Pilot-testing an Online Credibility Evaluation Learning Tool

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Abstract
In light of students’ reliance on the Internet, their general lack of IL skills and unsophisticated criteria for evaluating online information, and the lack of consistent institutional IL training, new pedagogical models are needed to teach effective online IL skills. This research addresses the need for today’s students to learn to effectively evaluate online information and describes pilot tests of a prototype online credibility evaluation learning tool. Results of online and in-person pilot tests showed that students had positive responses to the tool and indicated that they found it useful and effective. Concrete suggestions for improving the tool were generated. This research investigates a new pedagogical model to teach IL and credibility evaluation skills situated in the online information environment.

Keywords: information literacy, credibility evaluation, online learning, college students


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1 Introduction
Information literacy (IL) has been called a survival skill in the Information Age (ALA, 1989; Eisenberg, 2010) and “a prerequisite for participation in society and the work force” (US 21st Century Workforce Commission, 2000). It has also been described as the critical literacy of the 21st century and the foundation of learning in our contemporary environment of continuous technological change (Bruce, 2004). According to the American Library Association’s definition: “To be information literate, a person must be able to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information” (ALA, 1989), which has become the widely accepted definition in academic libraries. Academic and accreditation agencies include IL goals in their educational standards, including the Association of College and Research Libraries and the Middle States Commission on Higher Education (ACRL, 2000; MSCHE, 2003).

Expanding on the ALA definition, IL is now seen as not just a single skill but a set of skills that are increasingly recognized as critical to success in today’s economy and society, with several professional organizations including IL skills in their official standards. The Partnership for 21st Century Skills’ “Framework for 21st Century Learning” describes the “skills, knowledge and expertise students should master to succeed in work and life in the 21st century” (Partnership for 21st Century Skills, 2011), among which are information literacy and critical thinking. Another professional organization, the International Society for Technology in Education (ISTE), developed their National Educational Technology Standards, described as “the standards for learning, teaching, and leading in the digital age” (ISTE, 2012), which include “Research and Information Fluency” and “Critical Thinking, Problem Solving, and Decision Making.” A report from the Georgetown University Center on Education and the Workforce states that competencies such as critical thinking, active learning, and complex problem-solving are required for success in STEM (Science, Technology, Engineering, Mathematics) occupations, which are critical to our nation’s continued economic competitiveness (Carnevale, Smith, & Melton, 2011). These standards from professional organizations indicate the IL skills are valued and needed not just in academia, but in the professional workplace as well. Students benefit from these critical skills throughout their lives, as they are key to preparing students for life-long learning (ALA, 1989; Daugherty & Russo, 2011).
2 Literature review

A key component of information literacy is the ability to evaluate the quality of information sources. In today’s information environment, evaluating the credibility of online information sources may be difficult for students due to the volume and diversity of sources and the lack of conventional quality control mechanisms and indicators of authority from traditional print-based formats (Rieh, 2002; Gasser et al., 2012; Metzger et al., 2010). Historically, the markers of credibility in print-based information sources were maintained by professional gatekeepers such as editors and reviewers (Rieh & Danielson, 2007). One of the chief differences between the web and traditional sources of information is that the web often lack the filters and markers of institutional credibility and authority which promote reliability in many print sources (Burbules, 2001; Mackey & Jacobsen, 2011). Overall, web pages typically offer few reliable cues to credibility that students can use in their evaluations (Iding et al., 2008). Today’s students must learn a new set of evaluation skills.

Despite the attempts of IL instruction programs to instill critical evaluation skills, research shows that college students rarely evaluate the quality of information sources that they find online (Becker, 2003; Julien and Barker, 2009; Kolowich, 2011; Parker-Gibson, 2005; Walraven et al., 2009). Overall, students have trouble evaluating information and do not have a critical attitude towards information on the web (Brand-Gruwel et al., 2005). This is a particularly urgent problem since the web is the first choice of information source for most students (Curtis, 2000; Herring, 2011; Mizrachi 2010; Swanson 2005). Costello et al. (2004) note that students with an “information-age mindset” rely almost exclusively on the web for all their information needs. College students overwhelmingly rely on Google to the exclusion of scholarly databases and library research tools (Hargittai et al., 2010; Head & Eisenberg, 2011; Kim & Sin, 2011; OCLC, 2002). Instead, students use tools that require little skill, and “appear satisfied with a very simple or basic form of searching” and assume that “search engines ‘understand’ their queries” (Rowlands et al., 2008, p. 297). In addition, students tend to demonstrate inflated views of their own IL skills, especially students with lower level skills whose lack of skill hinders their ability to accurately assess their own performance or to recognize expertise in others (Gross and Latham 2007).

Studies in the library community demonstrate that IL instruction has a positive impact on student skills, performance and academic achievement. College students who participate in information literacy classes report significantly less library anxiety (Van Scyoc, 2003) and high achieving students are more likely to report experiencing formal information literacy instruction (Smalley, 2004; Gross & Latham, 2007). Wang (2006) found statistically significant differences in grades between college students who took a library credit course and students who did not, and those who had taken the instruction in library skills received higher grades on their papers and in their courses. Selegean, Thomas & Richman (1983) also found a statistically significant improvement in the academic performance of those college students who had completed the library instruction course over those students who had not. Ren (2000) found that receiving library instruction significantly increased college students’ self-efficacy in electronic information searching. School library studies have also shown IL’s positive effect on high school student attitudes and achievement. Goodin (1991) showed that IL instruction makes a significant impact on high school students' attitudes and performance and helps prepare them for college; Lance et al. (2000) showed that school library programs increased high school student reading scores; and Todd et al. (1992) demonstrated positive impacts on high school students’ learning processes and outcomes.

While stakeholders in higher education and in professional societies agree that IL is necessary to students’ success in their education and afterward in their work and personal lives, only a small percentage of higher education institutions include a required information literacy component (Boff and Johnson 2002). Where they are instituted, traditional library-based IL training methods (one-shot sessions, tutorials, worksheets) are often simplistic, not customized to the online information environment, and rely on a traditional classroom-based pedagogical model, and thus may not connect effectively with today’s students.
These brief training sessions may be the only explicit and focused exposure to IL that most students receive, however, the limited time and contact with students make it difficult for librarians to keep students interested and engaged (Doshi, 2006). When learning new skills, today’s students often prefer active involvement in the learning process, and a networked, participatory learning environment (Davidson & Goldberg, 2009; Halse & Mallinson, 2009; Thomas & Brown, 2011). Overall, one-shot instruction sessions rarely provide students with the engagement and sustained practice required to learn, apply and master IL competencies (Mokhtar et al. 2008, Mery et al. 2012).

As an alternative to library-based instruction, learning software applications can support students in learning IL skills in a networked, participatory learning environment. through the use of instructional scaffolding. These computer-based learning environments incorporate scaffolding, defined as “instructional support in the form of guides, strategies, and tools that are used during learning to support a level of understanding that would be impossible to attain if the students learned on their own” (Azevedo, 2005, p. 199). These instructional scaffolds can help students to work through a difficult task and attain a higher level of proximal development that would be beyond their unassisted efforts (Ge & Land, 2004). With the assistance of scaffolds, learners can bridge the gaps between their current abilities and intended learning goals that would be unachievable through their unassisted effort alone (Rosenshine & Meister, 1992). The use instructional scaffolding can help students to develop strategies to be more critical in their evaluation of the credibility of web sources (Iding et al. 2008).

In light of students’ reliance on the Internet, their general lack of IL skills, limited critical evaluation practices, and the lack of effective institutional IL training, new pedagogical models are needed to teach effective online IL skills. Specifically, there is a need for IL training that is customized to the online information environment and relevant to the research habits of today’s students. If students are to effectively evaluate the credibility of online information sources, they must learn the specific criteria on which to judge the credibility of these sources, and the evidence necessary to support their evaluations (Metzger, 2007; Harris, 2008). They must also learn to base their judgments on evidence-based source characteristics rather than relying on subjective judgments based on intuition or projection (Markey, Rich & Leeder, in press). A new pedagogical model to address these issues should provided through structured scaffolding that support students in reflecting on their learning. Developing students’ critical skills regarding online credibility evaluation, and helping them learn a structured process based on specific criteria and making judgments based on specific evidence, will help students become critically aware users of online information, and will prepare them for lifelong learning.

3 InCredibility: A prototype online-credibility-evaluation learning tool

To address these issues, a custom-built prototype online credibility evaluation learning tool called “InCredibility” has been developed. The objective of the tool is to teach students how to evaluate the credibility of online information based on specific criteria and using specific evidence-base source characteristics. InCredibility situates IL instruction in the online environment where students actually do their research, and guides them through a structured process of evaluating online information in an interactive format. In addition, the online participatory tool can be used collaboratively by a large class while researching information for an assignment. The tool consists of a tutorial introducing the basic questions to ask when evaluating the credibility of online information (Who, What, Where, When and Why) and an interactive support feature to guide students in how to use the specific elements of websites to gather evidence for their evaluation (Figure 1) followed by an interactive exercise in which they practice locating the parts of the website which can provide evidence for their answers (Figure 2). Pop-up boxes give feedback on correct and incorrect answers, and a Tip button is available to give more guidance on finding the correct evidence.
Once students complete the tutorial, they begin the structured evaluation process, broken down into stages titled Investigate, Question, and Solve. In the Investigate stage, they search for online sources about their research topic. First, they use a browser-based plugin, the Notebook, to gather evidence for answering the evaluation questions (Figure 3). The Notebook prompts students to answer the Who, What, Where, When and Why questions with specific evidence from the website they have found.

The responses students enter in the Notebook are saved to a InCredibility website. During the Investigate stage (Figure 4) students can review and revise their answers to the credibility questions.
The Question stage (Figure 5) asks students to evaluate other students’ responses, and prompts reflection on their own work and the different ways that others may evaluate evidence. This helps reinforce that credibility judgments can be subjective.

![Figure 5: Question stage](image)

In the Solve stage (Figures 6) students compare two randomly chosen sources and their evaluations, and make decisions about which source is best for their research topic. This stage guides students through synthesizing multiple types of evidence to make a credibility evaluation, and reinforces that credibility is not a single factor but incorporates many elements.

![Figure 6: Solve stage](image)

Each stage of the InCredibility tool builds upon the previous stage, providing students with multiple opportunities to practice applying the credibility criteria and reinforcing their learning through reflection on their own work and that of their peers. The original five questions are matched to higher-level concepts (Authority, Relevance, Reliability, Currency, and Purpose), providing instructional scaffolding from everyday terminology to expert terminology. Through a step-by-step process of web-based tips and scaffolds, including visual process maps, progress monitors, and reflective questions, students learn to plan, monitor and reflect on their learning.

The design of the tool follows Quintana et al.’s Scaffolding Design Framework of supporting sensemaking, process management, and reflection and articulation (2004). Learning is scaffolded by the structured decomposition of tasks into discrete units, and the segmentation of the learning goal into stages. Since novice learners usually have weak metacognitive skills, which are important for engaging in complex
practices like online credibility evaluation, the prototype learning tool provides needed practice and reinforcement of these important skills (Quintana et al., 2005).

4 Pilot testing the prototype

The purpose of this research was to assess experimentally the functionality and understandability of the prototype tool and its interface, and to gather feedback from students on their experience using the prototype. Pilot testing of the prototype consisted of two phases: online testing of the tutorial section and in-person testing of the complete prototype. Students in a large, introductory undergraduate course were invited to participate in both stages of the pilot testing. Students were offered extra credit in the class for their participation. IRB exemption for the pilot tests was secured.

4.1 Online tutorial pilot test

The first stage of pilot testing focused on the tutorial portion of the tool, since this is the initial stage which introduces students to the concepts and skills they will learn using the tool. Fifty-five students completed the online pilot test, then answered an online survey regarding the usability of the tutorial and their experience using it. Students were asked their year in college and their level of experience with searching for information online. Demographics of the online pilot test subjects are shown below in Tables 1-2:

<table>
<thead>
<tr>
<th>Option</th>
<th>Response</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman</td>
<td>12</td>
<td>22%</td>
</tr>
<tr>
<td>Sophomore</td>
<td>19</td>
<td>35%</td>
</tr>
<tr>
<td>Junior</td>
<td>17</td>
<td>31%</td>
</tr>
<tr>
<td>Senior</td>
<td>7</td>
<td>13%</td>
</tr>
<tr>
<td>Total</td>
<td>55</td>
<td>100%</td>
</tr>
</tbody>
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Table 1: Year in college

<table>
<thead>
<tr>
<th>Option</th>
<th>Response</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all experienced</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>A little experienced</td>
<td>5</td>
<td>9%</td>
</tr>
<tr>
<td>Average experience</td>
<td>34</td>
<td>62%</td>
</tr>
<tr>
<td>Above average experience</td>
<td>16</td>
<td>29%</td>
</tr>
<tr>
<td>Total</td>
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<td>100%</td>
</tr>
</tbody>
</table>

Table 2: Level of experience with searching for information on the Internet

The focus of the survey questions was on functionality, understandability of instructions, questions, and tips incorporated in the tool, and the terminology employed. Subjects were also asked for any other feedback they would like to provide on the experience of using the tool.

A high-level summary of the survey responses is shown below:

- Functionality: 75% of subjects indicated that they did not experience any issues or problems with the tool’s functionality.
- Instructions: 80% of subjects indicated that the instructions for the tutorial were clear; 20% indicated some confusion.
- Questions: 55% of subjects indicated that they had trouble answering some of the questions, although some were technical issues.
- Tips: 52% of subjects did not use the tip button, and some did not even notice it.
Terminology: Some subjects did not understand the 5Ws terminology, especially Where and Why.

Comments: Several students suggested better introductions and definitions of terms, as well as a summary/review at the end of the tutorial.

Overall, subjects responded positively about the tutorial’s functionality and usability. The primary areas of difficulty were the insufficient instructions and lack of use of the Tip button.

4.2 In-person pilot test of prototype

The second stage of pilot testing involved an in-person walkthrough of the complete prototype, to gain individualized feedback from users about the usability of the tool. Eight students completed the in-person pilot test. Students were asked their year in college and their level of experience with searching for information online. Demographics of in-person pilot test subjects are shown below in Tables 3-4:

<table>
<thead>
<tr>
<th>Option</th>
<th>Response</th>
<th>%</th>
</tr>
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<td>12.5%</td>
</tr>
<tr>
<td>Sophomore</td>
<td>4</td>
<td>50%</td>
</tr>
<tr>
<td>Junior</td>
<td>2</td>
<td>25%</td>
</tr>
<tr>
<td>Senior</td>
<td>1</td>
<td>12.5%</td>
</tr>
<tr>
<td>Total</td>
<td>8</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 3: Year in college

<table>
<thead>
<tr>
<th>Option</th>
<th>Response</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all experienced</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>A little experienced</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Average experience</td>
<td>2</td>
<td>25%</td>
</tr>
<tr>
<td>Above average experience</td>
<td>6</td>
<td>75%</td>
</tr>
<tr>
<td>Total</td>
<td>8</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 4: Level of experience with searching for information online

The test was conducted in a computer lab with the researcher present. Subjects were asked to “think aloud” as they used the tool, starting with the tutorial and following the three stages of the structured credibility evaluation process. If subjects failed to think aloud, the researcher asked prompting questions about what they were doing and why. As with the online pilot test, the focus of the questions was on functionality, understandability of instructions, questions, and tips incorporated in the tool, and the terminology employed.

Summary of in-person responses:

- Functionality: Most participants liked the functionality of the Notebook, the structure of the 5Ws and the sequence of stages
- Instructions: Most participants said that they needed more and clearer instructions and definitions, and some suggested a video intro
- Tips: Most participants didn’t use the tips, or sometimes did not notice the button, due to color and placement
- Comparing sources: Most participants liked the comparison of two sources side by side in the Solve stage
- Evaluations: Some participants were confused by the task in Solve, and were unsure if they were judging the comments added by other students or their own evaluation of the quality of the source
Terminology: Some students indicated confusion over terminology, including “currency,” “sources,” and “keywords.”

One highlight of the in-person pilot test was this example of feedback which demonstrates the student’s learning:

“I really like [InCredibility] because it makes me go over the source, the text, really well. It forces me to look for more information about the source and about the author, what he’s really talking about... I think it really helps me focus on an article more, instead of just skimming it. It definitely takes more time but I feel like I’m getting so much more than what I would just do on a skimming basis... (It’s) a fun way to approach an instructional thing to do during class, ‘cause it’s on the Internet so I feel you’re more engaged than if it were through a presentation.”

Overall, subjects in the in-person pilot test responded positively about the tutorial’s functionality and usability. Again, the primary issues were the need for more instructions and lack of use of the Tip button.

5 Discussion

Comparing the demographics of the two subject groups, the subjects of the in-person test reported being slightly older and slightly more experienced than the online test, although not significantly. This may reflect the greater willingness of more experienced students to volunteer for a study. Overall, these subjects generally represent the college student audience for which the online credibility evaluation tool is intended.

Results of the online pilot test showed that the functionality of the online tutorial worked well as participants reported few problems with usability, although the instructions and definitions can be expanded. Subjects provided some useful suggestions, such as adding a review of the tutorial content at the end to reinforce the material. The online survey seemed to be an effective way to gather feedback on an online tutorial from a large group of students.

Results of the in-person pilot test showed that participants responded positively to the structure and content of the tool. Overall functionality worked well, although again the instructions were insufficient. This underscores the importance of pilot testing to understand the students’ perspective and gain insight into the understanding that they bring with them and the necessity of detailed description of the concepts they are learning. Subjects provided some useful suggestions, such as adding a video introduction to the tutorial and tool functionality, and providing a review of the tutorial content at the end. Although the in-person pilot testing took more time and restricted the number of participants that could be interviewed, it produced in-depth and helpful feedback on the tool. The researcher was able to probe participants’ perceptions of the tool and their experience using it.

In both pilot tests participants often did not use the Tip button. In the in-person test, participants did not seem to notice the Tip box until the researcher pointed it out to them. When asked about this, they often replied they simply did not notice. This may be due to the color and placement of the button making it less noticeable. Participants also seemed to ignore pop-ups that provided guidance and suggestions and closed them without reading the text, perhaps dismissing them as error messages and not realizing that there was helpful information included.

Interestingly, many students reported that they had never investigated the “About” section of a website, which often states a site’s purpose or background, before using InCredibility. This relates to the tool’s objective of teaching students how to evaluate the purpose of a website, which can be one of the most difficult tasks of evaluating credibility. Thus, the tool introduced them to a new evaluation technique that they had not learned before.
6 Conclusion

Overall, the participants in both pilot tests responded favorably to the experience of using the tool and indicated that its functionality and usability were effective. There did not seem to be any major issues with the use of the Notebook, the concept of the 5Ws, and the structure of the three stages (Investigate, Question, and Solve). Several subjects mentioned that they found the tool to be useful, with subjects expressing positive reactions to the skills practice they experienced using the tool. Some subjects stated that critiquing other people’s work helped them learn how to evaluate better.

Several design changes have been made as a result of these findings. To address students’ failure to read the guidance given in the pop-up boxes and the lack of using the Tip button, some design changes were implemented. The word “TIP” was also added to the text of the pop-ups to draw the reader’s attention to the suggestions. Also, the “Close” button on the pop-ups, which was located at the top corner of the box, was moved to the bottom corner of the box, hopefully leading students to read the text before closing the pop-up. The Tip box color was changed to a bright red and the design changed to make it stand out more and hopefully make it more apparent to users.

More explicit instructions and definitions are clearly needed, along with clarifying the purpose of the tasks and simplifying terminology. On a related note, results showed that the tool should not rely on library terminology, but phrase concepts in terms that students understand. Since students may be learning skills that they have never used before, they need clear and understandable explanations given in language they understand, especially at the introductory stages. Later, the instructional scaffolding of the tool, which helps bridge students to more advanced topics that they might not learn on their own, guides them through the learning process.

This initial research suggests that the custom-built prototype online credibility evaluation learning tool can be used to support students in becoming more critical in their evaluation of the credibility of web sources. The prototype online credibility evaluation tool represents a novel pedagogical model to teach online IL skills. The tool situates IL instruction in the online environment where students actually do their research, and guides them through a structured process of evaluating online information in an interactive format. The use of instructional scaffolding can help students to develop evaluation strategies, learn the specific criteria on which to judge the credibility of online information sources, and the evidence-based source characteristics necessary to support their evaluations. Students are also supported in understanding IL as a structured process requiring practice, planning and reflection. Since this online participatory tool can be used simultaneously by all students in large classes, it enables providing IL training to greater numbers of students than traditional methods. Ultimately, more effective delivery of training in IL skills will help today’s students in learning critical 21st century skills and prepare them for lifelong learning.

7 Future research

The prototype online credibility evaluation learning tool will be revised and expanded based on the results of these pilot tests, especially in the area of instructions and terminology. After this upgrade, the finalized tool will then tested in a randomized experimental study with college students. Results of the experiment will be analyzed for evidence of learning gains by students who use the tool vs. students who receive more traditional forms of IL instruction. The goal of the research is to provide a fully functional, experimentally-tested tool which can be adopted by IL instructors to teach credibility evaluation skills to large classes.
8 References


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