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Fact or Fiction: Comparing BYU Library's Decision Based Learning and YSearch
Source Evaluation Modules

Ana Katz

A thesis submitted to the faculty of
Brigham Young University
in partial fulfillment of the requirements for the degree of
Master of Arts

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ABSTRACT

Fact or Fiction: Comparing BYU Library's Decision Based Learning and YSearch Source Evaluation Modules

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Current First-Year Writing research seeks to address the need to help students meet the Council of Writing Program Administrators objectives on source evaluation while also changing current pedagogy methods (Meola, 2004; Ostenson 2014; SHEG, 2016; Wineburg & McGrew, 2017). This paper seeks to compare two different source evaluation pedagogies, YSearch and Decision Based Learning, taught by Brigham Young University's library to determine which module is more effective at teaching students source evaluation skills. To answer these questions, this study uses both quantitative and qualitative methods, utilizing a quasi-experimental design by conducting an open comparison between the two pedagogy modules.

Keywords: First-Year Writing, Source Evaluation, The Council of Writing Program Administrators

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Fact or Fiction: Comparing BYU Library's Decision Based Learning and YSearch

Source Evaluation Modules

Introduction

In eighth grade, my science teacher assigned our class to research and write a formal paper on a *pseudoscience* subject. We were allowed to choose from a list of topics: ghosts, Ouija boards, unicorns, magic, fortune-telling, crop circles, the Bermuda Triangle, witchcraft, horoscopes, séances, and UFOs. While this was meant to be a fun project, our teacher didn't explain what the word *pseudo* meant. The goal of the project was to demonstrate why these topics were either false or, at best, controversial, but the class thought we were to prove how they were real. I hurried home with a pretty serious attitude about this assignment. I was going to research and write about crop circles because I had heard they could prove the validity of alien invasions. Everything I found online confirmed my beliefs. It wasn't until I finished the paper and was practicing my presentation in front of my parents that I found out what I had written wasn't true or from *trustworthy* sites. My father was so concerned for his daughter's newfound devout belief in alien crop circles that he spent the night online with me looking up accurate sources.

The next day during presentations, my teacher was shocked to discover that I was the only one with accurate information and sources on my subject; everyone else had gone to similar conspiracy theory websites that I had first visited. The assignment was scratched, and we moved on with eighth grade science without another mention of the failed project. While the failure of this project may have been due to the fact that our teacher never defined the word *pseudoscience*, it also may have been that he didn't tell us what online sources we should have been using.

Fast forward to my freshman year of college, one research paper in my freshman writing class required us to use eight to ten *reliable* sources. I was in a study group, and when it came time to find these sources, the majority of us did not know where to look. Those that claimed to have known what the term *reliable* meant just used equally ambiguous single word synonyms such as *scholarly* or *academic*. Despite the endless resources I had at my disposal—either from my online library’s search engine and Google—I muddled my way through the paper and still ended up using sources that were inaccurate. My professor wrote on one citation, “False information. Check your sources.” I was embarrassed, but not alone. Similar comments were made on the papers of those in my study group. Despite the low grade we received for that first paper, many of us did not bother visiting with our instructor to clear up our confusion. We also didn’t realize we could have visited with our university library and talked with the librarians. In fact, I never once consulted a librarian for anything until graduate school.

As an undergraduate, I learned to recognize *reliable* sources through a slow and painful process of trial and error. I discovered Google Scholar, then my library’s database, and finally, I realized that there were specific journals for specific subjects. I learned to follow up on information and links that were attached to the website, looking at the dates of published work or other citations that had been referenced. Eventually by the end of my sophomore year, mostly on my own and through watching YouTube videos on how to find sources, I had internalized the process of evaluating sources not only for my own academic papers, but also how and where to go to check my sources on everyday information.

As a new First-Year-Writing (FYW) instructor, I wondered how many of my students came in with a similar backstory as mine. After reading a student’s paper citing the animated Disney movie *Ratatouille* as a source to explain how rats are able to swim underwater for up to

three days, I knew at least one person in my class had problems with recognizing reliable sources. It was so obvious to me that citing something like that was inappropriate, but my student didn't know any difference despite our earlier one-on-one conference during which I clarified that using a Disney cartoon to convey factual information was not a reliable source.

Flabbergasted at this paper and others that were similar, it dawned on me that as a graduate my master's program has not only refined my skills I learned as an undergraduate but has trained me to become proficient in a particular area of study. Skills that I have developed such as evaluating the accuracy, authority, relevance, and currency of an article have turned what used to be a difficult concept into stored conditional knowledge, meaning I automatically know the "when" and "why" of what I'm doing. Yet, as an instructor, it is my job to mindfully and adequately instruct students on new concepts, such as information literacy acquisition, or "the set of integrated abilities encompassing the reflective discovery of information in creating new knowledge and participating ethically in communities of learning" (American Library Association). This can refer to helping students enter a conversation of research, allowing them to explore various opinions and ideas, and helping them navigate online communities that range in various degrees of validity. But with so many students coming in with what seems like a "hit or miss" on web-based source evaluation and information literacy, where and when do I begin the conversation with them? I ask myself if it's necessarily my job to teach them everything about source evaluation or is it primarily the library's responsibility, considering that the library at Brigham Young University (BYU) sets aside two days halfway during the semester to teach students college-level research search strategies?

This brings me to the issues that we face as instructors. College-level students do not adequately understand how to evaluate research sources and determine if those sources are

reliable enough to use in a college level research paper (Wineburg & McGrew, 2017). The study described in this thesis was performed to better understand how freshmen students approach source evaluation, and how to help them move from superficial to more complex understanding of source evaluation. This thesis recounts the history of teaching source evaluation in FYW and the attempts to help students move from superficial searches online to more complex behaviors of source evaluation. I propose a new method of source evaluation pedagogy rooted in conditional-schematized knowledge as opposed to learning source evaluation as a process of checking items off a list.

Background

The Need for Source Evaluation Revision

The Council of Writing Program Administrators (WPA), or those who write curriculum for and train instructors in First-Year Writing (FYW), outlines in their mission statement for nation-wide composition courses that students should be able to “analyze, synthesize, interpret, and evaluate ideas, information, situations, and texts...whether print texts, photographs, data sets, [or] videos” (“Council of Writing Program Administrators,” 2014). The WPA (2014) goes on to state that students should be able to “locate and evaluate (for credibility, sufficiency, accuracy, timeliness, bias and so on) primary and secondary research material...via Internet sources.” Repeatedly throughout their mission statement the WPA underscores that in order to think critically, students should be learning how to evaluate sources. The question then becomes what resources university writing programs and FYW instructors use in order to go about teaching students how to evaluate sources so that they may think critically and be information literate.

The two resources universities and instructors rely on to teach students the WPA

objectives and help students become information literate are the Association of College and Research Libraries (ACRL) and the American Library Association (ALA). The ALA defines information literacy as “a set of abilities requiring individuals to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information” (ALA, 1989). Source evaluation then falls under information literacy as a learned behavior in assessing potential resources. The ALA and ACRL then created a set of standards that would help students navigate online information. One standard emphasizes that an information literate student would demonstrate complex behaviors towards source evaluation if he/she were able to “evaluate information and its sources critically and incorporate selected information into his or her [own] knowledge base and value system” (ALA, 1989). The term *critically*, as defined by the ALA, is a student’s ability to “summarize the main ideas” that are “extracted from the information gathered...in his or her own words.” The ability to take meaning from information so that it becomes a student’s own *knowledge base* and *value system* refers to recognizing “prejudice, deception, or manipulation,” to “question the source of the data,” and “investigate differing viewpoints encountered in the literature” (ALA, 1989). If a student is able to investigate, review, and analyze, they are then demonstrating complex behaviors and are information literate. If our goal as instructors is to help students navigate the online world around them and guide them to “find, evaluate, analyze, and synthesize appropriate primary and secondary sources”—whether it be for everyday usage on social media, to help them avoid an ever increasing fear of “fake news,” or seeking out competent sources for their academic papers—these objectives as stated by the Writing Program Administrators (WPA) must be a priority in our FYW classrooms (“Council of Writing Program Administrators,” 2014).

Despite the standard of what an information literate student should look like as set by the

ALA, not all students have experience with source evaluation, and then may leave the FYW classroom not having learned those standards set by the WPA. If students are not receiving a sufficient starting base in source evaluation in high school, there should be an even greater stress in teaching students correct behaviors in college (Donald, 2016). Yet in 2013, Project Information Literacy (PIL), a nonprofit research institution, collected data from college students focusing on information literacy in the digital age. The data concluded that most college freshman depended solely on search engines like Google and *Wikipedia* to gather sources (Head, 2013). Meola's article "Chucking the Checklist," affirms that most college students are "completely unaware of any type of information sources besides Google or Yahoo and are easily duped by the most obviously fraudulent Web pages" (Meola, 2004, p. 334). Meaning, in this instance, that if a student relies only on Google search to provide the answers to questions, students may only check out the first websites that appear, which is not necessarily an indicator for reliable or accurate information. In fact, in the research of Breakstone, McGrew, Smith, Ortega, and Wineberg (2018) in "Why We Need a New Approach to Teaching Digital Illiteracy," the checklist is not even based on real research "skilled people actually do when facing a computer screen" (p. 28). Breakstone et al. (2018) allude to the idea that if students are not truly learning source evaluation the way experts in the field evaluate sources, such as professors and fact checkers, there seems to be little the checklist is doing to prepare students to think critically and become information literate.

A study done in 2007 by Metzger from the University of California, Santa Barbara reviewed efforts made in the classroom to help students learn reliable source evaluation behaviors by evaluating the usefulness of the checklist approach. Metzger's study recommended new curriculum approaches for teaching source evaluation because the checklist did not require

students to “exert a great deal of effort in assessing the credibility of the information...found online,” and instead students were more concerned about the appearance of the “professional site design,” something the checklist approach encourages students to evaluate as a more “surface value” assessment (Metzger, 2007, p. 2089). Even with Metzger’s study, FYW instruction has continued to rely on checklists to guide students when evaluating sources. So despite the objectives given by the WPA and the ALA’s definition of those standards, students were either not utilizing the available resources or instructors were not adequately instructed or aware of either the ALA’s definitions or the WPA outcomes. In fact, instructors are teaching students “information skills unguided by any empirical understanding” of source evaluation, meaning that instructors may be limited in their ability to teach effective source evaluate practices because they may not know what should be taught (Olsen & Diekema, 2013). Olsen and Diekema’s study then concluded, not surprisingly, that because of the confusion on how source evaluation should be taught or by whom it should be taught, most students continue to rely on Google and *Wikipedia*. Similarly, many of my own students come to a FYW class with a heavy reliance on Googling or searching *Wikipedia* for all source checks. While I encourage my students to start with an initial search of both Google and *Wikipedia*, they are then expected to practice more mindful searches of sources by following the standards set by the ALA and WPA. But are all instructors shifting student searches away from Google and *Wikipedia* to the standards, or are students expected to develop search strategies skills themselves?

Instruction that is centered on completing the assignment without teacher planning in order to meet course objectives over creating meaningful assignments that account for learning course objectives will not help students transfer the use of source evaluation outside the FYW classroom. Another study by the PIL found that when instruction centered on assignments over

objectives, students were solely concerned about “‘just passing the course’ and not [learning] lifelong literacy goals” (Head & Eisenberg, 2010, pg. 39). Students were less interested in developing mindful behaviors as they were in finishing a research paper with the least amount of effort.

Simple vs. Complex Behaviors

In an effort to understand this gap between learning course objectives and completing assignments, the Stanford History Education Group (SHEG) sought to understand student behaviors when selecting sources by evaluating college students across the country on their evaluation practices. SHEG concluded that a majority of students did not "investigate the particulars of sources" such as “organizations involved with [surveys], claims, assertions, and assumptions made on social media” (SHEG, 2016). The results suggested that deep learning, critical thinking, and students’ ability to learn complex behaviors in regard to source evaluation are *still* overlooked skills on a national FYW instructional level.

One such common way FYW classrooms teach source evaluation is through the C.R.A.A.P. test. The C.R.A.A.P. test, created by Blakeslee at California State University at Chico, is a set of questions that simplifies the material created by the ALA. The acronym stands for currency, relevance, authority, accuracy, and purpose. Under each C.R.A.A.P. bullet point, there’s a list of questions the student runs through when evaluating his/her own sources. One of the reasons for the C.R.A.A.P test is the ease it allows students to quickly check whether or not their source can answer the “yes/no” question. For example, the C.R.A.A.P. test asks students, “Does the information relate to your topic or answer your questions?” (Blakeslee, 2004). While the information is either a yes or no to the relevance of the student’s research, in no way does the question address whether or not the information is accurate or even appropriate to the specific

topic. If we continue to use a checklist based learning, how are students expected to: 1) recognize that objectives and standards are not just boxes to be checked off as if it were an assignment, and 2) move from superficial to complex behaviors when evaluating sources that only ask them “yes/no” questions?

The notion of ineffective checklists used for source evaluation is not new. Both Meola (2004) and Ostenson (2014) advocate for librarians and instructors on a national level to revise the approach we take when teaching students that evaluating sources is a checklist evaluation limited to the immediate webpage in front of them. When seeking to teach course objectives, it is often convenient to list those objectives, as series of boxes students must check off in order to move onto the next objective. Again, are students assigned the work to simply complete the assignment without taking the WPA objectives into account? It seems that a checklist mentality on source evaluation does not necessarily enable students to learn complex behaviors.

The invitation for students to ask questions beyond the checklist was the basis for Wineburg and McGrew’s study. Seeking to understand the behaviors that source evaluation experts employ when determining the validity of a source, the experiment compared fact checkers (“whose job it is to ascertain truth in digital form”), Stanford history professors (who “engaged in ‘extensive source’ [and] speculated about ‘who the author was and what he or she represented’”), and undergraduates (Wineburg & McGrew, 2017). The study observed how these three groups evaluated live websites and searched for information on social and political issues (Wineburg & McGrew, 2017). History professors looked for references within the source that would or would not confirm the validity of the source, and students used vague terms to describe the source’s validity, such as “it seems like,” or “I like how it says/doesn’t have/looks like...” (Wineburg & McGrew, 2017). Both the history professors and undergraduates’ methods of

searches seemed more like a checklist mentality of what did or did not appear credible or valid based on the evaluation of the source itself, and were not necessarily rooted in any additional searches outside the source.

On the other hand, fact checkers conducted their evaluation by opening more tabs to verify the sources information from additional outside sources. Fact checkers were able to “take bearings,” or understand that “websites...are designed, created, and financed by groups seeking to promote particular--and often partisan--interests” and factored that knowledge into their evaluation of the source (Wineburg & McGrew, 2017). They also engaged in what Wineburg and McGrew call “lateral reading,” or the act of leaving the website in question and opening new tabs “along a horizontal axis in order to use the resources of the internet to learn more about a site and its claims” (Wineburg & McGrew, 2017). In comparison, “vertical reading” looks more at the features of a site, asking questions such as “Does it look professional? Is it free of typos and advertisements?,” which are similar to the checklist questions undergraduates are taught to ask when evaluating sources. Lateral readers understand that in order to determine the currency, relevance, authority, accuracy, and purpose of a text, more time must be spent “investigating a site by leaving it” (Wineburg & McGrew, 2017). Fact checkers demonstrated complex behaviors by relying on multiple sources of knowledge “to inform their decisions,” as opposed to a checklist designed to evaluate one single source at a time (Wineburg & McGrew, 2017).

If moving away from a more simple checklist mentality will help students develop more complex behaviors when evaluating sources, we must focus on creating instructional methods that help students “rely on multiple sources of knowledge ‘to inform their decisions’” (Wineburg & McGrew, 2017).

One way to help students move away from a checklist mentality, would be to create

pedagogy that centers around helping students “recognize meaningful patterns from concrete situations,” or instructing students to know “under which circumstances concepts and procedures are relevant,” also known as conditional knowledge (Sansom, Suh, & Plummer, 2019, p. 446). Unlike checklists, teaching principles of conditional knowledge allows students to experience a concept such as evaluating sources at many different levels of the process, such as evaluating sources on the surface level to opening multiple tabs to engage in more complex searches, in order to teach them when and under what circumstance they would need to do more searching about the validity of a given source. No longer do students rely simply on a checklist of questions prescribed to each evaluation, but students are able to pull previous experience of different types of source evaluations to determine what conditionalized knowledge they will need to apply to determine the validity of that specific source. In that way, students create “meaningful patterns” that guide them through each situation, becoming mini experts for what to do in each instance as they build on previous knowledge (Sansom, Suh, & Plummer, 2019, p. 446).

To be an expert is to have “acquired extensive knowledge that affects what [is] notice[ed] and how [to] organize, represent, and interpret information in [a particular] environment” (Bransford, Brow & Cocking, 1999, p. 31). “Experts develop conditional knowledge” through experience in creating meaningful patterns to “allow them to quickly and accurately identify successful problem-solving strategies in a variety of situations” (Sansom et. al, 2019, p. 446). This module, called Decision Based Learning (DBL), “explicitly targets[s] *conditional knowledge*” (Plummer, Swan, & Lush, 2017, p.3). Librarians collaborated on their individual thought processes for evaluations they made when discerning the accuracy of academic, accurate, and news sources. After breaking down their thought process when evaluating multiple

sources, DBL serves as a sort of “turn by turn” guidance devoted to modeling each cross-road judgment librarians would make when evaluating the multifaceted complexities that often go beyond the checklist mentality of evaluating a source.

In turn, DBL offers students repeated exposure to evaluating multiple sources in the classroom. This is done by teaching students an expert’s methodology that “organizes instruction around the decision an expert would make...essentially a highly scaffold constructive approach” (Plummer et al., 2017, p.15). Students are presented with concise instruction for each decision until the student can determine the accuracy of a source, not based on a one-size-fits-all checklist, but through developing complex skills that teach students the same thought process an expert makes when determining the validity of any source.

Methods

The research sought to answer the following questions:

- Is BYU currently effective at teaching source evaluation?
- Are either of BYU library’s DBL or YSearch modules effective at teaching source evaluation to freshmen students?
- Which is more effective at teaching source evaluation, YSearch or DBL?
- Do students retain their new source evaluation skills over time?
- Which, if any, source evaluation behaviors were more effective?
- Which approach helps students move from simple to complex behaviors?

Study Design

To answer these questions I utilized both quantitative and qualitative methods utilizing a quasi-experimental design. I conducted an open comparison study between a class of YSearch students and a class of DBL students, utilizing a pre- and post-class source evaluation

questionnaire. A follow-up questionnaire was also sent to both set of students to determine retention. Part of the questionnaire involved asking students their thought process of how they determined if the source was reliable or not. Selected students were interviewed to provide more information on their thought processes.

Context

YSearch module. For the past several years, Brigham Young University's (BYU) library has been using a model called "YSearch" to teach source evaluation. YSearch was originally designed to help instructors teach the FYW WPA objectives through set-aside "library days," in which a librarian instructor helps students learn how to enter an academic conversation in order to create mindful complex behaviors when researching and evaluating sources. The thought process for setting aside designated "library days" was to ensure that FYW students would all receive the same module of instruction, regardless of different FYW teaching styles and emphasis on WPA standards.

YSearch is accessed through the library's website and teaches students five 5-15 minute learning modules that focus on finding and creating a research space within the academic community. One of the fifteen-minute modules focuses on source evaluation. The module takes students through two brief YouTube videos, produced by the BYU library, that introduce students to types of sources and how to begin evaluating them. At the bottom of the page there's a *suggested homework* assignment, which is an interactive learning tool to help students check their sources. There's also a "fake news vs. real news" game students can play with an attached set of questions loosely based on the C.R.A.A.P. test. Questions include: "Does this source use authoritative sources?;" or "Is this source timely according to the research topic/argument?" which are straightforward and allow students to answer with "yes/no" (YSearch).

The strength of this module is that it is designed to help students see evaluating sources as part of a larger process within research and helps them become acquainted with the academic vocabulary of information literacy, such as *authoritative* and *reliable*. The easy checklist also provides students with a quick way to evaluate their sources as either totally reliable or completely unreliable. However, not all sources are straightforward. If a source meets part of the checklist but not the rest, should the student still include the source? Again, this is a question not only BYU library's YSearch source evaluation module does not answer, but one that is not necessarily addressed with any source evaluation checklist.

BYU's YSearch is divided into five modules: background research, topic development, search strategies, source evaluation, and critical reading. The library asks instructors to introduce students to at least three of the five modules before library days. The modules may be assigned as videos to watch for homework, may be discussed and watched in class, or may be disregarded by instructors altogether. The level of discussion between students and instructors on these modules varies from class to class. A librarian may engage with a class who has spent several days discussing their topics and where to find sources, and then the next period that same librarian may have a class who has done nothing to prepare for library days. FYW Instructors might also not feel confident, or are confused as to what to teach about source evaluation, and may delegate all YSearch instruction to library days. Again, learning outcomes and standards are not so much emphasized as is completion of the modules so students can write the assigned paper.

One reason for this emphasis on completion over learning the outcomes and standards is that the library days for BYU FYW courses are only assigned as either two-class periods of fifty minutes or one class period of seventy-five minutes. Students are lectured by a librarian on

source evaluation, which may vary in length and detail by each librarian, then they might complete the suggested YSearch source evaluation homework, and finally begin finding sources on their own to use in their research paper. In all FYW classes at BYU, library days and the formal introduction of source evaluation are only introduced during the second half of the semester when students begin working on their first college-level research paper. The rushed length of time set aside for source evaluation with little time spent scaffolding, practicing, exploring, or asking questions about the complexities of source evaluation may make students feel like they are completing required assignments, as opposed to learning and internalizing the material. This might contribute to the feeling that completion is more important than learning complex behaviors in source evaluation. However, the library does remind students that they can always meet with a librarian to ask further questions.

Decision Based Learning module. Recently, BYU has used applied DBL to source evaluation to help students internalize complex behaviors and move away from a checklist mentality by centering learning on conditional knowledge. For this reason, the BYU library used librarians—considered to be experts at evaluating sources for the thousands of hours of deliberate practice devoted to the teaching the subject—to introduce a novel pedagogy module that was designed to help improve students’ conditional knowledge in source evaluation.

To use this module, students access DBL through an online program. Instructors may assign their students to practice the DBL module through the library’s DBL website by having students test the validity of their sources out on the module for homework. The challenge with such an assignment is that students may learn that their source may be particularly credible but not current. If the librarian does not instruct students sufficiently on how to use the DBL module, or the instructor does not feel confident using the DBL module to assign as homework, students

may learn that determining the validity of a source is complex but may feel overwhelmed and refer back to a checklist sort of mentality. It is then necessary for librarians to walk students through the DBL source evaluation module, and for instructors to continue to have students practice the process outside the classroom.

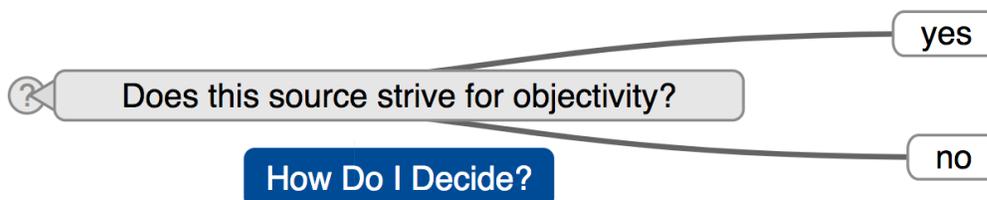


Figure 1: Decision Based Learning Source Evaluation Assignment #2 Part 1

When librarians use DBL during library days, the program presents decisions students must make like branches on a tree that continue to stretch out with each decision in an “explicit depiction of the conditional schema of an expert in this discipline” shown in figure 1 and 2 (Plummer et al., 2017, p.13). The module allows a student to make one decision at a time before moving onto the next decision. DBL also organizes the thought process when evaluating a source. Instead of students asking if the source meets everything on the checklist all at once, DBL frames the process of evaluation by breaking down each component on what makes a source reliable. Students can then select “the appropriate option which leads them to the next decision and so on and so forth until the problem is appropriately framed so as to be solved” (Plummer et al., 2017, p.13). This then gives students smaller instruction that helps them build an understanding towards the larger problem, allowing them to move from novice to expert behaviors for that particular task. Students engage in critical self-reflection because DBL asks them “how” they can tell if a source is not reliable but current through a process of evaluation. The module offers students insight that some sources may discuss current issues but are not

places to gain reliable information. With repeated exposure, students can internalize complex behaviors through discerning multiple facets that determine how and under what circumstances sources are reliable.

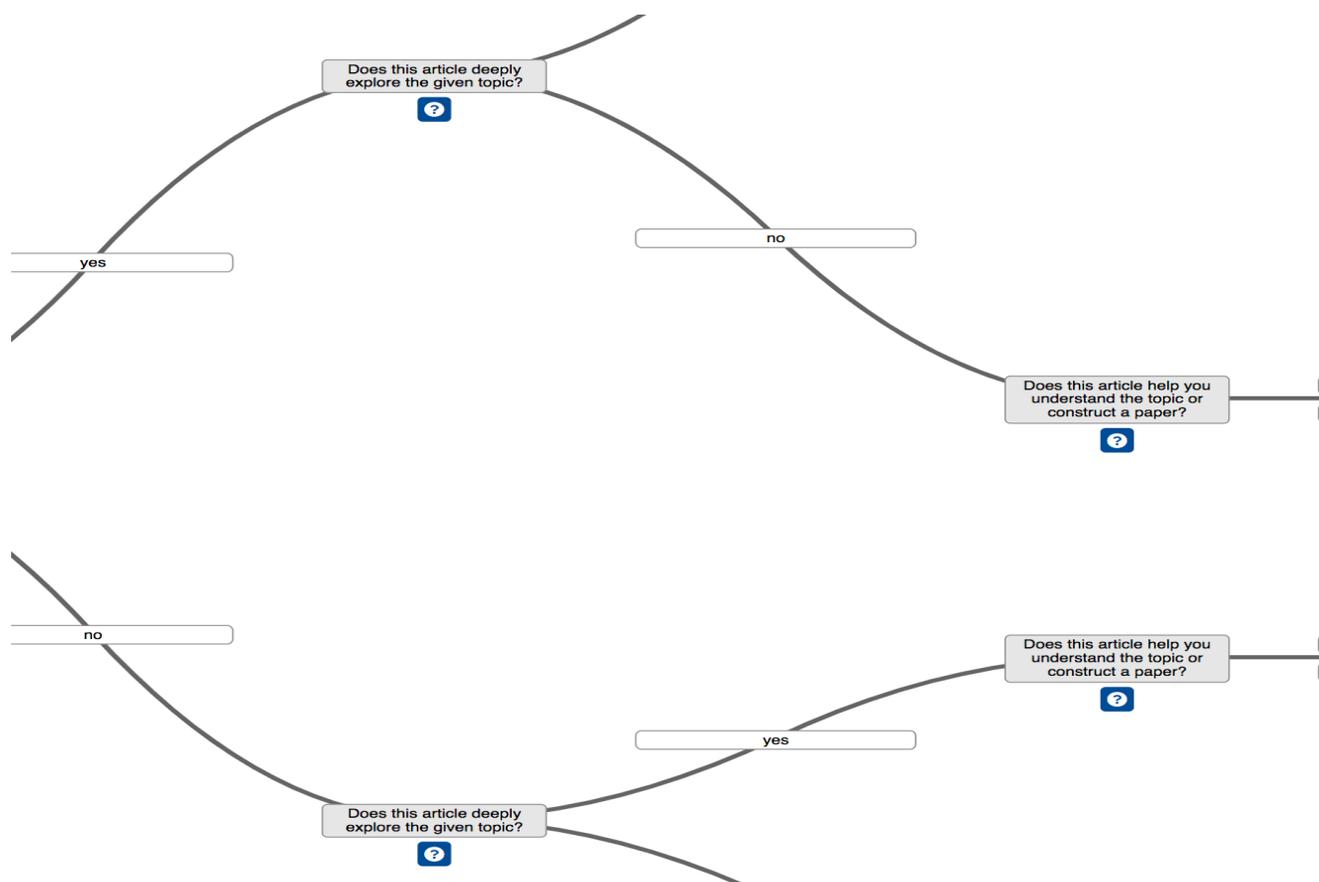


Figure 2: Decision Based Learning Source Evaluation Assignment #2 Part 2

DBL, as seen in figures 1 & 2, display decisions students make when learning how to evaluate sources. DBL instruction is taught during library days and students are both shown an example of how using DBL can reveal the complexities when determining the validity of a source. As seen in figure 1, students are asked if the source they are evaluating strives for objectivity. If they do not know the answer to that question, the module offers students an alternative, “How Do I Decide?” option that then walks students through how librarians determine that question, such as providing tips, explaining bad and good sources in that point of

decision making, and offers additional resources, such as “Source Watch” and “Fact Check,” to learn more about their source. Once a student feels confident answering either “yes” or “no” that their source is striving for objectivity, in this case, the module moves onto the next decision that the student must evaluate depending on the answer they’ve previously given. Figure 2 shows the complexity of the DBL module, which may seem overwhelming to students because of the extreme break down in each level and how many “turn-by-turn” guidance questions the module asks students. Students may find that their sources are not accurate, not authoritative, but very current. By knowing that their source is a timely topic but not accurate in the information provide, students target how to find more accurate and authoritative sources because the DBL module has walked them through how experts identify accurate and authoritative sources. Again, using the DBL module reveals to students how complex the process of determining the validity of a source can be, and encourages students to rely on expert’s knowledge to learn complex behaviors that meet the WPA standards.

Both of these methods have been employed by the BYU library to teach source evaluations to freshmen students. As discussed above, both have different theoretical strengths and weakness they in teach this subject. No objective process has yet been employed to determine if one method is superior to the other, or if one is better in teaching students complex over simple behaviors in evaluating a potential source to cite in a research paper.

Participants. The participants for this study came from two sections of Writing 150 classes. The same instructor taught both sections. The instructor was a graduate student of BYU teaching both sections in consecutive hours. This was done to minimize the confounding variables that may have occurred with different instructors and instruction styles, as well as different times of the day and days of the week. The instructor selected was a second year

masters student who had taught this section multiple times in the past year, and was felt to be both seasoned and capable.

The librarian selected to teach the DBL class was selected because he was the one who had created the source evaluation module. The YSearch librarian was selected because he had worked with the graduate master's student before with another class. This was the DBL librarian's first time teaching source evaluation, while the YSearch Librarian has taught library days and source evaluation to FYW classes for many years. Both librarians work as instructors for BYU's library days, in which they teach students about the purpose of the library, the available resources within the library, which academic search engines to use for their papers, direct them to what subject librarians students should seek out when writing their papers, and narrowing topic selection for academic papers.

Each section contained twenty students, for a total of forty student participants. In the DBL group, seventeen students were freshmen with two sophomore, and in the YSearch group, nineteen students were freshman with one sophomore. The DBL group had ten females and nine males, while the YSearch group had eleven females and nine males. The DBL group had one Hispanic student, while the YSearch group had three Hispanic students. YSearch group also had one Korean student.

Data Collection and Data Analysis

Data collection. In accordance with the university's human study policies, the students were specifically instructed that while they needed to take their assigned source evaluation module as part of the class curriculum, their participation in the assessment and oral interview collection of this experiment was entirely voluntary and that their participation would not affect their grade. The students were informed that their participation involved taking a pre- and post-

instruction assessment before beginning and upon completion of the module. One class of 20 students completed the university's standard "Library Day" (YSearch) model on source evaluation, and the other class of 20 students used the untested Decision Based Learning (DBL) module. Completion of either module fulfilled a first-year writing requirement, and the study did not alter this requirement.

Six students, three from each instructional group, were invited for oral interviews following the assessment and completion of the source evaluation models. Students within this group selected for these interviews were divided into three categories: those who showed no growth, those who showed little growth, and those who showed marked growth based on their answers to the pre-and post-instruction assessments. Students were selected for interviews because they fit into one of the following categories. A student from each category was selected from each class and was invited to participate in the interview.

Students who participated in the follow up oral interviews were compensated for their time with school bookstore gift card for \$10. Additionally of the remaining students, ten were randomly selected in the follow-up assessment and were each also given a \$10 school bookstore gift card.

One section of FYW was randomly directed to use the YSearch module, and the other section was directed to use the DBL module. For convenience the two classes will be labeled "YSearch Class" and "DBL Class." As is typical for Writing 150 classes, the instructor of the two sections left introducing source evaluation to the librarians.

Instruments and data source. In order to answer the research question, three source evaluation assessments were developed (pre-, post-, and follow-up); for each assessment, students were asked to assess and evaluate the credibility of four websites (which changed with

each assessment). After looking at each website, students were instructed to answer either yes or no if the source was reliable and to explain their decision. *Reliable* was defined as “acceptable to cite for a college level research paper.” In addition students were asked to give a brief explanation for their response for each website. (See Appendix A for a full list of sources asked in the pre-, post-, and follow-up assessment). These responses were coded to determine if they were using complex or superficial skills when explaining their above assessment response.

Pre-instructional assessments were emailed out to students prior to taking their assigned modules. Students were directed to complete the assessment at a time of their convenience prior to taking the learning module. Students were told that part of the course objectives for Writing 150 is to teach students how to look at informational sources and determine which sources are reliable for a research paper, such as a typical college term paper. Students were reminded that completion of one of the library’s source evaluation modules was a requirement for all WRTG 150 students, regardless of being part of the study. They were told that only the responses from those students who volunteered would be used for the study, and that their participation would not affect their grade. Students were told that the study was comparing two methods of teaching source evaluation. They were also informed that those who agreed to participate might be part of a group selected for brief oral interviews along with a follow up assessment on source evaluation the next semester.

Students who had agreed to participate in the study were again emailed a post-module and a follow up instructional assessment the next mid-semester. They were asked similar questions about source evaluation, but utilizing different websites.

The pre-assessment also asked questions about the student’s prior high school instruction on source evaluation (see Appendix A). The post-assessment additionally asked questions to

determine if students approached the module librarian instructor for clarification, or if they would ever consult librarians about source evaluation questions (see Appendix A).

To better understand whether the students used defined simple or complex behavior (see Appendix C) to arrive at their reliable or unreliable determinations, oral interviews were conducted on campus and recorded via an iPhone app on six students, three from each class. Students were selected for interviews based on their pre- and post-assessment scores, consisting of those who showed an increase scores for their ability to evaluate sources as well as those who did not. The interviews were semi-structured with focused questions and open-ended responses from students (see Appendix D). Questions asked students about why they thought certain sources were reliable or unreliable either in the pre- or post-test and invited students to walk through their thought process when determining if a source was acceptable or not (see Appendix D). Further questions were asked to follow up on students' responses or to ask for clarification. Interviews were transcribed, coded, and analyzed to determine patterns of source evaluation behaviors in responses.

For example, when students were asked if they could give a walk-through of their thought process, no one mentioned the idea to pull up a new search page and Google the source, author, or sponsoring organization. It wasn't until they were asked if they ever Googled their own sources that they sheepishly wondered if that was even okay to admit. All students interviewed were under the impression that Googling a source was not the "correct" way to check the credibility of a source. Given that this age group Googles everything, it is surprising that students thought Googling the very source they were evaluating was an inherently wrong idea; this may be in part because of the limited instruction from either module. Students were capable of demonstrating both complex and simple behaviors within the same evaluation of a

source.

Data analysis. The class average and standard deviations for the pre-, post-, and follow-up assessments was calculated. The websites used in the assessment were polarized in their credibility so that the handful of BYU graduate students and professors consulted to evaluate the sources themselves, all arrived at the same conclusion of reliable or unreliable for each source.

To make the case for equivalence, I asked myself what the knowledgeable student would need to notice in order answer each whether each website was reliable or not. I wrote out what the knowledgeable student would need to know in order to correctly answer if the cite was reliable or not (See Appendix B). An unpaired two-tailed Student-t test was used to determine the differences between the DBL and the YSearch classes with each of the three assessments. To demonstrate any changes within each class from the pre- and post-assessments and between the post- and follow-up assessments a paired two-tailed Student-t test was used. Microsoft Excel version 14.3.8 statistical functions were used for the statistical analysis.

Students' written responses explaining why they identified each site as reliable or unreliable were coded to identify complex and simple behaviors. These codes were determined prior to the coding process by reviewing the current literature that describes and defines these behaviors. The Association of College and Research Libraries' (ACRL) and American Library Association (ALA) defines information literacy and the standards instructors use to check for understanding when it comes to students and source evaluation. Information literacy is defined as "a set of abilities requiring individuals to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information" (ALA, 2019). The ALA and ACRL then created a set of standards that would help students navigate online information. One standard stated that an information literate student would demonstrate complex behaviors

towards source evaluation if they were able to “evaluate information and its sources critically and incorporate selected information into his or her [own] knowledge base and value system” (ALA, 2019). Again, defined by the ALA, the term *critically* means a student’s ability to “summarize the main ideas” that are “extracted from the information gathered...in his or her own words.” The ability to discern information into a student’s own *knowledge base* and *value system* refers to recognizing “prejudice, deception, or manipulation,” to “question the source of the data,” and “investigate differing viewpoints encountered in the literature” (ALA, 2019). If a student is able to investigate, review, and analyze, they are then demonstrating complex behaviors.

Complex definitions were then defined as an ability to click on the link or source within the article and create a separate search of the material to trace back to a primary source; an ability to conduct a separate search of authorship outside the source itself; an ability to “Google” the website to find further information; an ability to analyze and expounding the meaning of the term “bias” in an articulate way that demonstrates the student’s ability to know who wrote the source, what they know about that source, what evidence is being used to support that source, what the alternative perspectives are, how the student knows the bias tilt of the source, and/or how the source commits to presenting the truth; and explaining their own background knowledge on the source if they are familiar with the cite. If a student wrote about doing any of these searches, it was coded as a complex behavior.

In turn, simple behaviors reported by students were viewed as an inability to investigate the sources and/or to analyze how they came to their conclusion about a source. Coding for simple behaviors came from examining the responses students gave and categorizing similar patterns of behavior. Simple behaviors were vague impressions students gave, such as “looks

like,” “seems to be,” “makes me feel” that were based on reactions to the appearance and organization that may or may not have contributed to the source was reliable.

An example of this occurred in the interview process where many students continued to justify the credibility of the source because it “seemed legit.” When pressed for clarification in follow up interviews, one student replied that he didn’t necessarily know how to explain it, but it was just a gut feeling for him. He later clarified that when the source seemed legitimate it was because the website didn’t appear to be bias and that there was a graph posted on the page that appeared to be correct. Again, when asked what the word “bias” meant, he again replied that knowing if a source was biased or not was just a “gut feeling” for him; something he couldn’t explain. Of the students interviewed, all used this similar phrase of a “gut feeling” indicating how they knew a source was reliable or not.

Other simple behaviors included citing the presence or absence of links and sources; only mentioning a bias without any sort of explanation; mentioning only the domain name (URL); crediting the presence or absence of (an) author(s); describing the language used within the source; mentioning the length of the publication; and noticing the presence or absence of advertisements all as something that either contributed or took away from the validity of that source (see Appendix C).

Pre-assessment response percentages were coded by myself and another coder using the codebook I developed based on the research cited above. We met to compare codes. On the codes the other coder and I disagreed on, we talked through to reach an agreement and to also revise the definitions in the codebook. I then went back with the revised codebook and coded the rest of the data.

The coded data was then tabulated as shown in tables 7-9. The number of coded

responses in both pre- and post-assessments were determined. It became apparent that the wide variation in responses in each of the listed behaviors made comparisons very difficult. The data was then normalized and listed as a percentage of the highest response rate of either the pre- or post-response for each of the listed behaviors. These are listed as “Pre % Max” and “Post % Max.” The Pre % Max value was then subtracted from the Post % Max value, and listed in the “Difference” column. A difference of -100 means the listed behaviors were only used in the pre group, and a difference of 100 means the listed behavior were only used in the post group; the post group being more successful at source evaluation than the pre group. Differences between 25 and -25 were felt to be too close and were not included in the analysis.

Interviews were recorded on an iPhone and transcribed onto a Google Doc. Repeated phrases and words from the transcribed interviews that seemed to be connected (such as vague terms like “feels like,” “looks like,” or “gut feeling,”) were then identified and sorted into themes of “vague terms” that was used to code for comments like these from the transcribed interviews. I was particularly looking for explanations on how students evaluated their assessment sources and whether or not they could articulate how they knew if the source was reliable or not. Interviews were coded to group instances of complex behaviors from simple behaviors when justifying their evaluation. After grouping complex vs. simple behaviors in interviews, I identified several phrases that students tended to favor that were similar in each instance for either behavior. These repeated phrases were then divided into different themes about students’ understanding of source evaluation.

Results

As stated above, this research sought to answer the following questions. This discussion will discuss them one by one.

- Is BYU currently effective at teaching source evaluation?
- Are either of BYU library's DBL or YSearch modules effective at teaching source evaluation to freshmen students?
- Which is more effective at teaching source evaluation, YSearch or DBL?
- Do students retain their new source evaluation skills over time?
- Which, if any, source evaluation behaviors were more effective?
- Which approach helps students move from simple to complex behaviors?

Is BYU Currently Effective at Teaching Source Evaluation?

This section is further divided into three separate questions: 1) are the two classes similar before and 2) at the completion of taking their modules, and 3) did the two class' assessment scores improve after taking their module?

Are the two classes similar before taking the modules? The DBL Class had eighteen students volunteer to participate and completed the pre-assessment and the YSearch Class had seventeen students. An unpaired, two-tailed t-test was performed on their assessment scores to determine the p-value, or probability, that the differences seen between the two classes could be attributed to random change alone. This statistical method was used because it met the assumptions of distribution normality and scaled data (0-4). This is the case for other analysis. The results of this test show the two classes were similar in the initial performance, demonstrating that both classes were starting from a shared level understanding, or in this case, a misunderstanding, of source evaluation (See table 1). Since both classes are at the same "starting point," progress between their "end points" can now be readily compared. Furthermore, both classes had similar pre-college instruction on source evaluation with ten in the DBL Class saying this was discussed in high school and eleven in the YSearch Class.

Are the two classes similar after taking the modules? Similarly, an unpaired, two-tailed t-test analysis of the results of the post-assessment also showed no statistical difference between the two instructional models (see table 2). Students in both the DBL and YSearch class had similar post-assessment scores, as both modules performed similarly in their abilities to identify sources as reliable after they received instruction (see table 2).

Table 1

Pre-Assessment Results

	DBL Class	YSearch Class
Number	15	15
Mean Score	1.93	1.88
Std Dev	0.68	0.78

Note: Table 1 shows that both the DBL Class and YSearch Class had similar pre-assessment scores. p-value = 0.83

Table 2

Post-Assessment Results

	DBL Class	YSearch Class
Number	15	15
Mean Score	2.60	2.50
Std Dev	0.78	0.61

Note: Table 2 shows that both the DBL Class and YSearch Class had similar post-assessment scores. p-value = 0.69

Did the two classes' assessment scores improve after taking their module? The above analysis demonstrated that who had completed either module were equal in their ability, or inability, to teach source evaluation, but it has not shown if there was any improvement. To evaluate if there was improvement the pre-assessment and post-assessment scores need to be compared. Since the post-assessment scores between the two classes were similar, their results can be combined. The combined use of this data will improve the sensitivity in determining if there was any improvement after completing the modules. Individual modules assessment will be performed in a later section.

A comparison between the pre- and post-surveys of all students (DBL and YSearch

combined) is shown in table 3, along with the p-value, calculated using a paired two-tailed student-t test. I did run a Split-plot ANOVA to check for an interaction effect between time (pre/post) and group (DBL/YSearch). Because no interaction effect was found, it was determined to run a paired sample t-test for the DBL group (pre/post) and the Ysearch group (pre/post). Students' average scores in both modules improved from 1.90 in the pre-test to 2.55 in the post-test, or a 0.65 improvement in score with a p-value of 0.00029.

Table 3

Comparison Between Pre- and Post-Assessments (Classes Combined)

	Pre	Post
Number	30	30
Mean Score	1.90	2.55
Std Dev	0.73	0.66

Note: Table 3 shows that both the DBL Class and YSearch Class had a significant improvement in their post-assessment scores. p-value = 0.00029

Table 4

Comparison Between Pre- and Post-Assessments (DBL Class)

	Pre	Post
Mean Score	1.93	2.60
Std Dev	0.68	0.71

Note: p-value = 0.00692

Table 5

Comparison Between Pre- and Post-Assessments (YSearch Class)

	Pre	Post
Mean Score	1.88	2.50
Std Dev	0.78	0.61

Note: p-value = 0.01971

Are either of BYU library's DBL or YSearch modules effective at teaching source evaluation to freshmen students? To evaluate how effective each module was at teaching source evaluations, the pre- and post-assessments of all students in just the DBL (see table 4) or YSearch class (see table 5) were analyzed using a paired two-tailed student-t test, the same method in table 3 above. Both have p-values less than 0.05 (0.00692 and 0.01971 respectively). While the p-values of the two teaching methods are different, the analysis in table 2 demonstrated that these differences are not significant, p-value of 0.69 and most likely from just random chance alone.

Which is more effective at teaching source evaluation, YSearch or DBL? As shown in table 2 both were equally effective in teaching source evaluation.

Table 6

Follow-up Assessment Result

	Post	Follow-up
Number	30	8
Mean Score	2.55	2.88
Std Dev	0.66	0.33

Note: p-value = 0.197

Do students retain their new source evaluation skills over time? To better understand if students retained their new understanding of source evaluation, a follow-up questionnaire was sent to them four months after they took their module. Unfortunately, only eight of the thirty-five responded, three from the DBL class and five from the YSearch class. There were too few respondents to compare between classes, therefore the scores from both classes are combined

and analyzed using a paired two-tailed student-t test as is shown in table 6. Interestingly, the follow-up scores were slightly higher than the post scores, however this difference is not statistically significant (p-value 0.0197). While it is reassuring that the follow-up scores were higher, implying there was trend toward not forgetting their newly acquired skills, the small numbers in the follow-up group implies that any conclusions must be considered tentative at best.

Which, if any, source evaluation behaviors were more effective? The discussion above demonstrated that both the YSearch and DBL source evaluation modules were equally effective at teaching freshman students, and that the new skill remained with some students at least four months following the learning modules. To determine which source evaluation behaviors were more effective, be they complex or simple, coded data from the students' interviews and written responses were used and analyzed as the data above suggests (see tables 7-9).

Table 7 looks at the data of both classes combined. As discussed above, differences ranged from -100 to 100. A difference of -100 means the listed behaviors were only used in the pre group, and a difference of 100 means the listed behavior were only used in the post group; the post group being more successful at source evaluation than the pre group. Differences between 25 and -25 were felt to be too close and were not included in the analysis. The pre and the post groups emphasized different simple and complex behaviors. Since the post group scored higher in the assessment, it would imply that behaviors utilized in the post group were more effective for these students to differentiate between a reliable versus unreliable source. Specifically these behaviors were "Advertisement," "Follow-up on Citations," "Googling Website," and "Following any Links." It is possible that instruction focusing on these behaviors

may improve students' ability.

Which approach helps students move from simple to complex behaviors? When the coded results from the two classes are viewed separately, differences appear as shown in tables 8 and 9. Interestingly the YSearch and DBL classes used different evaluation behaviors in the post-assessment. Indeed, there was no overlap, implying that the modules were not only different in teaching styles, but also students learned different behaviors.

Table 7

Combine Classes Coded Data

Behaviors	Type	Pre	Post	Highest Response	Pre % Max	Post % Max	Difference
Searches of Authorship	Complex	1	0	1	100%	0%	-100
Vague Response	Simple	43	18	43	100%	42%	-58
Talking about bias or agenda	Complex	49	23	49	100%	47%	-53
Date Published	Simple	4	2	4	100%	50%	-50
Authority	Simple	33	23	33	100%	70%	-30
Background Knowledge	Complex	34	24	34	100%	71%	-29
Domain Name	Simple	31	23	31	100%	74%	-26
Length of Publication	Simple	3	3	3	100%	100%	0
Links/Citations	Simple	36	38	38	95%	100%	5
Appearance of Design	Simple	22	25	25	88%	100%	12

Language Used	Simple	6	8	8	75%	100%	25
Advertisement	Simple	3	7	7	43%	100%	57
Follow Up on Citations	Complex	0	1	1	0%	100%	100
“Googling” Website	Complex	0	1	1	0%	100%	100
Following any links	Complex	0	1	1	0%	100%	100
Minimum Errors	Simple	0	0	0	-	-	-
Ability to Juggle Information	Complex	0	0	0	-	-	-

The complex evaluation behaviors of “Searches of Authorship,” and “Background Knowledge” as well as the simple behavior of “Authority,” were the behaviors used by the YSearch class in their pre-assessment, while the simple behavior of Advertisement was used in their post-assessment.

Table 8

YSearch Class Coded Data

Behaviors	Type	Pre	Post	Highest Response	Pre % Max	Post % Max	Difference
Searches of Authorship	Complex	1	0	1	100%	0%	-100
Vague Response	Simple	12	6	12	100%	50%	-50
Authority	Simple	18	10	18	100%	56%	-44
Background Knowledge	Complex	19	11	19	100%	58%	-42

Length of Publication	Simple	3	2	3	100%	67%	-33
Talking about bias or agenda	Complex	29	23	29	100%	79%	-21
Links/Citations	Simple	23	21	23	100%	91%	-9
Appearance of Design	Simple	11	11	11	100%	100%	0
Language Used	Simple	5	5	5	100%	100%	0
Domain Name	Simple	13	15	15	87%	100%	13
Advertisement	Simple	2	4	4	50%	100%	50
Date Published	Simple	0	0	0	-	-	-
Minimum Errors	Simple	0	0	0	-	-	-
Follow Up on Citations	Complex	0	0	0	-	-	-
“Googling” Website	Complex	0	0	0	-	-	-
Following any links	Complex	0	0	0	-	-	-
Ability to Juggle Information	Complex	0	0	0	-	-	-

The complex evaluation behavior of “Talking about Bias or Agenda” was the favored behavior used by the DBL Class in their pre-assessment, while the complex behaviors “Follow up on Citations,” “Googling Website,” and “Following any Link” were used in their post-assessment. Again, implying these were the behaviors learned in that class.

Interestingly, the complex behaviors used in the pre-assessment in both classes were used less frequently in the post-assessment. It is not clear why these students stopped using this

complex evaluation behavior.

On a numerical basis, DBL moved more students to complex evaluation behaviors than YSearch. DBL also had students using more complex behaviors in the post-assessment than did YSearch. However, the raw numbers are small, giving a very low confidence to this conclusion.

Table 9

DBL Class Coded Data

Behaviors	Type	Pre	Post	Highest Response	Pre % Max	Post % Max	Difference
Talking about bias or agenda	Complex	20	0	20	100%	0%	-100
Vague Response	Simple	31	12	31	100%	39%	-61
Domain Name	Simple	18	8	18	100%	44%	-56
Date Published	Simple	4	2	4	100%	50%	-50
Background Knowledge	Complex	15	13	15	100%	87%	-13
Authority	Simple	15	13	15	100%	87%	-13
Appearance of Design	Simple	11	14	14	79%	100%	21
Links/Citations	Simple	13	17	17	76%	100%	24
Language Used	Simple	1	3	3	33%	100%	67
Advertisement	Simple	1	3	3	33%	100%	67
Length of Publication	Simple	0	1	1	0%	100%	100
Follow Up on Citations	Complex	0	1	1	0%	100%	100

“Googling” Website	Complex	0	1	1	0%	100%	100
Following any links	Complex	0	1	1	0%	100%	100
Minimum Errors	Simple	0	0	0	-	-	-
Searches of Authorship	Complex	0	0	0	-	-	-
Ability to Juggle Information	Complex	0	0	0	-	-	-

It is interesting that while the DBL students used more complex behaviors in the post-analysis than the YSearch students utilized, in the end, their results were similar. The reasons for this are uncertain; it could be that some complex behaviors are more effective than others, or it is possible that the small numbers of students in the study and even smaller who were interviewed may not give an accurate reflection of the methods to discern reliable vs. unreliable sources.

Qualitative Results

One theme from the interviews that emerges is that students know the language of source evaluation, but have failed to understand and appropriately implement the meanings into their source evaluation. For example, while students answered more questions correctly on the post-assessment when interviewed, four out of the five students were not able to articulate *how* they knew the source was or was not reliable. While this may be similar to the explanation of a “gut feeling” discussed earlier, when I asked students to define terms for me, such as the word “reliable,” students defined the word by describing the appearance and design of the website, such as the absence of “click-bait” or if the paragraphs looked professional. Even for those students selected for the interview because they showed improvement on the post-assessment, this theme suggests that was not because their use of complex behaviors had increased. In fact, as

often as students said one source was reliable, they said another source was unreliable for the same reason about the appearance of design on the website. One example of this pattern is seen by a student who said she determined a website was reliable or not by whether the site included “just the facts.” When I asked her what “facts” meant, she stated that the article aligned with her beliefs or knowledge of that subject matter. If the site included “facts” that aligned with her belief system, the source was automatically reliable. However, if it did not agree or contradict her knowledge on the subject, the website was not reliable. To illustrate this point, she had determined an article from “Daily Jstor” that summarized a Supreme Court decision to be unreliable because she disagreed with the decision the Supreme Court had made. Despite the fact that the article included links and footnotes from several attached primary sources on the decision, the student determined the source was not accurate.

Another example that illustrates this theme is seen with another student who was asked what “primary sources” meant; after reviewing this student’s justification for claiming that PETA was a reliable source, the student claimed that PETA’s article on the effects of how a meat and dairy lifestyle consumption can lead to an early death (which did not include any sort of statistical evidence) was reliable because the website was claiming “appeared” to be the primary source. The student justified the article because the source itself had created the claim and then proven their claim. While it may be true that PETA had proven their own claim, I asked that student if she meant PETA’s source was factual. The student then stated that any source that proves its claim is a factual source. Like this student, every student I interviewed was familiar with the term “primary source,” but none of them could define it.

A second theme that emerged from the interviews was a lack of motivation to learn the material. Despite the significance of proper source citation for their future academic and

potentially careers, based up the interviews it was apparent that all of the students were not truly motivated to learn the subject, each saying they were just trying to do their best to get a good grade, having no real interest in consulting with their instructor or librarian for assistance, and continued to rely on previous behaviors that they had used in the pre-assessment evaluations. In follow-up interviews, I followed up each question asking if students had transferred any practices from what they learned in library days to their own evaluation of social media sources. All of them said they would continue to use Facebook or Twitter as their main source of news, regardless of the tools they learned to check the validity of sources.

Discussion and Implications

The research sought to examine if BYU's library YSearch and DBL source evaluation teaching modules were effective in teaching students how to evaluate sources and if either would move students from a superficial to a more complex understanding of source evaluation. I also evaluated if students experienced source evaluation differently through DBL versus YSearch, and whether any of this new knowledge stayed with students beyond the semester. Briefly the conclusions reached in this study were:

1. Reassuringly, both YSearch and DBL were equally effective at teaching source evaluation. It should be noted that their pre-assessment scores improved from a 1.90 to a 2.55 out of 4 questions, meaning after the instruction, students showed improvement on $\frac{3}{4}$'s of a question. Clearly, there's room for improvement.
2. The behaviors exhibited by students on their post-assessment differed depending upon which module they took. This implies that the learning modules emphasized different skills. One could speculate on if it would be advantageous to have students take both modules.

3. After completing the learning modules, DBL module utilized more complex behaviors than YSearch in the post-assessment. There was a trend that those in the DBL class used more complex behaviors than those who completed the YSearch module. It should be noted that the raw numbers are small and confidence in these conclusions is very low.

The ultimate goal was to improve freshman college students' ability to determine the quality a potential source and if it could or should be used in their analysis. This study affirmed that entering freshmen are generally unskilled at source evaluations, and that current teaching methods are effective. It also showed that despite students' growth, there is still significant room for more improvement. This discussion will focus on how to use the understanding gained from this study to help future students become even more proficient at source evaluation.

Expand Current Modules So That They Are Longer and Give More Detailed Instruction

This study gives us a better understanding of each module's strengths and weaknesses. These modules could be modified to address their respective weak areas as well as to reinforce their strong points. While students showed improvement from their first assessment, most students continued to rely on simple behaviors when evaluating post-assessment sources. Without repeated scaffolding and repetition, students may rely on their "gut feeling" over the lesson they've only learned once in a short fifteen-minute lecture. Perhaps expanding the current modules so that they are taught throughout the semester may help students move away from relying on their own gut feeling and start becoming experts in source evaluation practices themselves.

Another possibility to helping students develop complex behaviors would be to lengthen out the time devoted to source evaluation in library days. If students learn YSearch in the

classroom throughout the semester on how to evaluate sources in their various writing unit, the library could take more time to build on that knowledge. When observing both YSearch and DBL teaching instruction, both module instructors' discussions were different from each other. This again could be in part because of the differences that either module may emphasize different complex behaviors. But despite the fact that students may or may not have any prior experience with source evaluation, library instructors made certain assumptions. For example, the YSearch instructor did not mention to students that they should initially Google their source, while the DBL instructor showed students how to Google sources as an initial decision experts make when evaluating sources. Though the DBL instructor did not repeatedly Google every aspect of the website—like Wineburg's fact checkers did when applying "lateral reading"—they did inform students that Googling a website is useful when discerning a website's agenda (Wineburg & McGrew, 2017). In comparison, the YSearch instructor never specifically used the phrase "to separately Google" the source, but did instruct students to "look up" the author and purpose, though students might have confused the phrase to having meant they should look up the information from the website itself as opposed to opening a new tab and search. The YSearch module was given in lecture format, devoting a total of twelve minutes to source evaluation, with zero visuals.

While both YSearch and DBL students were able to answer more questions correctly on the post-assessment, this does not necessarily mean they were using more complex behaviors. If students are to learn complex behaviors, instruction must be unified so that students are on a level playing field.

Lengthening the time spent on teaching complex behaviors of source evaluation during library days will require multiple examples of an instructor demonstrating how to evaluate

sources in various online situations. If the learning modules are too short in length and time allotted, students may continue to rely on their “gut feeling” over gaining and apply an expert’s knowledge on the subject. At present, both the DBL and YSearch modules on source evaluations are less than 15 minutes each. Another possible quick, easy, and cheap solution may be just to expand the time to a full hour and have the instructor show examples of how he or she approaches a potential source. Students also may not have internalized the importance of source evaluation because of the limited time offered to teach the material. Students are already limited for time and attention due to competing classes and activities, so if instructors only devote thirty minutes of instruction to source evaluation, students may not think the subject is as important to remember or learn.

Modify Learning Modules That Emphasize Complex Learning Behaviors

It appears that the modules have succeeded in teaching students the language and meanings of terms used in source evaluation, but have failed to teach the actual implementation skills. The implications of this answer are concerning. No matter how fictitious a website might be, if a student believes the site is true, they may see that site as a reliable source. Again, the need to clarify, instruct, model, and then practice terminology such as the difference between facts, primary and secondary sources, and attached links and footnotes is missing from both YSearch and DBL modules. Students may complete the assignments, but if they do not understand what the terms or how to implement them, they are probably more likely to rely on their own trial and error “gut feelings” and biases of sources as opposed to learning complex behaviors.

Future source evaluation instruction must take into account that students may be familiar with the terminology of source evaluation, such as facts, primary sources, even “fake news,” but

that does not mean they know what those terms mean or, more importantly, how to use complex behaviors to assess sources using the meaning of that given terminology. Taking time to do more than just discuss source evaluation, instructors should demonstrate complex behaviors to help students differentiate between a reliable and an unreliable source. If instructors structure their lesson around live demonstrations, students will develop these complex behaviors more quickly and retain it longer, understanding not just the terminology but also the techniques of source evaluation.

Take YSearch Then DBL

As demonstrated in tables 8 and 9, the YSearch and DBL modules students came away with different effective source evaluation skills. The DBL students tended to utilize more complex evaluation behaviors than the Ysearch students. If, like mentioned above, students learn source evaluation sooner in their FYW course they may be able to transfer complex behaviors outside the classroom. Perhaps FYW instructors could be trained by the library on how to implement YSearch in their classroom at the beginning of the semester, and as students prepare for library days or their research paper, librarians instruct students in DBL. The reason for this is that YSearch is already a tool instructors are informed about before teaching WRTG 150, but often didn't use. If teachers are first trained to feel confident and comfortable teaching YSearch, which encompasses all aspects of the research processes, librarians could spend their time learning about and then instructing students on the DBL module during library days. The DBL module is already based in the YSearch curriculum, but builds and expands to address the complexities of source evaluation. If instructors are already confident on implementing YSearch, including the homework and repeated learning exercises that can be applied to each unit, it may be easier for instructors to implement DBL exercises and homework. Students would then be

constantly building their knowledge on source evaluation and strengthening the complex behaviors YSearch and DBL emphasize. If this two-step were effective, having students take the two existing learning modules would be very easy to quickly implement.

Incentivize Students to Learn Source Evaluation; i.e., Improvement Is Part of Grade

As noted above, many of the students were unmotivated to learn proper source evaluation. The reason for this may include student's lack of understanding the importance of source evaluation; many may not have necessarily realized that the concept of source evaluation is not limited to academic work, but also transfers to their social, political and professional lives, such as how they determine where they get their social and political news sources, or future reports for school or work. Perhaps connecting source evaluation as a skill that transfers outside of the classroom is a unit that needs to be taught in FYW courses.

If students are given an incentive to learn the material, such as making the mastery of source evaluation as part of their grade students will prioritize learning source evaluation and in turn, should develop complex behaviors that will assist them with the complexities of source evaluation in both their academic work and also in their own personal and professional pursuits. If students are assigned source evaluation grades somewhere between 5-10% of their grade, it's not enough that they will fail the class, but enough that not completing or learning the material in order to improve in their abilities may drop a letter grade.

Limitations

Despite best efforts, this study did have several limitations. The largest limitation was the small numbers used to conduct the study, which pulled from only two FYW classes with twenty students each, for a total of forty students. Limiting sample sizes to two sections presents problems for generalizability, but limited time and resources dictated this decision.

Likewise, since only eight of the thirty-five students completed the follow-up assessment, it is difficult to have confidence in extrapolating results from 15% of the study group to the entire group and certainly even more so to applying these conclusions to a larger group. Although this small group's performance suggested that what they learned had stuck with them, it's difficult to generalize that conclusion to the whole group.

Future Research

Within the limitations discussed above, this study answered its initial questions. However, it also raised even more interesting questions.

An obvious possible future research study would be to repeat this study, but with a much larger number of students across different sections with different instructors. Depending upon the subsets selected, a significantly larger number of students may be needed, perhaps up to ten times as many. A power analysis could be performed to better estimate the size needed.

To reduce the dropout rate in the follow-up assessment, subjects could be incentivized for their participation. This could be either financial, such each student receiving a \$5 dollar gift card upon completion, or to make learning this skill set part of their grade.

Since the YSearch class and the DBL class successfully utilized different complex evaluation behaviors, comparing students who reviewed both modules to those who took just one would be an interesting study. If using both methods, students could potentially learn and apply both complex behaviors favored by either module. If our goal as instructors is to help students learn the most complex behaviors so that they can transfer their source evaluation skills outside the classroom, using as many methods that work to teach students complex behaviors could prove to be a useful method. Perhaps combining both teaching modules would create a hybrid that could be incorporated into a FYW classroom more effectively and offer extended time to teach

source evaluation.

Conclusion

Recent studies have demonstrated that college freshman students are relying on more simple than complex behaviors when they review a source of information to determine if it should be included as a reference for a research paper. Students appear to be ill prepared in reliable source evaluation techniques. In this study I preformed a comparative analysis of Brigham Young University freshman students using two different source evaluation pedagogies, YSearch and DBL. I initially determined their ability to discriminate between reliable and unreliable sources before and after taking their FYW course. I determined that these entering freshmen had a low ability to determine between reliable and unreliable sources, having correctly discerned only 1.85 out of 4 questions on source evaluation correctly. Following their source evaluation modules, their scores improved to answering 2.55 correctly out of 4 questions on source evaluation. While a significant improvement (p-value 0.00029), their scores demonstrate there is room for continued improvement. On further evaluation, I determined that YSearch and DBL were equally effective at teaching these students, but these students favored different complex behaviors. A few students took a follow-up assessment and appeared to retain their skill-set. The response rate was too low to provide significance, but there was some improvement in the follow-up.

While this study provided insight into the current status of Brigham Young University's entering freshman students and its current source evaluation methods, the number of students studied was insufficient to make firm conclusions. A further analysis with larger numbers would be needed. An intriguing question raised by this study is if students took both the YSearch and DBL modules and learned both sets of complex behaviors taught by these modules would their

ability to determine source reliability improve further? This study could be used to help modify YSearch and DBL module techniques or help develop a completely new source evaluation teaching method. It is anticipated that this study will be the first stepping-stone on a path to enhance freshman source evaluation pedagogies.

References

- Agosto, D. E. (2002). A model of young people's decision-making in using the web. *Library & Information Science Research*, 24(4), 311–341. doi:10.1016/S0740-8188(02)00131-7.
- Association of American Colleges & Universities. Essential learning outcomes. Retrieved from <https://www.aacu.org/leap/essential-learning-outcomes>.
- American Library Association. (1989). Presidential committee on information literacy: Final Report. Chicago: American Library Association. Retrieved from <http://www.ala.org/acrl/publications/whitepapers/presidential>.
- Barzilai, S., & Zohar, A. (2012). Epistemic thinking in action: Evaluating and integrating online sources. *Cognition and Instruction*, 30(1), 39-85. doi: 10.1080/07370008.2011.636495.
- Biggs, J. B. (2011). *Teaching for quality learning at university: What the student does*. McGraw-Hill Education (UK).
- Blakeslee, S. (2004). The CRAAP Test. *LOEX Quarterly*. 31(3). Retrieved from <https://commons.emich.edu/loexquarterly/vol31/iss3/4/>.
- Donald, B. (2016). Stanford researchers find students have trouble judging the credibility of information online. *Stanford Graduate School of Education*. Retrieved from ed.stanford.edu/news/stanford-researchers-find-students-have-trouble-judging-credibility-information-online.
- Bransford, J. D., Brown, A. L., & Cocking, R. R. (1999). *How people learn: Mind, brain, experience, and school*. Washington DC: National Academies Press.
- Breakstone, J., McGrew, S., Smith, M., Ortega, T., & Wineburg, S. (2018). Why we need a new approach to teaching digital literacy. *Phi Delta Kappan*, vol. 99(6), 27–32., doi:10.1177/0031721718762419.

- Council of Writing Program Administrators. (2014). WPA outcomes statement for first-year composition (3.0), approved July 17, 2014. Retrieved from wpacouncil.org/positions/outcomes.html.
- Head, A. (2013). What can be learned about the information-seeking behavior of today's college students?. Retrieved from www.projectinfolit.org/uploads.
- Head, A., & Eisenberg, M. (2010). How College Students Evaluate and Use Information in the Digital Age. Retrieved from www.projectinfolit.org/uploads.
- Iding, M. K., Crosby, M. E., Auernheimer, B., & Klemm, B. (2009). Web site credibility: Why do people believe what they believe? *Instructional Science*, 37, 43-63. doi: 10.1007/s11251008-9080-7.
- Julien, H., & Barker, S. (2009). How high school students find and evaluate scientific information: A basis for information literacy skills development. *Library & Information Science Research*, 31, 12-17. doi:10.1016/j.lisr.2008.10.008.
- Meola, M. (2004). Chucking the checklist: A contextual approach to teaching undergraduates web-site evaluation. *Portal: Libraries and the Academy*, 4(3), 331–344., doi:10.1353/pla.2004.0055.
- Metzger, M.J. (2007). Making sense of credibility on the web: Models for evaluating online information and recommendations for future research.” *Journal of the American Society for Information Science and Technology*, 58(13), 2078–2091. doi:10.1002/asi.20672.
- Olsen, M.W., & Diekema A.R. (2013). “I just Wikipedia it”: Information behavior of first-year writing students.” *Proceedings of the American Society for Information Science and Technology*. Retrieved from nlinelibrary.wiley.com/doi/full/10.1002/meet.14504901176.

- Ostenson, J. (2013). Reconsidering the checklist in teaching internet source evaluation. *Portal: Libraries and the Academy*, 14(1), 33–50. doi:10.1353/pla.2013.0045.
- Plummer, K., Swan, R., & Lush, N. (2017). Introduction to Decision-Based Learning. *INTED 2017 Proceedings*, 2629-2638.
- Project Information Literacy. (2010) How college students seek information in the digital age. Retrieved from www.projectinfolit.org/uploads/.
- Sansom, R.L., Suh, E. & Plummer, K.J. (2019). Decision-Based Learning: “If I just knew which equation to use, I know I could solve this problem!” *Journal of Chemical Education*, 96(3), 445–454. doi:10.1021/acs.jchemed.8b00754.
- Stanford History Education Group. (2016). *Evaluating information: The cornerstone of civic online reasoning*. Robert R. McCormic Foundation. Retrieved from stacks.stanford.edu/file.
- Wineburg, S., & McGrew S. (2017). Lateral reading: Reading less and learning more when evaluating digital information.” *SSRN Electronic Journal*. doi:10.2139/ssrn.3048994.
- YSearch module 4: Source evaluation. Retrieved from ysearch.lib.byu.edu/module-4/.

Appendix A

Pre/Post/Follow-Up Assessment Questions

Pre-Assessment

In a paper, an instructor will often ask you to cite where you found your information. Some sources are felt to be more acceptable than others.

Please Write a Brief Answer To The Following Questions:

Do you recall being taught about source evaluation, and if so what do you recall being emphasized in that instruction?

On a scale from 0 to 5, 0 being no time spent to 5 being time spent reviewing for each paper, how long did your classes, which required research papers, spend time reviewing whether a source was acceptable or not acceptable?

There are 4 Yes/No and follow up questions about source evaluation. Answer them to the best of your ability.

1) Is this an acceptable source to cite for a college level research paper?

<https://politics.theonion.com/ivanka-trump-distraught-after-learning-detained-migrant-1828062128>

Yes or No.

Please explain, in 3-4 sentences, *why* and *how* you can tell this source is acceptable or unacceptable.

2) Is this an acceptable source to cite for a college level research paper?

<https://www.americanprogress.org/issues/democracy/reports/2018/05/24/451262/trust-government-trump-era/>

Yes or No.

Please explain, in 3-4 sentences, *why* and *how* you can tell this source is acceptable or unacceptable.

3) Is this an acceptable source to cite for a college level research paper?

<https://www.npr.org/2018/06/22/622540331/fact-check-trump-illegal-immigration-and-crime>

Yes or No.

Please explain, in 3-4 sentences, *why* and *how* you can tell this source is acceptable or unacceptable.

4) Is this an acceptable source to cite for a college level research paper?

<https://www.ncbi.nlm.nih.gov/pubmed/9500320>

Yes or No.

Please explain, in 3-4 sentences, *why* and *how* you can tell this source is acceptable or unacceptable.

Post-Assessment

At any point during this Conference Paper, did you consult your instructor or ask a librarian for help or clarification on evaluating a source? Yes or No.

If yes, what did you need help or clarification for specifically? If no, why not? Please explain in 3-4 sentences.

If you were ever confused about the reliability of source for a future research paper, would you ever consult your instructor or librarian?

Yes or No.

Please explain, in 3-4 sentences, why you would, or what you would do instead if you were ever confused about the reliability of a source.

There are 4 Yes/No and follow up questions about source evaluation. Answer them to the best of your ability.

1) Is this an acceptable source to cite for a college level research paper?

<https://www.peta.org/features/shady-meat-egg-and-dairy-industry-euphemisms/>

Yes or No.

Please explain, in 3-4 sentences, *why* and *how* you can tell this source is acceptable or unacceptable.

2) Is this an acceptable source to cite for a college level research paper?

<https://www.hiv.va.gov/patient/daily/diet/single-page.asp>

Yes or No.

Please explain, in 3-4 sentences, *why* and *how* you can tell this source is acceptable or unacceptable.

3) Is this an acceptable source to cite for a college level research paper?

<http://www.ageofautism.com/2018/07/research-backs-parental-concerns-kids-with-food-allergies-2x-more-likely-to-have-get-autism.html>

Yes or No.

Please explain, in 3-4 sentences, *why* and *how* you can tell this source is acceptable or unacceptable.

4) Is this an acceptable source to cite for a college level research paper?

<http://www.foxnews.com/opinion/2018/07/17/want-to-live-happier-life-be-conservative.html>

Yes or No.

Please explain, in 3-4 sentences, *why* and *how* you can tell this source is acceptable or unacceptable.

Follow-Up Assessment

In Winter Semester, how many papers have you written that have required you to use additional sources?

If you have used additional sources, how did you find those sources?

How would you define "credible" or "reliable" sources?

How do you tell the difference between an opinion and facts?

Now you will evaluate four potential sources for a college-level research paper. For each source, you'll see a link that should open an article in a new window. After reviewing each article, return to this survey window where you'll answer a Yes/No question and a follow up question about your evaluation. Answer them to the best of your ability.

1) Is the article linked below an acceptable source to cite for a college level research paper?

<https://www.vox.com/2018/3/20/17115620/me-too-sexual-harassment-sex-abuse-poll>

Yes or No.

Please explain, in 3-4 sentences, *why* and *how* you can tell this source is acceptable or unacceptable.

2) Is the article linked below an acceptable source to cite for a college level research paper?

<https://www.rainforest-alliance.org/pictures/9-rainforest-facts-everyone-should-know>

Yes or No.

Please explain, in 3-4 sentences, *why* and *how* you can tell this source is acceptable or unacceptable.

3) Is the article linked below an acceptable source to cite for a college level research paper?

<https://daily.jstor.org/what-roe-v-wade-means-for-internet-privacy/>

Yes or No.

Please explain, in 3-4 sentences, why and how you can tell this source is acceptable or unacceptable.

4) Is the article linked below an acceptable source to cite for a college level research paper?

<https://www.nytimes.com/2018/07/17/technology/political-ads-facebook-trump.html?rref=collection%2Fsectioncollection%2Ftechnology&action=click&contentCollection=technology®ion=rank&module=package&version=highlights&contentPlacement=1&pgtype=sectionfront>

Yes or No.

Please explain, in 3-4 sentences, why and how you can tell this source is acceptable or unacceptable.

Appendix B

A Case for Equivalence

Pre-Assessment	Post-Assessment	Follow-Up Assessment
<p>1. The Onion: Ivanka Trump Distraught After Detained Migrant Children Completely Without Sewing Machines What the Knowledgeable Student Needs To Know:</p> <ul style="list-style-type: none"> - No Author Listed - Click-Bait - The Onion is Satirical - Short article - No in-citation links/references 	<p>1. PETA: Meat, Egg, and Dairy Terms and What They SHOULD Be Called What the Knowledgeable Student Needs To Know:</p> <ul style="list-style-type: none"> - No Author Listed - Emotional Music Playing on Website - Graphic images - Data is collected internally - No citations for photos or information - Website's agenda 	<p>1. Vox News: The #MeToo generation gap is a myth What the Knowledgeable Student Needs To Know:</p> <ul style="list-style-type: none"> - Separate search of author - Follow up on Links and Citations - Data is collected internally - Website's agenda
<p>2. Center for American Progress: Trust in Government in the Trump Era What the Knowledgeable Student Needs To Know:</p> <ul style="list-style-type: none"> - Separate Searches of 	<p>2. U.S. Department of Veterans Affairs: HIV/AIDS: Diet and Nutrition and HIV What the Knowledgeable Student Needs To Know:</p> <ul style="list-style-type: none"> - Government 	<p>2. Rainforest-Alliance: 9 Rainforest Facts Everyone Should Know What the Knowledgeable Student Needs To Know:</p> <ul style="list-style-type: none"> - No author listed

<p>Authorship</p> <ul style="list-style-type: none"> - Organization's agenda - Center for American Progress bias - Data collected internally - Follow Up on Links and Citations 	<p>publications</p> <ul style="list-style-type: none"> - Separate links to further information - Intended audience - Data collected from United Nations 	<ul style="list-style-type: none"> - Separate search of organization - Organization's agenda - No links or citations
<p>3. NPR: Fact Check: Trump, Illegal Immigration And Crime</p> <p>What the Knowledgeable Student Needs To Know:</p> <ul style="list-style-type: none"> - Separate Searches of Authorship - Organization's agenda - Follow Up on Links and Citations - Data citation from outside source 	<p>3. Age of Autism, Daily Web Newspaper of the Autism Epidemic: Research backs Parental Concerns: Kids With Food Allergies 2X More Likely To Have (Get?) Autism</p> <p>What the Knowledgeable Student Needs To Know:</p> <ul style="list-style-type: none"> - No information provide on author anywhere - Website is a personal blog - Website's agenda - Follow Up on Links 	<p>3. Daily Jstor: What Roe v. Wade Means for Internet Privacy</p> <p>What the Knowledgeable Student Needs To Know:</p> <ul style="list-style-type: none"> - Separate search of Jstor - Separate search of author - Follow Up on Links and Citations

	<p>and Citations</p> <ul style="list-style-type: none"> - Additional Articles on Vaccine-Autism Link 	
<p>4. Pub Med: Ileal-lymphoid-nodular hyperplasia, non-specific colitis, and pervasive developmental disorder in children</p> <p>What the Knowledgeable Student Needs To Know:</p> <ul style="list-style-type: none"> - Pub Med publications - Currency of article - Article has been retracted 	<p>4. Fox News: Want to live a happier life? Be a conservative!</p> <p>What the Knowledgeable Student Needs To Know:</p> <ul style="list-style-type: none"> - Article is published in Opinion Editorial section - Organization's agenda - Fox News bias - Separate search of author 	<p>4. The New York Times: The Biggest Spender of Political Ads on Facebook? President Trump</p> <p>What the Knowledgeable Student Needs To Know:</p> <ul style="list-style-type: none"> - Separate Search of author - Separate search of The New York Time's - Organization's agenda - The New York Times bias - Follow up on Links and Citations

Appendix C

Simple and Complex Definitions

Simple

- Presence or absence of links or sources: claiming without stated reason that because of the presence or absence of an attached link or other listed sources/works consulted, it is the believed to contribute to the validity of the source
- Mentions bias: uses language that is vague in meaning that does not explain the reason other than to claim that because of the presence or absence of basis is believed to contribute to the validity of the source
- Domain name extension: mentions the domain name, citing either “.org,” “.com,” “.gov,” “.edu,” as part of what may or may not add to the validity of the source
- Author or credentials: mentions the presence or absence of the author(s) and credentials as believed to contribute to the validity of the source
- Language used: describes the language as something that is believed to contribute to the validity of the source
- Length of publication: information of research and level of added detail believed to contribute to the validity of the source
- Presence or absence of advertisement: observation of advertisements is believed to contribute to the validity of the source
- General impressions of source: uses phrases such as “looks like,” “seems to be,” “makes me feel,” that are based in reactions to the design, appearance, and organization that are believed to contribute to the validity of the source

Complex

- Clicking on link or source: selects highlighted information or works cited references to create a separate search of the material in order to trace that material back to a primary source
- Separate searches of authorship: creates a separate search to find and evaluate source authorship outside the source authorship itself
- “Googling” website: creates a separate search to find and evaluate further information on the source outside of the source itself
- Expanding meaning of potential bias or agenda: can articulate how they know who wrote the source, what they know about the source, what evidence is being used to support a certain position, how does the source acknowledge alternative perspectives, how they know what side the source presents the issue on, what the mission of the source is, how the source commits to discovering truth?
- Have background knowledge of source: can articulate what knowledge they have of source and how it influences their evaluation

Appendix D

Post-Assessment Interview Questions

In the pretest, you thought certain sources were unacceptable and/or acceptable. Why did you change?

Tell me why you thought some sources were unacceptable and/or acceptable. Walk me through the evaluation process you used.