

EXECUTIVE SUMMARY

More than 90% of teens and young adults in the U.S. use the Internet (Pew Internet/Lenhart et al., 2011), and similar statistics are reported from many European countries (Ofcom, 2011). The implications of this are profound; a growing body of interdisciplinary research suggests the Internet has become a key medium for young people who have access to digital technology and the basic skills to use it. Various studies also suggest that the Internet shapes many aspects of young people's lives. In light of this growing importance of the Internet, various stakeholders—including parents, teachers, technology providers, policy-makers and, in some instances, young people themselves—have engaged over the past half a decade in a dialog about the risks and opportunities that young internet users experience online. A significant share of stakeholder writing focused on risky behaviors online, including contact risks, cyberbullying, and privacy problems (Pew Internet/Lenhart et al., 2011; boyd & Marwick, 2011; Palfrey, boyd, & Sacco, 2008). Researchers from various disciplines have also concentrated efforts on these issues, providing a growing body of data on these risk categories and related economic, social, and legal practices has become available and can be used to inform the public debate and policy-making.

Other important youth-related policy issues have yet to be explored in greater detail. This highlights one such underexplored topic: *information quality* in the youth and digital media context. This paper is motivated by the observation that the Internet has led to structural changes in the information environment that affect the quality of information (in this paper, we use the term “information” in the semantic and pragmatic sense, i.e. information as “meaning” and “effect”). The increased and more diverse set of “speakers” online, the lack of traditional gatekeepers, the entrance of new intermediaries, the disappearance or replacement of mechanisms and standards aimed at ensuring certain quality levels, media convergence, and context shifts make quality judgments about information in the digital media ecosystem arguably more challenging and corresponding skills even more important. The relative vulnerability of children given their stage of cognitive development and limited life experience increases the relevance of the problem. That being said, the ability to adequately deal with the multi-faceted information quality challenge is not a youth-specific issue that resolves itself once an individual reaches adulthood. Rather, the relevant skills, or the lack thereof, will significantly shape the ability to navigate cyberspace throughout a user's life.

This paper offers a conceptual framework to inform future research initiatives on this topic and serves as a navigation aid to slowly emerging policy debates. Second, the paper reviews a diverse body of literature—including disciplines such as information science, library science, psychology, sociology, anthropology, education, and law—at the intersection of research areas concerning digital media, youth, and information quality and cluster key findings onto the framework outlined in the first part of the paper.

Our approach is novel in two important respects. First, we suggest expanding the currently dominant theoretical model with its focus on credibility towards a more holistic notion and *framework* of information quality. Second, we suggest a stronger *process-orientation* when exploring information quality issues by looking at the entire process of youth interaction with information, which today includes not only the evaluation of a piece of information, but also the search, creation, and dissemination of information.

In order to be able to draw upon research from various disciplines, a common referent for categorizing studies that might subscribe to different disciplinary norms had to be established as part of our framework. We developed a tentative *taxonomy* with four basic clusters that approach information quality from different perspectives:

- The *ethnographic perspective* defines information quality as that which makes young information seekers choose one piece of information over another.
- The *adult-normative perspective* defines information quality and young users' recognition of it in terms of adult expectations and norms.
- The *systematic perspective* defines information quality through abstract reflection rather than empirical investigation.
- The *prescriptive perspective* defines information quality by how much the datum improves the lives of users, whether young or adult.

Using this taxonomy, we have reviewed studies in English that discuss digital media, youth (which we limit to individuals up to 18 years of age, i.e., legal minors under U.S. law), and information quality, with a primary focus on works from library and information science, sociology, and education, complemented by a review of ethnographic studies and research in the field of “new literacies.” The literature has been screened and organized along several interrelated, but not necessarily sequential, phases of youth interaction with information: determining information needs, searching for information, evaluating information, adapting and applying information, creating new information, and disseminating information.

In order to gain a deeper understanding of how youth determine information quality on the Internet, it is important to take into account the *different contexts* in which they engage with information online. For the purpose of this paper, we differentiate among three such contexts:

- The academic context, a set of patterns associated with school and homework;
- The personal context, a set of patterns associated with time alone
- The social context, a set of patterns associated with places and spaces of socializing and peer interaction.

Although it is analytically useful to parse out these contexts, they are in reality not mutually exclusive and may overlap in many cases. Our paper surveys practices in all three contexts, but our ultimate area of interest is the academic context.

The literature review offers an overview of the current state of research on information quality in the youth and digital media context. That being said, the individual findings highlighted in this paper need to be read in the specific methodological context of each scholarly contribution we have reviewed. More often than not, the findings summarized in this literature review are based on small sample sizes and therefore cannot be (over-)generalized. Nonetheless, the numerous studies we have summarized provide at least an early approximation of—and in the case of some recent studies even a proxy for—youths’ information quality experience online. With these important caveats in mind, we present the following findings from research, which outline some of the key issues covered in the paper. The findings are roughly clustered into three main categories: search, evaluation, and creation and dissemination.

Our review of literature on *how youth search for information*—particularly in the academic context—reveals a number of interesting insights and issues for further consideration, including the following:

- Several studies suggest that information-seeking activities often span both online and offline media (including human resources), that online and traditional sources do not necessarily present an either/or situation for youth, but that youth might use different information sources for varying purposes.
- Research findings on youths’ search behavior reflect the advances in online information retrieval systems over time. One early study found that young users often tried to use keywords to guess at website URLs, but more recent research showed young people ubiquitously using search engines. Studies suggest that youth generally feel positively about their experience with search tools. Nevertheless, research also suggests varying degrees of fluency with the full functionality of search engines.
- Exploratory studies suggest that younger users in particular prefer search results with clear reference to their topic, for instance in terms of keywords, while the context is of secondary importance to them. When searching through websites, younger users pay much attention to visual elements, including the quality of the graphics and multimedia. Research also suggests that youth prefer sites with large quantities of information.
- Our review of literature has revealed relatively little on how young users search for visual and interactive content, including videos—an area of growing importance with YouTube ranking among the most frequently-used search engines.

- In addition to the importance of search engines, ethnographic studies highlight the importance of “fortuitous searching”, a form of search involving browsing from link to link in an undirected manner—particularly where search in the personal context is concerned.
- According to multiple studies, the termination of the search process depends not only on the finding of satisfactory information, but also on factors such as motivation, boredom, time limit, and information overload.
- Information-seeking behavior shapes and is shaped by a set of contextual and demographic variables. Studies suggest that variables include not only the purpose of search, but also gender (boys and girls appear to employ different search and navigation strategies), socio-economic status, networks of friends, and to some extent age, race and ethnicity (for instance regarding information needs). However, many of these variables have not yet been fully explored.
- Key challenges are information overload, distraction, and complexity of information. These are challenges not only recognized by adults as facing youth, but also by youth through vocalizing their frustrations.

The second cluster of literature we reviewed looks at the phenomenon of *information evaluation* by exploring how youth make the decision about whether to use a given piece of information towards the purpose that motivated the search. We surveyed both research examining “relevance judgments” as well as “credibility judgments” and identified some overall patterns. In this thematic context, we interpret quality criteria as aspects of information quality, which deepen our understanding of how youth evaluate information online.

- At a basic level, various studies suggest that topicality is among the first evaluation criteria for youth and adults alike.
- Research suggests that youth use indirect cues and heuristics to judge the quality of websites. One study, for instance, reports that students filter out websites with pornographic content, websites with content and spelling errors, and websites lacking a bibliography. Distrust was also reported for .com sites, with a preference for .gov and .edu sites. A proposed theory about youth heuristics associated with digital media leads to a list of quality criteria that includes utility, importance, relevance, believability, popularity, etc.
- Perhaps the most important cue for youth—both in the search context as well as with respect to the evaluation of sites—is that of visual and interactive elements, as a number of studies indicate. Importantly, there is also some evidence that youth do see graphics and multimedia not just as indicators of overall quality, but also as information objects which are open to quality judgments.

- As in the search context, evaluation depends on a number of variables. Studies suggest that evaluation patterns are primarily shaped by the purpose and motivation of a search, with academic purpose and personal or social purpose as the two main values of the variable.
- Research suggests that gender affects evaluation. One study, for instance, suggests that male high school students seem to evaluate the credibility of websites more positively than their female peers do. Another study suggests that participants with high feminine-normative characteristics place more importance on the quantity and quality of visual designs than their female peers with high masculine-normative characteristics do.
- Social and cognitive development, which is usually a function of age, is among the most important variables shaping the ways in which youth perform evaluations. For instance, studies indicate that users' ability to articulate quality criteria, for instance, differs among different age groups. Another study suggests that the skepticism about certain types of information found on the Internet (e.g. health information) decreases, as youth gets older. Though further research is warranted, some studies document the influence of socio-economic status on evaluation as well as the relevance of variables such as race and ethnicity, peer influence, and individual preferences.
- Problems in this area are mostly concerns adults have for youth, especially that youth do not evaluate quality according to the established adult-normative criteria emphasizing credibility, accuracy, and authority. Another concern is that youth do not distinguish sufficiently between commercial and non-commercial content.

The third cluster of literature considered in this paper concerns youths' *information creation and dissemination* practices. Youths' creative activities are an important dimension of their interaction with information, which in turn can be expected to shape how they search for and evaluate information. Some of the key considerations include:

- A review of creative content categories such as social networking services, wikis, personal websites, blogs, self-authored content sharing, games, etc., suggests that a significant share of content creation happens within the personal and social contexts of a young person's life.
- Research shows that youth may acquire a number of skills as they create and disseminate content on the Internet. Broadly speaking, such practices allow youth to develop better skills in navigating the information environment and making judgments about the quality of information. In addition to the acquisition of digital fluency and technical skills, a growing body of literature further suggests that online spaces help youth develop language and writing skills, as well as social and collaborative skills.

- Norms exist for youth's information creation and dissemination activities. Such norms—which often take the form of expectations and behavior patterns—include peer-based reciprocity, practices and codes of conduct around “beta-reading,” feedback and editing, and interest-directed practice.
- Though content creation and dissemination practices from the personal and social contexts are significant for the academic context because they relate to information quality issues, the practices and norms that youth form around their content creation activities in the personal/social context may frequently clash with classroom norms and expectations. This complicates hopes of straightforward “skill transfer,” but leaves open the possibility that engagement with the entire culture of content creation and dissemination can bring skills into the classroom context in a way that a decontextualized approach to and understanding of youth skills may fail to do.

The fourth and last cluster of literature surveyed in the paper explores *how youth acquire behaviors* concerning search, evaluation, and creation of information. This section of the paper departs from traditional literature review conventions and adopts a discussion format in order to put the mostly small-scale intervention studies in dialog with the literature reviewed in the previous sections and the information quality framework developed in the first part of the paper. High-level insights gained from the engagement with selected literature include the following, including the identification of knowledge gaps:

- Youth acquire search, evaluation, and creation behaviors in personal, social and academic contexts. Ethnographic studies demonstrate that youth learn from engaging with games, creative activities, and virtual communities in personal and social contexts. These shape young users' social experience of the Internet as well as their notions of information quality.
- There is relatively little work examining how learning around search and evaluation works in the personal context. One ethnographic study points to the importance of learning through trial and error and piecemeal exploration, such as by refining search query terms after getting confused by initial research and by cross-referencing offline and online information.
- In the course of our review, we have not been able to identify research examining parents' roles in the development of youths' search and evaluation skills. Previous research demonstrates the impact of parental guidance on children's literacy; it would be interesting to explore whether this translates into the digital media space with phenomena such as fan fiction writing and information exchanges on social networking and online messaging sites.

- Several examples from ethnographic research suggest that virtual communities create norms for technology use and participation, which in turn shape young users' social experience of the Internet and their ideas about information quality.
- Studies suggest that the learning associated with information creation blends the personal and social contexts more than does the learning associated with information seeking and evaluating. Also, research suggests that the communities that form around digital media creation are not invariably mediated through digital media themselves. Settings such as clubhouses, after-school programs, and community centers provide opportunities for access and peer-based learning.
- In addition to studies examining how youth learn outside of school, academic literature also documents a series of school-based interventions aimed at improving youths' search, evaluation, and creation behavior. Research in this context is largely prescriptive, testing or seeking to improve youth behavior according to adult-normative standards, and pertains to media education and educational technology.
- Our review suggests that the majority of interventions regarding information quality tend to focus on carrying out the search process and aim to help students at this stage, for instance by providing specific tools for narrowing the search space or teaching students a specific process model for searching. Alternative approaches such as "minimalist instruction" or teaching "self-regulatory skills" also exist. The experiences with these interventions vary greatly. The timeframe for instruction and the degree of teacher involvement are important variables, some investigators think more important than the content of the actual intervention.
- Classroom interventions that focus on search often convey implicit prescriptions for evaluation. Much research, however, focuses on evaluation outside of the search process. One common, but frequently criticized, approach to teaching website evaluation is to prescribe a fixed set of evaluative criteria (i.e. a checklist). Alternative approaches include fostering critical thinking and teaching through games.
- Educational programs have emerged with the goal to teach creation and teach through creation. The Computer Clubhouse Network is likely the largest and best-documented educational initiative structured around information creation. Ethnographic studies also document efforts in other after-school programs and learning environments. Several studies discuss the (still limited) experiences with blogging, wikis, social networking, and the creation of video games in the academic context.

The research map on youth, digital media, and information quality offered in this paper sets the stage for at least two important conversations. First, it highlights specific focus areas and research questions that are currently underexplored, including

- How increased levels of creative interaction with information shape users' ideas of information quality and how they influence search and evaluation behavior.
- How different variables, including socio-economic status, gender, development and experience, and peer influences, affect the search, evaluation, and creation practices of youth.
- How to leverage youth content creation and dissemination activities effectively from the personal and social contexts for the academic context, and how to resolve the conflicts of expectations and norms between these two contexts.
- How to consistently, and systematically test educational interventions that teach young people how to search and evaluate search results. An effective testing method could be used on existing educational interventions and to develop new ones.

Perhaps even more important than the new questions the current state of research suggests is the mandate for a public *policy discussion* on youth, digital media, and information quality issues. As young people rely increasingly on the Internet as a source for information, a research-based policy is imperative.

For example, this paper reviews a body of literature on how young people access health information on the Internet. As youth turn to online sources for critical decisions about health, educators and policy-makers must be wary of the risks arising from information quality issues and seize the opportunity to design accessible online sources that account for youths' search, evaluation, and dissemination behaviors.

Educational interventions seeking to increase youth facility with navigating online information stand to benefit from the information quality framework, as the search, evaluation and creation process will increasingly come to bear on the modern information economy. As more careers demand immersion in digital technologies, education and job training must adapt to the new information ecosystem. As civic engagement, cultural participation and employment increasingly demand immersion in digital technologies, education must adapt to the new information ecosystem, especially to ensure that inequalities in support structures and access do not further deprive disadvantaged populations of opportunities for advancement.

We wrote this paper to initiate this policy discussion by distilling important findings in the literature and highlighting areas of future research. We have defined an information quality framework that emphasizes the imperative of involving in this policy discussion the participation of all stakeholders, including policy-makers, technology developers, educators, parents, and youth.