2.84$, $p = .006$ with students who drew the photo traveling in a branching path reporting higher average grades than students who drew the photo traveling in a linear path. No other variables were significant.

**Drawing 3 – Show me what happens to a homework file.** The way that students talked about the third drawing prompt “Draw a picture to show me what happens to a homework file if you send it to a friend on the Internet,” was different than after the prompt about photo sharing. Almost all of the pictures showed the homework traveling in a linear way from person A to person B and possibly beyond. However, explanations were about where the homework file ended its journey. Results were coded either the homework ends up with the friend or the homework was sent on to others including sent to the Internet, a teacher, or a principal (see Figure 10). The majority of students (61.5%) responded that the file went to the friend and the remaining students (38.5%) responded that it was sent on to others.

![Figure 10. Examples homework going to friend or to others for Drawing 3.](image)
Chi-square analysis showed no relationship of Drawing 3 to Drawing 1, \( \chi^2 (4) = 2.57, p = .63 \), and no relationship of Drawing 3 to Drawing 2, \( \chi^2 (1) = 1.67, p = .20 \). As with Drawings 1 and 2, each code used with Drawing 3 was distributed across the levels of complexity used to code Drawing 1 (see Table 15).

Table 15.

<table>
<thead>
<tr>
<th>Drawing 3 by Drawing 1a Count (percentage of students in each column in parenthesis)</th>
<th>With the friend</th>
<th>Was sent on to others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimal</td>
<td>29 (60%)</td>
<td>22 (73%)</td>
</tr>
<tr>
<td>Partial</td>
<td>12 (25%)</td>
<td>6 (20%)</td>
</tr>
<tr>
<td>Sophisticated</td>
<td>7 (15%)</td>
<td>2 (7%)</td>
</tr>
</tbody>
</table>

Drawing 3 did show a significant difference by age, \( \chi^2 (2) = 9.22, p = .01 \), where the students who said that the homework would end with the friend were more likely to be the 11 or 12 years olds and those who said the homework would be sent on to others were more likely to be 13-year-olds. The 14-15 year old age group was split in their responses. No other variables were significant.

**Social Complexity of the Internet**

**Vignette 1 – Embarrassing Photo with Taylor and Harper.** Students answered a series of questions after listening to the vignette about Taylor and Harper, which included an embarrassing picture. I looked at how children answered questions about potential real world social consequences. In this vignette the questions started with social consequences followed by questions about social complexity.

I looked at how students thought about the social complexity of the Internet in terms of where the picture went and potential risks from posting a picture online. Responses were coded to the highest level students explained. In response to the question block “Where did the picture
go? Where is the picture now? and Who might have the picture now?" 30.8% said that anyone who took a screenshot could have it and 69.2% of students responded that it was still on the Internet somewhere (some of these students also mentioned screenshots). The following analysis treated these categories as mutually exclusive.

There was a significant relationship between responses and number of social media sites, \( t(72) = 2.27, p = .03 \). Students who reported 4 or more social media accounts were more likely to say the picture was a screenshot (i.e. no longer on the Internet). Responses also differed by how often students reported going to a social networking site, \( \chi^2 (2) = 13.03, p < .001 \), with all but one of the students who said “screenshot” having reported visiting their social media sites often (more than once a day). Thus, students who reported more social media use in both number of accounts and frequency of visiting less likely to say that the photograph could still be on the Internet than students who reported less social media use.

Both this vignette and the drawing of the path of the photograph concerned how images travel through the Internet. Because of this relationship I compared student responses from the vignette asking where the photo was (screenshot or still on Internet) to those of Picture 2 (linear and branching). Those students who said that the photo existed only as a screenshot were more likely to draw a linear path for the photograph \( \chi^2 (1) = 7.00, p = .008 \); see Table 16.

Table 16.

<table>
<thead>
<tr>
<th>Vignette 1 – Where is the picture?</th>
<th>Vignette 2 – How does a photograph travel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screenshot</td>
<td>Linear</td>
</tr>
<tr>
<td>18 (75%)</td>
<td>18 (75%)</td>
</tr>
<tr>
<td>Still on Internet</td>
<td>Branching</td>
</tr>
<tr>
<td>23 (41%)</td>
<td>23 (41%)</td>
</tr>
<tr>
<td></td>
<td>6 (25%)</td>
</tr>
<tr>
<td></td>
<td>31 (59%)</td>
</tr>
</tbody>
</table>
When asked if there was a risk that something bad could happen with the picture, only 3.8% of students said there was no risk and 10.3% gave a general “something bad” response. Student responses were evenly distributed across the other risk mentioned (see Figure 11). In examining responses to the risk question in relation to variables of interest, only self-reported grades was significant, $\chi^2 (5) = 11.94, p = .04$. Students who replied that there was no risk were those that reported earning mostly Bs & Cs or lower; students who reported earning mostly Bs or higher were more likely to talk about the risk of the picture getting reposted. There was no relationship between student responses to where the picture is and the potential risk.

![Figure 11. Student responses to potential risks of posting an embarrassing photograph on social media](image)

**Vignette 2 – Homework Sharing with Jamie and Riley.** After listening to the vignette about Jamie sending Riley a homework assignment, students answered a series of questions about the potential real world social consequences. Their responses shed light on the extent to which they viewed the Internet as socially complex. In coding their responses, I focused on students’ answers to the questions concerned with where the homework went and potential risks from sending completed homework to a friend via Facebook. In response to the question block,
“Where did the picture go? Where is the picture now? and Who might have the picture now?”.

61.5% of students responded that the homework was on Facebook / the Internet, and the remaining 38.5% said that Riley had the homework. Responses did not differ across any of the demographic or use variables. I compared responses to the homework sharing vignette with the responses to Picture 3 about how homework traveled to a friend and found no relationship, $\chi^2 (1) = .066, p = .797$.

I also compared student responses to the two vignettes with each other as they asked the same questions about where a file ended up. Responses to where the photograph was (screenshot or on the Internet) to where the homework was (friend or on the Internet) were related, $\chi^2 (1) = 15.35, p < .001$. Most of the students (85.4%) who said that the homework was on Facebook / the Internet also said that the photo Taylor posted was still on the Internet. However, students who said the homework was with Riley were split in responding that the photo existed only as a screenshot (56.7%) or that the photo was still on the Internet (43.3%).

When asked about the risk of something bad happening as a consequence of sharing homework via Facebook, students primarily talked about the risk of getting caught or the risk that Riley or others could cheat, with a substantial number of students responding there was no risk at all (see Figure 12).
Figure 12. Student responses to is potential risks of sending completed homework through Facebook

When examining potential risk in relation to variables of interest, only the number of social media sites was significant, \( \chi^2 (3) = 11.97, p = .007 \). Students who reported use of a high number of social media sites talked about risk in practical terms, either getting caught (55.5%) or said that there was no risk (27.8%). Students who used reported use of fewer social media sites talked about the risk in moral terms, that the homework could be used to cheat (47.4%), followed by getting caught (34.2%).
CHAPTER 7

Discussion

With the introduction of mobile technology adolescents are using the Internet at unprecedented rates. However, research on their understanding of the Internet remains dated. This dissertation sought to explore questions surrounding how children understand and interact with the Internet especially with regard to media literacy and social media use. Using a mixed-methods approach, the findings suggest wide variability in regard to what adolescents’ understand about media literacy and the Internet. Our examination of adolescents’ understanding of the technical and social complexities of the Internet through drawings and vignettes showed varied and at times contradictory results. Students’ responses to the different questions and scenarios lent support to the idea that the context in which adolescents think about issues relating to Internet use is important and students may answer in a technically sophisticated way to one question and in a simplistic way to the next. For example, one student described the Internet as a network and described how computers are connected to all the other computers, but then when asked to describe how a photo or document travels through the Internet, his answer was much less sophisticated (i.e., “the photo just sends and someone can post it and that I don’t know how that [document sending] works”).

Research Question 1: Media Literacy

To what extent will students show adeptness in media literacy skills and are there specific areas in which students are more adept than others? Will relationships exist between media literacy skills and social media use or academic achievement?

The 14-item general media literacy scale showed only moderate internal consistency, signifying that it may not reflect a single underlying construct and measuring it as such may not
be ideal. Factor analysis showed that the 14-item media literacy scale mapped onto six factors. However, after examining patterns of correlations across the individual items, three groups of questions were apparent that roughly corresponded to the three domains of media literacy (authors/audiences, messages/meaning, representation/reality) identified by Hobbs (2006). Further factor analysis showed that the items in each of these groups mapped onto a single factor. When examining scores on the scale as a whole, students showed a moderate level of media literacy understanding. Across the scale, there were specific questions where students generally showed a lesser understanding, such as when asked whether photos friends posted online were accurate representations of what is going on in their life.

In addition to administering the general media literacy scale, we asked students to identify one or more markers of a trustworthy website. Their ability to identify such markers was positively correlated with their total scores on the media literacy scale. Students’ self-reported academic grades were positively correlated with performance on both the media literacy scale and students’ ability to recognize markers of a trustworthy website (see Tables 6 & 7 for items). Grades were negatively correlated with the amount of media multi-tasking students reported, which suggests that students who engage heavily in media multi-tasking may need targeted instruction on media literacy and implications of media use on schoolwork. The observed trends that media literacy correlated negatively with self-reported rates of checking social media and posting to social media suggest that students who use social media do not show any enhancements of media literacy, as measured by our scale.

These findings suggest that media literacy comprises partially separable domains, such as authors/audiences, messages/meaning, representation/reality. Media literacy may also be viewed as encompassing the ability to safely navigate the Internet, the ability to made accurate
determinations about trustworthy content, and the ability to create media content. In much of the extant literature, researchers have tended to focus narrowly on specific topics within the broader field of media literacy. To develop a comprehensive assessment of media literacy as a whole, it may be necessary to identify the disparate media literacy skills that make up the whole, determine how to measure expertise in each domain, and identify contexts or activities that help to develop to that expertise. Such comprehensive assessment may require a variety of assessments, e.g., rating scales as well as specific tasks where a person has to explain or do something, such as engage in critical evaluation of media content.

Current work in media literacy education emphasizes themes of protection and empowerment. Work under the theme of protection aims to provide guidance on protecting a person’s digital footprint and engaging youth in thinking about consequences of their online actions. Other work within media literacy emphasizes critical evaluation and empowerment of students to make informed choices. From either perspective, students need to learn not to trust everything on the Internet, and they need to learn how to identify the source of information they read online. For example a teacher might said “don’t just look at Wikipedia, you need to do research” but doing a Google search and just taking the first link that appears may be worse. Without instruction as to what makes information trustworthy blanket rules are not going to be helpful (boyd, 2017). Recent studies have also shown that while adolescents and adults say they know not to trust everything on the Internet that they don’t actually put in the work needed to fully evaluate information sources (OFCOM, 2016; Stanford History Education Group, 2016). Are adolescents not evaluating information sources because they don’t understand how or do they not view this as important? Either reason should be addressed. If it is a lack of knowledge then more training and practice as to how to evaluate and think about content is needed. If it is a
lack of awareness of the importance of information sourcing then discussions about why trustworthy information is important are needed, along with discussions about how appearances or an official sounding web address or media name are not indicators of the quality of content.

General media literacy skills are often talked about, but not necessarily defined or easily measured. Rather than focusing efforts to develop a more accurate media literacy scale, efforts may be better spent on developing targeted assessments of the different components of media literacy and media literacy education could be designed to target these. Three areas to consider including:

1) Evaluating trustworthiness. How do you evaluate the content you are reading? Is the information credible?

2) Technical sophistication. Knowing the technical aspects allows you to make better choices about using it.

3) Privacy. Recognizing that your data is being collected and motives of the website creator.

**Research Question 2: Technical Complexity of the Internet**

*At what level of sophistication will students explain the technical complexity of the Internet through a series of drawings and explanations, and what relationships exist between student characteristics (age, gender, academic achievement, and social media use) and their understanding of the technical complexity of the Internet?*

To explore their technical understanding of the Internet, students were asked to draw three pictures and answer a series of questions. When students were asked to draw a picture of what the Internet looked like, more than half of the students drew pictures that represented a minimal understanding of the Internet. Students were also asked a series of questions, including:
What, Where, and How big is the Internet? Their answers were coded with the same scheme as the pictures and showed a similar pattern where most students answered “minimal” followed by “partial” and “sophisticated.” The second and third pictures, showing how a photograph or homework file travels through the Internet, were coded at two levels. Comparisons of the three pictures showed no relationship between the level of sophistication across pictures despite the fact that they were drawn in the same session within minutes of one another. While the coding schemes were not directly comparable, it is arguable that saying the photograph travels in a linear manner, or that the homework stops with the friend, is less sophisticated than saying that a sent photograph can reach multiple destinations at the same time, or that the homework could end up with someone other than the intended friend. The results suggest that students did not make connections between their answers to the questions. Students’ conceptions and explanations of the technical complexity of the Internet seem to be contextually bound, with students thinking differently about what the Internet is depending on the phrasing of the question or the task scenario.

There was not a common student characteristic or variable related to all three pictures, nor did social media use predict more sophisticated understanding. These results suggest that media use alone does not help students develop understanding of the complexity of the Internet. Understanding the technical complexity of the Internet and media literacy are intricate topics that are difficult for youth to grasp. While middle-school students are adept users of digital media, they may benefit from direct instruction as to how the Internet works, and when comprehending important concepts they should keep in mind the need to evaluate the content they consume.

Research Question 3: Video Intervention
After viewing an instructional video will students explain the technical complexity of the Internet in a more sophisticated manner, including networks and how information is relayed?

Students watched a five-minute animated video about how information travels on the Internet and were then given a chance to make changes to the first drawing they made (Picture 1). After viewing the video, the students demonstrated a significant shift to a more sophisticated understanding of the Internet. However, one limitation to this technique is that it may be easier for students to add to what they have already drawn, potentially by simply adding elements from the video. This method may have discouraged the students from removing elements they had drawn initially. Additionally, students were evaluated for understanding immediately after viewing the video, thus the study is unable to measure retention.

Students’ were highly engaged while watching the video, which suggests that a media literacy curriculum in the spirit of School House Rock (Dorogh et al., 2002) might be effective in enhancing children and adolescents’ understanding of today’s technology-saturated media landscape. For example, students might be shown a series of short videos each focusing on a different aspect of how the Internet works, such as use of search algorithms that generate filter bubbles. Such a multimedia curriculum has the potential to be an engaging and salient teaching method. Even remembering one line or take home message from each video could yield a positive impact on the decisions students make when using the Internet and thinking about the potential consequences of their actions.

Research Question 4: Social complexity of the Internet in regard to posting pictures

When asked to explain the path of a photograph that has been posted to and deleted from the Internet, will students explain the social complexity of the Internet in a sophisticated
manner and do students understand potential risks of using social media to ‘get back at’ someone by posting an embarrassing picture?

After listening to a vignette about Taylor’s posting and deleting an embarrassing photo of Harper, students answered the questions: “Where did the picture go?” “Where is the picture now?” and “Who might have the picture now?” Responses were split by where students thought the picture ended up, either as a screenshot or whether the image was still on the Internet somewhere. Students understood the ability for people to save images and were aware that a deleted photograph was not gone. The difference in student’s explanations was in how they discussed where the deleted picture ended up. The student either thought about a person who may have taken a screenshot or saved the photo (i.e., it is not on the Internet anymore) or the student thought about the photo as still on the Internet on someone else’s account or on a different website or hidden somewhere where potentially anyone with the right skills could find it.

Students who reported four or more social media accounts and those who reported visiting their social media sites more than once a day were more likely to say that the picture was a screenshot than those reporting less social media use. This suggests that students may have been thinking about where the photo went based on their own experience with posting and deleting photos on social media and taking screenshots. Students who are heavy users of social media and posting lots of pictures are also likely taking many screenshots, especially on places like Snapchat where the pictures or video disappear after a relatively short amount of time. Additionally, students who often use social media are likely using it so often because they are having an enjoyable experience connecting with their friends or at a minimum looking at things
the people they follow post. They may not know they need to think about what happens beyond their own experience.

Students were also asked about the potential risk of posting a photo to the Internet. Four main categories of risk were identified as well as an “other” category with students saying “something bad” or talking about long-term effects like when interviewing for a job. A small number of students said there was no risk. Risk was not related to where students said the picture ended up. Students who reported earning mostly As & Bs were more likely to say that there was a risk the photo would get reposted than students who reported earning lower grades.

**Research Question 5: Social complexity of the Internet in regard to homework sharing**

*When asked to explain the path of a file sent to a friend via Facebook, will students explain the social complexity of the Internet in a sophisticated manner and how do students talk about the potential risks of sharing homework or helping a friend via Facebook?*

After listening to a vignette about Taylor’s posting and deleting an embarrassing photo of Harper, students answered the questions: “Where did the picture go?” “Where is the picture now?” and “Who might have the picture now?” Responses were split between students saying that Riley had the homework (i.e., it went where Jamie sent it) and that the homework was on Facebook or the Internet. These responses did not differ across any of the student characteristics, but they were related to responses from the same question block from the first vignette. Most of the students who responded that the homework file was on Facebook or on the Internet also said that the photo was still on the Internet. However, students who said the homework was with Riley were equally likely to say the photo was a screenshot or on the Internet. This suggests that there is some consistency in how students understand the social complexity of the Internet and that files have a life outside of the control of the person who first uploads them to the Internet.
Students were also asked about the potential risk of something bad happening with the homework. Students who reported using four or more social media sites were more likely than those using fewer sites to say that the risk was getting caught or that there was no risk at all. This again could suggest that students who use more social media are thinking about these questions in the context of their own use and personal consequences. Students who reported using fewer social media sites (0-3) were more likely to say that the risk was cheating. The moral implications of how students talked about cheating were not analyzed further in this work. Future research could address this aspect of children’s understanding of digital media usage.

Comparison of responses to vignettes showed that students who understood that private messaging or email does not mean that files are staying with the intended audience (the homework is on the Internet) were more likely to understand that deleted files may also stay on the Internet. Whereas students who explained that files stay with the intended audience (Riley) were split in how they understood the life of information posted to social media. The social consequences of sharing information on social media and students’ own experiences with finding images via Google, for example, may help them to grasp the public nature of digital media well before they grasp the technical aspects of privacy settings.

General Discussion

Media literacy skills, understanding the social complexity of the Internet, and understanding the technical complexity of the Internet are related concepts that arguably fall under a larger umbrella of digital literacy. However, the results of this study have shown that the concepts may be more separate than alike. Media literacy can be measured as multiple, potentially three, separate domains. Understanding the social and technical complexities of the Internet may be contextually bound, with students thinking about the Internet in specific contexts
of usage without transferring concepts across situation. Transfer of information across domains is difficult for students, and this research affirms that this is true in the area of digital literacy. One explanation as to why this might be is that navigation and understanding of the complexity of the Internet relies on skills from different core domains of reasoning (Huang & Spelke, 2015).

The two scenarios presented in the vignettes produced two different ways of thinking about the social complexity of the Internet. After both vignettes students were asked, “Where did the picture/homework go? Where is it now? And who might have it now?” While the questions were the same, the context of the vignette produced different answers. After hearing about Taylor and Harper and the embarrassing photograph, students talked about “how” the photo existed, either as a screenshot or as a file on the Internet. After hearing about Jamie and Riley sharing homework, students talked about “where” the homework existed, with Riley or on Facebook or the Internet. Responses to this question block were related, but the theme is subtly different. The context in which the question was asked made a difference as to how the students thought about the answer. It is possible that the hypothetical, potentially real-life scenario was interfering with the ability to think in a general way about the affordances of the Internet (Dias, Roazzi, & Harris, 2005; Hawkins, Pea, Glick, & Scribner, 1994). Students may default to what they know from experience (e.g., how they share homework via social media), even though their experience is not related to more complex understanding of the technical details of how the homework travels via the Internet. Contextualizing questions in unfamiliar or fantasy situations might change the way in which students’ reason about how the Internet works. Research is needed to better understand if students are reasoning differently about the Internet in familiar vs. fantasy contexts. If, as research suggests, reasoning may be more logical and complex in
unfamiliar contexts (Hawkins et al., 1994), it could be beneficial for students to receive explicit instruction as to how to transfer what they know to real life situations.

Students earning higher grades were most likely to say that a picture traveled in a branching path and that there was a risk of a photo getting reposted. This contrasted with the students reporting lower grades who were more likely say that a photo traveled in a linear path and that there was no risk associated with posting it. This suggests that there may be relationships between how the technical parts of the Internet are conceptualized and how one thinks about consequences. This would fit with Yan’s (2009) finding that technical understanding of the Internet influences social understanding. However, in the current study, there were many tasks that did not show this relationship, so more research is needed to identify how technical concepts may facilitate awareness of social consequences of Internet usage.

In contrast to Denham (1993) and Yan (2005, 2006, 2009) where age effects were prominent, the current study did not find significant age effects in media literacy skills or in understanding of the complexity of the Internet. One explanation for this is that the age effects were closely tied to years of experience. When those studies were conducted, people were still using desktop and laptop computers rather than using hand-held mobile devices. Moreover, children tended to have access to computers and the Internet at older ages than children today who are essentially growing up online with their smartphones and tablets. We might expect to see developmental changes if we included children at younger ages in future work or sampled a wider age range. A more focused drawing task, e.g., to draw a specific function of the Internet, might yield results showing age differences in understanding of Internet functionality.

Early use of computers for online interactions, such as video calls with grandparents, may impact cognitive development in ways not yet understood. Adolescents’ had some awareness of
the longevity of their online actions, which is a shift from communicating in person where speech occurs and then goes away without a permanent record. It is unclear if their awareness of the durability of online content affects their behavior outside of the context in which they are engaging in the moment. That is, outside of their immediate actions, they may not be thinking about their digital footprint at all. The Internet and mobile technology for them is just a part of the world they live in.

Yan’s last study (2009) was based on the premise that if preadolescents had a better understanding of the technological aspects of the Internet they would engage in less risky social behaviors when engaging with others online. Yan explored the understanding of the technical complexity of the Internet (i.e. how it works) and the understanding of the social complexity of the Internet (i.e. how it is used) as separate ideas. In the current research it was clear that students viewed the Internet is a communication network where technical and social complexities are intertwined. The sub-codes used for the first set of drawings are evidence of this. It was challenging to separate the technical from the social because students viewed the Internet in terms of what it is used for. I used the prior work of Denham and Yan as a starting point in developing the methods for the current study, but attempted to respond to what the students actually drew and said in developing the coding schemes. In Yan’s work, the code for the fourth level – a scientific or correct understanding – was exhibited by only a small number of participants. In the current study, this code was not evident in any of the students’ drawings or response. Future work may require coding schemes that encompass students’ functional knowledge of the Internet where technical and social concepts may be linked.

It may not be imperative that children and adolescents understand how the wires and signals work or know how to read coding languages and the bits and bytes that make up the
digital content they see on their screen. I do, however, think that it is critical for youth to understand where information travels and how it is saved and ownership of content in order to make decisions about what to post or share. Students need to understand that the purpose of an Internet site from the creator or owner’s point of view may be very different from its purpose from the user’s point of view. Students need to think about the consequences of data sharing, and not just about personal information like their age or the names of family members that they might post online, but what brands of clothes they wear, what food they eat, and where they get their news. Students need to grasp that Internet business today is in the business of buying and selling data.

**Limitations and Future Directions**

The current study had a number of limitations. First, this involved a relatively small sample of adolescents from one rural school with little cultural diversity. Future studies should look at more representative samples. While the age range was distributed normally, half of the sample was from a single grade (grade 8) and the girls were on average slightly older than the boys. Additionally, the younger students reported better overall grades in school than older students, which is a potentially confounding variable within the sample. Much of the student demographic data were self-reported, and students may have been biased to report higher than average grades. Accessing school records or asking students to report GPA would be a more precise measure of academic achievement. The survey used questions from multiple prior reports; these items were not altered to make comparison to the original samples a possibility. However, across the survey questions, the format of the Likert scales varied, which made it more difficult to make direct comparison across variables within the survey.
Middle-school students were selected for this study because in Yan’s (2006) work adolescents at age 13 showed adult-like understanding of the Internet. Spanning this age range, I hoped to capture a shift in understanding of the complexity of the Internet. However, as discussed, the media landscape and children’s access to the Internet is vastly different today with children using digital technology before the age of 2; therefore future work should include samples with young children. In designing media literacy curricula, it would be beneficial to identify grades where direct instruction would be most useful. Moreover, in examining the efficacy of curricular materials, such as the video used in this study, it might be advantageous to have students create new drawings rather than building on a previous drawing, which may have constrained their responses. In addition to immediate post-tests, follow up at longer intervals would be useful for assessing whether students retained information they learned from the video. Future efforts to develop videos for a media literacy curriculum might target skills that are crucial for using the Internet in schoolwork, which might include, for example, how to evaluate the reputability of various Internet information sources.

The current study asked students a series of hypothetical questions about potential real-world scenarios involving file sharing. As suggested above, it is likely that students’ responses were drawn from their personal experience; hence, future research should include explicit questions about individual experiences using social media and the social consequences of their online interactions to better gauge experience impacts students’ thinking about the social complexity of the Internet. Future research could broaden the scope of this study by examining how children’s descriptions and/or definitions of friendship, bullying, and moral reasoning relate to their understanding of the social complexity of the Internet.
Conclusions

The extant literature provides examples of middle-school aged students talking about their online experiences in ways that suggest that they have considerable grasp of the complexity of online social interactions (Livingstone, Bober & Helsper, 2005; Livingstone & Sefton-Green, 2016). Their ability to discuss myriad topics such as cyber-bullying, teasing, spam, and age-inappropriate content is contrasted by their seemingly simplistic technical descriptions of the Internet (Yan, 2005, 2006, 2009). Findings from the current study indicate that media use alone does not help students develop understanding of the complexity of the Internet and suggest the need for direct explicit instruction in the form of a targeted curriculum on digital literacy. Skills under the umbrella term “digital literacy” or “media literacy” are diverse and seem to encompass multiple domains. It is important for policy makers, researchers, and educators to come together and determine what are the critical skills for schoolwork and informed citizenship, and best practices for teaching these skills and assessing learning. Video instruction is one way these skills could effectively be taught. Developing a series of videos teaching important concepts are next steps in this research program.
Appendix A

Social Media and Computer Use Survey

Link to survey: https://csipsychology.qualtrics.com/SE/?SID=SV_0BR14vrj3dxCTRP

Notes: This sample of students were from a middle school in rural Indiana. Each student in the school received a Chromebook for in-school and at home use. A dash (-) represents a value of zero. Percentages may not always add to 100% due to the acceptance of multiple answers on some questions and because the percent of students who offered no answer (students were not required to answer a question before moving on) is not shown. Students who responded, “I do not use any social media sites” were not shown the questions about specific social media use. Unless noted the base for each question is all respondents.

Block 1

This survey will ask you questions about how you use the Internet and social networks. This is NOT a test. Please ask an adult to help you if there are any questions you are unsure how to answer.

1. Please enter the ID number sent to your email.

Block 2

This group of questions will ask you some questions about yourself.

2. How old are you?

<table>
<thead>
<tr>
<th>Age</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>10.3%</td>
</tr>
<tr>
<td>12</td>
<td>28.2%</td>
</tr>
<tr>
<td>13</td>
<td>32.1%</td>
</tr>
<tr>
<td>14</td>
<td>26.9%</td>
</tr>
<tr>
<td>15</td>
<td>2.6%</td>
</tr>
</tbody>
</table>

Grouped

<table>
<thead>
<tr>
<th>Age Range</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>11 - 12</td>
<td>38.5%</td>
</tr>
<tr>
<td>13</td>
<td>32.1%</td>
</tr>
<tr>
<td>14 - 15</td>
<td>29.5%</td>
</tr>
</tbody>
</table>
3. Are you a boy or a girl?
   boy 43.6%
   girl 56.4%

4. What grade are you in?
   grade 6 35.9%
   grade 7 14.1%
   grade 8 50%

5. What kind of grades do you get in school?
   Mostly As 26.9%
   Mostly As and Bs 37.2%
   Mostly Bs 2.6%
   Mostly Bs and Cs 11.5%
   Mostly Cs 2.6%
   Mostly Cs and Ds 16.7%
   Mostly Ds or lower 2.6%
   My school doesn’t give grades -

6. How well do each of the following statements describe you? Is each statement a lot like you, somewhat like you, not much like you, or not at all like you?

<table>
<thead>
<tr>
<th>Statement</th>
<th>A lot like me</th>
<th>Somewhat like me</th>
<th>Not much like me</th>
<th>Not at all like me</th>
</tr>
</thead>
<tbody>
<tr>
<td>I have a lot of friends</td>
<td>44.9</td>
<td>39.7</td>
<td>15.5</td>
<td>-</td>
</tr>
<tr>
<td>I get along well with my parents</td>
<td>46.2</td>
<td>39.7</td>
<td>7.7</td>
<td>5.1</td>
</tr>
<tr>
<td>I am often bored</td>
<td>34.6</td>
<td>30.8</td>
<td>29.5</td>
<td>3.8</td>
</tr>
<tr>
<td>I’m lonely</td>
<td>6.4</td>
<td>10.3</td>
<td>24.4</td>
<td>57.7</td>
</tr>
<tr>
<td>Compared to other people my age, I feel normal</td>
<td>37.2</td>
<td>43.6</td>
<td>15.4</td>
<td>3.8</td>
</tr>
<tr>
<td>Statement</td>
<td>Percentage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------------------------------------------------------------</td>
<td>------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I often feel rejected by people my age</td>
<td>11.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I get into trouble a lot</td>
<td>6.4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>There are lots of things I can do well</td>
<td>46.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I like myself</td>
<td>64.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I’m happy with myself</td>
<td>59.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I’m happy with my life</td>
<td>64.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have been happy at school this year</td>
<td>42.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I often feel sad or depressed</td>
<td>10.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I’m outgoing</td>
<td>42.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I’m shy</td>
<td>10.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I find it easy to make new friends</td>
<td>48.7</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Block 3**

Computer and Media Use: This set of questions is going to ask you about the computers and mobile devices you might use to connect to the Internet and about some of the things you might do on the Internet.

7. Did you use a computer yesterday?
   - Yes 87.2
   - No 12.8

8. What kind of computer do you most often use?
   - Desktop computer 3.8
   - Laptop computer 64.1
   - Tablet computer (like an iPad, Samsung Galaxy, or Kindle Fire) 32.1

9. Did you use the Internet yesterday?
   - Yes 97.4
   - No 2.6

10. What did you do on the Internet? TEXT
11. Which type of Internet access do you have at home?
   Dial up -
   High-speed, such as cable, DSL, or wireless 67.9
   I’m not sure 21.8
   I don’t have internet access at home 10.3

Block 4

12. Do you have any of the following items in your home? (Check all that you have)
   A video game player such as a Wii, PlayStation, or Xbox 88.5
   A handheld game player such as a Gameboy, PSP, or DS 46.2
   A laptop or desktop computer 76.9
   None of these 2.6

13. Do you personally have your own (Check all that you have)
   Smart phone 61.5
   Cell phone (not a smart phone) 11.5
   iPod or other MP3 player 23.1
   iPod Touch or similar device 42.3
   Tablet computer (like an iPad, Samsung Galaxy, or Kindle Fire) 64.1
   Desktop or laptop computer 65.4
   Gaming system like an Xbox, Playstation, or Wii 74.4
   None of these 1.3

14. Does anyone else who lives in your home have (Check all that you have)
   Smart phone 84.6
   Cell phone (not a smart phone) 24.4
   iPod or other MP3 player 32.1
iPod Touch or similar device 55.1
Tablet computer (like an iPad, Samsung Galaxy, or Kindle Fire) 69.2
Desktop or laptop computer 79.5
Gaming system like an Xbox, Playstation, or Wii 71.8
None of these -

15. Do you have any of the following items in your bedroom? (Including portables that you use mainly in your bedroom.) (Check all that you have)  
   TV 65.4
   Desktop or laptop Computer 39.7
   Internet Access 79.5
   Gaming system like an Xbox, Playstation, or Wii 39.7
   Mobile device (cell phone, iPod touch, tablet computer) 85.9

16. What type of device do you use most often to access the Internet?  
   Smart phone 52.6
   iPod Touch or similar device 11.5
   Tablet computer (like an iPad, Samsung Galaxy, or Kindle Fire) 11.5
   Desktop or laptop computer 14.1
   Gaming system like an Xbox, Playstation, or Wii 5.1
   Other: 3.8 (3)

17. Do you access the Internet from a cell phone, tablet, or other mobile device, at least occasionally?  
   Yes 97.4
18. How often, if ever do you do each of the following activities on a cell phone: often, sometimes, rarely, or never.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Often</th>
<th>Sometimes</th>
<th>Rarely</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Text message</td>
<td>56.4</td>
<td>26.9</td>
<td>9.0</td>
<td>5.1</td>
</tr>
<tr>
<td>Take pictures</td>
<td>53.8</td>
<td>23.1</td>
<td>15.4</td>
<td>5.1</td>
</tr>
<tr>
<td>Take videos</td>
<td>23.1</td>
<td>26.8</td>
<td>35.9</td>
<td>11.5</td>
</tr>
<tr>
<td>Listen to music</td>
<td>69.2</td>
<td>16.7</td>
<td>6.4</td>
<td>5.1</td>
</tr>
<tr>
<td>Play games</td>
<td>33.3</td>
<td>33.3</td>
<td>20.5</td>
<td>10.3</td>
</tr>
<tr>
<td>Connect to the Internet</td>
<td>71.8</td>
<td>15.4</td>
<td>5.1</td>
<td>3.8</td>
</tr>
<tr>
<td>Go to social networking sites like MySpace or Facebook</td>
<td>70.5</td>
<td>11.5</td>
<td>2.6</td>
<td>12.8</td>
</tr>
<tr>
<td>Watch videos</td>
<td>53.8</td>
<td>29.5</td>
<td>9.0</td>
<td>5.1</td>
</tr>
</tbody>
</table>

19. Please select each of the following activities you have ever done.

- Sent or received email                       | 89.7  |
- “Checked in” with a location service on your cell phone, like FourSquare or Loopt | 19.2  |
- Watched a video on a site like YouTube or Google Video | 89.7  |
- Posted a video to a site like YouTube or Google Video | 24.4  |
- Created a profile for yourself on a social networking site such as Facebook, Instagram, or Twitter | 75.6  |
- Created your own character or pet online     | 29.5  |
- Played a video or computer game against other players online | 53.8  |
20. How often do you send or receive text messages on a cell phone?
   - Almost constantly: 26.9
   - Several times a day: 39.7
   - Once a day: 5.1
   - Several times a week: 11.5
   - Once a week: 3.8
   - Less than once a week: 6.4
   - Never: 3.8

21. Thinking only about yesterday, about how many text messages did you send? Your best guess is fine. If you did not send any text messages, please write “0”.
   a. __________

22. When you use a computer how often do you do any of the following activities at the same time: watch TV, read, play video games, text message, or listen to music?
   - most of the time: 43.6
   - some of the time: 26.9
   - a little of the time: 23.1
   - never: 3.8

23. When you do your homework, how often do you do any of the following activities at the same time: use a computer, watch TV, read, play video games, text message, or listen to music?
   - most of the time: 32.1
   - some of the time: 32.1
   - a little of the time: 21.8
   - never: 11.5

***MEDIA LITERACY QUESTIONS
24. Which websites are MOST LIKELY to be trustworthy for schoolwork? (N = 76 due to missing data)
a website with a .org domain 67.1
a website with lots of advertisements 3.9
a website with many grammatical and spelling mistakes 3.9
a website written by university professors that includes their contact information 61.8
a website that is frequently updated with news and with new sources cited 57.9

25. Rachel is writing a report on the history of baseball. She found a lot of information on Wikipedia, but she’s not sure if it’s accurate. What should Rachel do? (N = 76 due to missing data)

   Edit the page’s content herself. 1.3
   Assume it’s accurate because it is on Wikipedia. -
   Check the source links to determine if they are reliable. 82.9
   Use the information and claim it is from a different site. 15.8
Please mark how much you agree or disagree with each of these. (These questions were randomized when presented to students) (N = 75 due to missing data)

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most of the time, when people advertise products they are more concerned about making a profit than giving correct information.</td>
<td>1.3</td>
<td>12.0</td>
<td>52.0</td>
<td>34.7</td>
</tr>
<tr>
<td>People who advertise think very carefully about the people they want to buy their product.</td>
<td>4.0</td>
<td>28.0</td>
<td>46.7</td>
<td>21.3</td>
</tr>
<tr>
<td>Two people may see the same movie or TV show and get very different ideas about it.</td>
<td>-</td>
<td>2.7</td>
<td>65.3</td>
<td>32.0</td>
</tr>
<tr>
<td>Two people may see the same advertisement and get very different ideas about it.</td>
<td>-</td>
<td>4.0</td>
<td>66.7</td>
<td>29.3</td>
</tr>
<tr>
<td>People are influenced by TV and movies, whether they realize it or not.</td>
<td>1.3</td>
<td>4.0</td>
<td>74.7</td>
<td>20.0</td>
</tr>
<tr>
<td>People are influenced by advertisements, whether they realize it or not.</td>
<td>1.3</td>
<td>14.7</td>
<td>68.0</td>
<td>16.0</td>
</tr>
<tr>
<td>When people make movies and TV shows, every camera shot is very carefully planned.</td>
<td>4.0</td>
<td>9.3</td>
<td>54.7</td>
<td>32.0</td>
</tr>
<tr>
<td>When people make advertisements, every camera shot is very carefully planned.</td>
<td>1.3</td>
<td>22.7</td>
<td>57.3</td>
<td>18.7</td>
</tr>
<tr>
<td>Movies and TV shows don’t usually show life like it really is.</td>
<td>-</td>
<td>10.7</td>
<td>66.7</td>
<td>22.7</td>
</tr>
<tr>
<td>Advertisements usually leave out a lot of important information.</td>
<td>1.3</td>
<td>18.7</td>
<td>56.0</td>
<td>24.0</td>
</tr>
<tr>
<td>When you see an ad, it is very important to think about what was left out of the ad.</td>
<td>4.0</td>
<td>25.3</td>
<td>54.7</td>
<td>16.0</td>
</tr>
<tr>
<td>When you see something on the Internet the creator is trying to convince you to agree with their point of view.</td>
<td>-</td>
<td>13.3</td>
<td>70.7</td>
<td>16.0</td>
</tr>
<tr>
<td>When you see something on the Internet you can always believe that it is true.</td>
<td>56.0</td>
<td>34.7</td>
<td>6.7</td>
<td>2.7</td>
</tr>
<tr>
<td>Photos your friends post on social media are an accurate representation of what is going on in their life.</td>
<td>18.7</td>
<td>38.7</td>
<td>32.0</td>
<td>10.7</td>
</tr>
<tr>
<td>Sending a document or picture to one friend on the Internet means no one else will ever see it.</td>
<td>46.7</td>
<td>46.7</td>
<td>5.3</td>
<td>1.3</td>
</tr>
<tr>
<td>When you see something on the Internet you look at the source before deciding if it is trustworthy.</td>
<td>2.7</td>
<td>22.7</td>
<td>61.3</td>
<td>13.3</td>
</tr>
</tbody>
</table>
Block 6

Social Media: This next set of questions is about “social media.” By “social media,” we mean social networking sites like Facebook and MySpace; programs like Twitter or Tumblr; virtual worlds like Second Life; online chatting in video or computer games like World of Warcraft; and things posted on sites like YouTube, or other websites.

26. How often do you go to a social networking site like Facebook, Instagram, or Twitter?
   - Almost constantly: 23.1
   - Several times a day: 41.0
   - Once a day: 7.7
   - Several times a week: 7.7
   - Once a week: 2.6
   - Less than once a week: 7.7
   - Never: 9.0

Grouped
   - Often: more than once a day: 64.1
   - Rarely: once a day or less: 23.1
   - Never: 9.0

27. How often do you send or receive message on a social networking site like Facebook, Instagram, or Twitter?
   - Almost constantly: 10.3
   - Several times a day: 41.0
   - Once a day: 5.1
   - Several times a week: 14.1
   - Once a week: 6.4
   - Less than once a week: 7.7
   - Never: 11.5

28. How often do you send or receive instant messages (IMs) or other online chats?
   - Almost constantly: 11.5
Several times a day 29.5
Once a day 7.7
Several times a week 11.5
Once a week 6.4
Less than once a week 3.8
Never 25.6

29. How often do you use video chat such as Skype, Facetime, Google Chat, or iChat?
  Almost constantly 6.4
  Several times a day 9.0
  Once a day 3.8
  Several times a week 5.1
  Once a week 10.3
  Less than once a week 29.5
  Never 32.1

30. How often do you write a blog or comment on someone else’s blog?
  Almost constantly 3.8
  Several times a day 6.4
  Once a day 2.6
  Several times a week 11.5
  Once a week 6.4
  Less than once a week 10.3
  Never 55.1

31. How often do you visit virtual worlds such as Second Life, World of Warcraft, or The Sims?
  Almost constantly -
  Several times a day 3.8
  Once a day 7.7
  Several times a week 5.1
Once a week 2.6
Less than once a week 1.3
Never 75.6

32. How often do you chat through text online with other players in a video or computer game?
   Almost constantly 2.6
   Several times a day 5.1
   Once a day 5.1
   Several times a week 6.4
   Once a week 2.6
   Less than once a week 7.7
   Never 66.7

33. How often do you talk through headsets to other players online in a video or computer game?
   Almost constantly 2.6
   Several times a day 1.3
   Once a day 1.3
   Several times a week 3.8
   Once a week 3.8
   Less than once a week 2.6
   Never 80.8

Block 7

34. Which, if any, social networking sites do you use?
   Facebook 65.4
   Twitter 29.5
   Instagram 67.9
   Google+ 34.6
   Snapchat 59.0
Vine 34.6
Tumblr 12.8
Other: 21.8
I do not use any social media sites 9.0

Number of social media sites used (calculated)
9  1.3
8  1.3
7  2.6
6  6.4
5  21.8
4  12.8
3  11.5
2  19.2
1  10.3
0  7.7

Number of social media sites used (calculated grouped)
High: 4 or more sites 46.2
Low: 0-3 sites 48.7

35. Which social networking site do you use most often?
Facebook 24.4
Twitter 1.3
Instagram 41.0
Google+ 2.6
Snapchat 11.5
Vine 1.3
Tumblr -
I don’t use any social networking sites NA
Other: 2.6
36. If you have a Facebook account about how many friends do you have?
   *percentages taken from number of students who have a FB account. (n=51)
   
<table>
<thead>
<tr>
<th>Range</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>low 1-199</td>
<td>37.3</td>
</tr>
<tr>
<td>mid 200-399</td>
<td>27.5</td>
</tr>
<tr>
<td>high 400 or</td>
<td>23.5</td>
</tr>
<tr>
<td>more</td>
<td></td>
</tr>
<tr>
<td>unsure</td>
<td>11.8</td>
</tr>
</tbody>
</table>

37. If you have an Instagram account about how many followers do you have?
   *percentages taken from number of students who have a FB account. (n=54)

<table>
<thead>
<tr>
<th>Range</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>low 1-199</td>
<td>31.5</td>
</tr>
<tr>
<td>mid 200-399</td>
<td>27.8</td>
</tr>
<tr>
<td>high 400 or</td>
<td>33.3</td>
</tr>
<tr>
<td>more</td>
<td></td>
</tr>
<tr>
<td>unsure</td>
<td>7.4</td>
</tr>
</tbody>
</table>

38. If you have a Twitter account about how many followers do you have?
   *percentages taken from number of students who have a FB account. (n=22)

<table>
<thead>
<tr>
<th>Range</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>low 1-199</td>
<td>54.5</td>
</tr>
<tr>
<td>mid 200-399</td>
<td>18.2</td>
</tr>
<tr>
<td>high 400 or</td>
<td>27.3</td>
</tr>
<tr>
<td>more</td>
<td></td>
</tr>
</tbody>
</table>

39. How often do you check your social networking site(s)?

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Several times a day</td>
<td>64.1</td>
</tr>
<tr>
<td>Once a day</td>
<td>10.3</td>
</tr>
<tr>
<td>Several times a week</td>
<td>3.8</td>
</tr>
<tr>
<td>Once a week</td>
<td>2.6</td>
</tr>
<tr>
<td>Less than once a week</td>
<td>5.1</td>
</tr>
</tbody>
</table>
40. How often do you post things to your own or someone else’s social networking site(s)?

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Several times a day</td>
<td>16.7</td>
</tr>
<tr>
<td>Once a day</td>
<td>10.3</td>
</tr>
<tr>
<td>Several times a week</td>
<td>20.5</td>
</tr>
<tr>
<td>Once a week</td>
<td>15.4</td>
</tr>
<tr>
<td>Less than once a week</td>
<td>23.1</td>
</tr>
</tbody>
</table>

41. From which type of device do you most often access your social networking site(s)?

<table>
<thead>
<tr>
<th>Device</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer</td>
<td>-</td>
</tr>
<tr>
<td>Laptop computer</td>
<td>5.1</td>
</tr>
<tr>
<td>Tablet (like an iPad, Samsung Galaxy, or Kindle Fire)</td>
<td>11.5</td>
</tr>
<tr>
<td>Phone</td>
<td>65.4</td>
</tr>
<tr>
<td>Other device: ipod</td>
<td>3.8</td>
</tr>
</tbody>
</table>

**Block 8**

The next group of questions will ask you about rules your parents might have about your media use. And about how social media might affect your relationships with your family and friends.

42. Do your parents have any rules about which video games you’re allowed to play?

<table>
<thead>
<tr>
<th>Response</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>47.4</td>
</tr>
<tr>
<td>No</td>
<td>47.4</td>
</tr>
</tbody>
</table>

43. Do your parents have any rules about what you’re allowed to do on the computer?

<table>
<thead>
<tr>
<th>Response</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>66.7</td>
</tr>
<tr>
<td>No</td>
<td>28.2</td>
</tr>
</tbody>
</table>

44. Do your parents have any rules about whether or not you can have a profile on a social networking site?

<table>
<thead>
<tr>
<th>Response</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>57.7</td>
</tr>
<tr>
<td>No</td>
<td>37.2</td>
</tr>
</tbody>
</table>
45. Do your parents have any rules about how much time you can spend playing video games?
   - Yes: 42.3%
   - No: 52.6%

46. Do your parents have any rules about how much time you can spend on the computer?
   - Yes: 39.7%
   - No: 55.1%

47. Do your parents have any rules about how much time you can spend on your cell phone?
   - Yes: 33.3%
   - No: 61.5%

48. Do your parents have any rules about how much time you can spend on the internet?
   - Yes: 32.1%
   - No: 62.8%

49. Do your parents have any rules about downloading or purchasing apps?
   - Yes: 60.3%
   - No: 34.6%

50. In general how often do your parents make sure you follow the rules they have about using media?
   - most of the time: 33.3%
   - some of the time: 19.2%
   - a little of time: 20.5%
   - never: 6.4%
   - my parents don’t have rules about using media: 15.4%

*Block 9*
51. Which of the following is your favorite way to communicate with your friends?

- In person: 70.5
- Talking on the phone: 3.8
- Texting: 16.7
- Through a social networking site: 2.6
- Using IM or some other online chat program: -
- Using a video program like Skype, iChat, or Facetime: 1.4
- Through email: -
- By chatting or talking online in a video or computer game: -
- Through Twitter: -

52. Which of the following, if any, are reasons why this is your favorite way to communicate with your friends?

- It’s the quickest: 33.3
- We can talk more seriously that way: 52.6
- It’s the easiest: 33.3
- It’s more private: 25.6
- I feel more comfortable talking about personal things that way: 43.6
- It’s less awkward: 21.8
- I can understand what people really mean better this way: 50.0
- It gives me time to think about how to respond: 20.5
- It’s more fun: 37.2
- Other (specify): 7.7

53. Which of the following is your **MAIN REASON** why this is your favorite way to communicate with your friends?

- It’s the quickest: 17.9
We can talk more seriously that way 14.1
It’s the easiest 11.5
It’s more private 5.1
I feel more comfortable talking about personal things that way 11.5
It’s less awkward 1.3
I can understand what people really mean better this way 11.5
It gives me time to think about how to respond 6.4
It’s more fun 12.8
Other (specify) 1.3

Block 10

Please choose the answer that best applies to your experience.

54. Using my social networking site makes me feel:
   More confident 19.2
   less confident -
   doesn’t make much difference one way or the other 69.2
   I do not use any social media sites 6.4 (these students were not shown the rest of this block)

55. Using my social networking site makes me feel:
   Better about myself 14.1
   worse about myself 1.3
   doesn’t make much difference one way or the other 71.8

56. Using my social networking site makes me feel:
   More connected with my family and friends 34.6
less connected with my family and friends 5.1
doesn’t make much difference one way or 46.2
the other

57. Using my social networking site makes me feel:
   More sympathetic to what other people are 20.5
   going through
   less sympathetic to what other people are 3.8
   going through
doesn’t make much difference one way or 62.8
   the other

58. Using my social networking site makes me feel:
   More outgoing 23.1
   less outgoing 2.6
doesn’t make much difference one way or 61.5
   the other

59. Using my social networking site makes me feel:
   More depressed 2.6
   less depressed 9.0
doesn’t make much difference one way or 75.6
   the other

60. Using my social networking site makes me feel:
   More popular 20.5
   less popular 2.6
doesn’t make much difference one way or 62.8
   the other

61. Using my social networking site makes me feel:
More shy 1.3
less shy 25.6
doesn’t make much difference one way or the other 60.3

Block 11
Some people think using Twitter or social networking sites like Facebook and MySpace helps their relationships with their friends. Other people think using social networking sites and Twitter hurts their relationships with their friends and family. We want to know what your experience has been.

62. Has using your social networking site mainly helped or mainly hurt or has not made a difference in your relationship with your friends?
   
   | Helps      | 20.5 |
   | Hurt       | 1.3  |
   | It has not made a difference | 25.6 |
   | It has both helped and hurt | 34.6 |

63. Has using your social networking site mainly helped or mainly hurt or has not made a difference in your relationship with your teachers?

   | Helps      | 6.4  |
   | Hurt       | 1.3  |
   | It has not made a difference | 67.9 |
   | It has both helped and hurt | 6.4  |

64. Has using your social networking site mainly helped or mainly hurt or has not made a difference in your relationship with your parents?

   | Helps      | 9.0  |
   | Hurt       | 5.1  |
   | It has not made a difference | 57.7 |
   | It has both helped and hurt | 10.3 |
65. Has using your social networking site mainly helped or mainly hurt or has not made a difference in your relationship with your other family members like cousins, aunts and uncles, or grandparents?

- Helped: 21.8
- Hurt: 3.8
- It has not made a difference: 50.0
- It has both helped and hurt: 6.4

**Block 12**

Please choose if you agree or disagree with each of the following statements.

66. Using my social networking site has helped me get to know other students at my school better.

- Agree: 66.7
- Disagree: 14.1

67. Using my social networking site has helped me stay in touch with friends I can’t see on a regular basis.

- Agree: 75.6
- Disagree: 5.1

68. Using my social networking site has helped connect me with new people who share a common interest, hobby, or activity of mine

- Agree: 51.3
- Disagree: 29.5

69. Using my social networking site often distracts me when I should be paying attention to the people I’m with

- Agree: 43.6
- Disagree: 37.2

70. Using my social networking site has helped me be more aware of current events

- Agree: 69.2
- Disagree: 11.5
71. How often, if ever, have you encountered the following types of comments in social media: [often, sometimes, rarely, never]

<table>
<thead>
<tr>
<th>Type of Comments</th>
<th>Often</th>
<th>Sometimes</th>
<th>Rarely</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Racist comments, that is, someone putting people down based on their race or ethnicity – such as for being Black, Hispanic, Asian, or White, or using insulting words that refer to race</td>
<td>9.0</td>
<td>26.9</td>
<td>23.1</td>
<td>25.6</td>
</tr>
<tr>
<td>Homophobic comments, that is, someone putting people down for being gay or using insulting words about being gay</td>
<td>7.7</td>
<td>28.2</td>
<td>17.9</td>
<td>29.5</td>
</tr>
<tr>
<td>Sexist comments, that is, someone putting girls or guys down in a way that called attention to their gender or using insulting words about women or men</td>
<td>7.7</td>
<td>19.2</td>
<td>30.8</td>
<td>25.6</td>
</tr>
<tr>
<td>Anti-religious comments, that is, someone putting people down for their religious beliefs – such as for being Muslim, Jewish, Mormon, Christian, or for not being religious enough</td>
<td>7.7</td>
<td>14.1</td>
<td>23.1</td>
<td>38.5</td>
</tr>
</tbody>
</table>

72. Have you ever flirted with someone online or through texting who you wouldn’t have flirted with in person?
   - Yes 28.2
   - No 55.1

73. Have you ever said something bad about someone online or through texting that you wouldn’t have said in person?
   - Yes 30.8
   - No 52.6
74. Have you ever become friends with someone you met through an online game?
   Yes 20.5
   No 61.5

75. Have you ever edited pictures to make yourself look better before you posted them online?
   Yes 23.1
   No 60.3

76. Please read each statement below and check any that you agree with.
   I wish my parents would spend less time on their cell phones and other devices 20.5
   Sometimes I wish I could just “unplug” for awhile 20.5
   I get frustrated with my friends for texting, surfing the internet, or checking their social networking sites instead of paying attention to me when we’re hanging out together 29.5
   Sometimes I wish I could go back to a time when there was no Facebook 15.4
   I love posting photos of me and my friends online 38.5
   I get stressed out about how I look when I post pictures online 17.9
   I worry about people posting ugly pictures of me and tagging me in them 17.9
   I feel pressured to post photos even when I don’t want to 7.7
   I sometimes feel left out or excluded after seeing photos 29.5
   I feel bad about myself when nobody comments on or “likes” my photos 15.4

Block 14
About your family: This page will ask you some questions about you and your family. Please ask an adult to help you if you are unsure of an answer.
77. Who are the adults you live with? If you live in more than one home, please answer about the home you spend the most time in.

- Mother: 82.1
- Father: 65.4
- Stepmother: 7.7
- Stepfather: 19.2
- Some other adults (specify): grandmother, grandpa, aunt, sister, brother, sister’s boyfriend, grandmas and nephew: 7.7

78. What is the highest level of school your mother has completed?
- Some high school or less: 2.6
- Finished high school: 17.9
- Some college or special school after high school: 12.8
- Finished college: 38.5
- School beyond college (like doctor, lawyer, professor, social worker): 15.4
- No one fills the role of mother in my family: 3.8

79. What is the highest level of school your father has completed?
- Some high school or less: 9.0
- Finished high school: 42.3
- Some college or special school after high school: 7.7
- Finished college: 16.7
- School beyond college (like doctor, lawyer, professor, social worker): 12.8
- No one fills the role of father in my family: 2.6

80. What is your race or ethnic background?
<table>
<thead>
<tr>
<th>Race Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>White (not Hispanic)</td>
<td>80.8</td>
</tr>
<tr>
<td>Black or African-American (not Hispanic)</td>
<td>1.3</td>
</tr>
<tr>
<td>Hispanic/Latino – White</td>
<td>6.4</td>
</tr>
<tr>
<td>Hispanic/Latino – Black</td>
<td>-</td>
</tr>
<tr>
<td>Asian, Asian Indian, or Pacific Islander</td>
<td>-</td>
</tr>
<tr>
<td>Native American or Alaskan Native</td>
<td>2.6</td>
</tr>
<tr>
<td>Some other race</td>
<td>-</td>
</tr>
<tr>
<td>Hispanic (unspecified)</td>
<td>-</td>
</tr>
</tbody>
</table>
Appendix B

Interview Protocol for Session 1 (page 1 of 2)

We are going to talk about the Internet and some things you might do online. I am also going to ask you to draw some pictures that show your understanding of how the Internet works. There are no right or wrong answers. I just want to know what you think.

Picture 1:

Draw a picture to show me what the Internet looks like.

Follow-up questions for drawing 1

1. Use your picture to tell me about what the Internet looks like. (prompt for details about picture as needed: What is this part? / Tell me more about that? / Can you explain this?)

2. What is the Internet?*

3. Where is the Internet?*

4. How big is the Internet?*

5. How many computers are there on the Internet?

6. How did you know about that?

7. How many websites are there on the Internet?

8. How did you know about that?

9. If you could walk into the Internet what would it look like?

10. If you stand a long distance away from the Internet what does it look like?
Appendix B continued

Interview Protocol for Session 1 (page 2 of 2)

Picture 2:

*Ok, now I am going to ask you to draw another picture.*

Draw a picture to show me how a photograph travels through the Internet when you share it online.

**Follow-up questions for drawing 2**

1. Use your picture to explain to me how a photograph travels through the Internet?
2. What happens to the picture as it travels through the Internet?
3. How do other people see that photo?

Picture 3:

*Now I am going to ask you to draw one more picture.*

Draw a picture to show me what might happen to a file after someone hits the send button to send a friend a homework assignment?

**Follow-up questions for drawing 3**

1. Use your picture to explain what happens to the homework assignment when it is sent through the Internet.
2. How was it shared?
Appendix D

Post-video Questions (page 1 of 2)

Revisiting pictures

So now what? What do you think?

I’m going to show you one of the pictures you drew earlier when I asked you, “What is the Internet and what does it look like?” Please look at your picture and tell me if there is anything you would like to change about your picture? What do you think? [give photocopies of drawing to each participant] What would you title your new picture?

While you are making any changes I also want to you write TWO sentences telling me What has changed for you.

Questions to guide group discussion

Now that we have all had a chance to think about our pictures, let’s talk about what we think.

1. What has changed for you now? [prompt for picture changes]
   a. What did you title your picture?
   b. What did you write?

2. What happens when you post something on the Internet?

3. What happens when you delete something from the Internet?

4. What are user agreements on social networking sites?
   a. Have you ever read a user agreement? Why or why not?
   b. Have you ever agreed to a user agreement?
   c. Do you think you will read one in the future?
Appendix D continued

Post-video Questions (page 2 of 2)

5. What would you tell other kids about using social media?

6. What would you tell your friends when they are about to (1) post a photo and (2) share their homework?

7. If you were going to keep talking about the things we have talked about today on social media what would the hashtag be? Can you write it down?

8. Did you learn something? What did you learn?
Appendix E
Coding Manual
Children’s Social Media Use and Conceptions of the Internet

1. Complete coding for an entire scheme on all transcripts before moving on.
2. Codes are exclusive and only one code may be assigned within a question or question block.
3. Coding will take place in the transcript documents.
   a. use comment boxes to assign code & highlighting as needed to mark important text
   b. refer to coding manual and training transcripts (101 – 107)

PICTURE 1: Code drawing AND child description of the drawing.
PICTURE 1b: Code drawing with changes AND descriptions of what changed including sentences written.

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
</table>
| W: Websites | Picture of the Internet as a website, often a search engine (Google) or social media site (Facebook, Instagram). Website also includes web browsers such as Internet Explorer and logos of sites or browsers (e.g. Google logo or IE logo)  
  **Note:** E if Google home page or an Internet search bar.  
  **Note:** SM if Facebook, Instagram, SnapChat or other SM |
| D: (single) device | Picture of the Internet as a computer or mobile device. If the picture includes a specific website but is clearly on a computer, phone, etc… Code as single device. |
| M: multiple computers | Picture of the Internet as multiple computers/phones/tablets (2 or more) with or without simple connections. A person sending and receiving things (documents, pictures, files) |
| C: cloud | Picture of the Internet as the Cloud, a wifi signal, etc… but shows some understanding of the Internet as a mechanism that can send and receive information. The Internet as an abstract idea. The internet as something that can be retrieved and connected to. |
| P: people connecting | Picture of the Internet as people connecting, but DOES NOT include a computer or other electronic device in the drawing. Shows a network of communication. |
| N: network | Picture of the Internet as a network system, with multiple connections. **Includes relay stations such as a server, radio tower, or satellites.** Includes people sending and receiving things (documents, pictures, files) and researching or searching things. Includes infrastructure – shows service outside of the device. |
### Picture 1 and 1b: Secondary Coding to Level.
#### Level of Understanding of the Internet

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimal</td>
<td>A minimal understanding of the Internet includes pictures coded W: Websites, D: (single) device,</td>
</tr>
<tr>
<td>Partial</td>
<td>M: Multiple computers and C: Cloud</td>
</tr>
<tr>
<td>Sophisticated / Extended</td>
<td>A sophisticated understanding of the Internet includes pictures coded, N: Network P: People Connecting,</td>
</tr>
</tbody>
</table>

#### Interview part 1:
**QUESTIONS** - What is the Internet?/Where is the Internet?/How big is the Internet?

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimal</td>
<td>A minimal understanding is the Internet as bound within a single device. Lots of people may have devices with the Internet inside them. The Internet can be turned on and off, as with the device. Included describing the Internet as a website included search engines (e.g. Google), social media (e.g. Facebook), and a place for entertainment (e.g. play games, watch videos, look at pictures, listen to music)</td>
</tr>
<tr>
<td>Partial</td>
<td>A partial (developing) understanding of the Internet is an awareness of something outside of the device like data or wifi. Includes talking about the Internet as multiple computers/devices with <strong>simple connections</strong>, reference to the Cloud, and people sending or receiving things on the Internet.</td>
</tr>
<tr>
<td>Sophisticated / Extended</td>
<td>A sophisticated understanding of the Internet includes talking about a Network of computers/devices or people connecting. The Internet is full of connections and communication. Devices connecting to each other. The Internet as people connecting and communicating.</td>
</tr>
</tbody>
</table>
PICTURE 2: Draw me a picture to show me what happens to a photograph when it's shared online.

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linear</td>
<td>Images / Files travel from point A directly to point B or other points, on a linear pathway. Images can go from point to point but still linear. It travels through the Internet, through mega pixels and goes a whole bunch of places.</td>
</tr>
<tr>
<td>Multi Linear</td>
<td>Images / Files do not travel directly from point A to point B. Images go viral. Image is on the Internet even if deleted from source (someone could still access it). Multi possible pathways along which the image can travel including loops and branching jumps.</td>
</tr>
</tbody>
</table>

PICTURE 3: Can you draw me a picture to show what might happen to a file after someone hits the send button to send a friend a homework assignment.

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Friend</td>
<td>Homework file travels to a friend.</td>
</tr>
<tr>
<td>Others, Teacher/Principal</td>
<td>Recognize that other people could get the homework in addition to the friend. The friend could share with more people. A hacker could get it from their computer. The homework ends up with the teacher or principal and they could get in trouble.</td>
</tr>
</tbody>
</table>

VIGNETTE 1: Did Taylor do the right thing by deleting the picture?

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>Yes, Taylor did the right thing.</td>
</tr>
<tr>
<td>No</td>
<td>No, Taylor did not do the right thing. / No, it’s still out there.</td>
</tr>
<tr>
<td>Tried</td>
<td>Yes, but she shouldn’t have posted it in the first place. / People still say it. / She tried to do the right thing. / Yes and no, it was good to delete but she shouldn’t have done it.</td>
</tr>
<tr>
<td>Still there</td>
<td>Yes, but it’s still on the Internet. / Yes, but people could have it or screenshots it.</td>
</tr>
</tbody>
</table>
### VIGNETTE 1: Is there a risk that something bad might happen with this picture? What kind of risk?

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predator</td>
<td>Someone could find her and target her. Kidnap. Do something bad. Be a bully [someone she doesn’t know]. The idea that a person unknown “someone creepy” could use the photo.</td>
</tr>
<tr>
<td>Bully</td>
<td>Friends could make fun of her. Friends could bully her. She might get teased or called names.</td>
</tr>
<tr>
<td>Alter</td>
<td>Someone could alter the picture in some way. The person could use the altered picture to make-fun of the person or make it even worse/more embarrassing. Someone could alter with the intent to make it worse and post that to the Internet.</td>
</tr>
<tr>
<td>Repost</td>
<td>Someone could repost the picture.</td>
</tr>
<tr>
<td>Bad and Long-term consequences</td>
<td>Affect college or jobs, suspended from school.</td>
</tr>
<tr>
<td>No</td>
<td>There is no risk.</td>
</tr>
</tbody>
</table>

### VIGNETTE 2: Where did the homework go? Where is it now? Who might have it now?

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>to Riley</td>
<td>To Riley or to Riley’s computer</td>
</tr>
<tr>
<td>to Facebook / Internet</td>
<td>To Facebook, to her wall, to her Facebook followers Sent to everybody, sent to the Internet</td>
</tr>
</tbody>
</table>

### VIGNETTE 2: Is there a risk that something bad might happen with the homework?

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get caught</td>
<td>That the teacher or principal might find out. They could get caught. The teacher might notice. The teacher might find out and suspend. Includes cheating and getting caught (or punished) for it.</td>
</tr>
<tr>
<td>Cheating</td>
<td>They could cheat. / A lot of people can copy answers and claim it’s theirs</td>
</tr>
<tr>
<td>Predator</td>
<td>There is a risk to Riley that is not related to the homework sharing - Location, IP address, Predator-risk</td>
</tr>
<tr>
<td>No</td>
<td>There is no risk.</td>
</tr>
</tbody>
</table>
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