

## Health literacy education: The impact of synchronous instruction

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### **Structured Abstract** (250 words total)

#### Purpose

This article examines the integration of librarian-led health literacy instruction into an undergraduate course, focusing specifically on how the method of instruction impacts learning outcomes and self-reported confidence levels in completing a course assignment. Undergraduate students struggle to critically evaluate online health information in an increasingly diffuse information landscape. Assessing the success of different instructional techniques aimed at building these abilities can guide pedagogical choices and provide new opportunities to increase health literacy skills in a variety of library user populations.

#### Design/methodology/approach

A quasi-experimental research design with pre- and post-tests and a participant survey was used to compare one-shot information literacy instruction techniques in two hybrid sections of a kinesiology course. One class received a traditional, face-to-face librarian-led session and the other a synchronous online instructional session through web conferencing.

#### Findings

There were no significant differences in student learning between the in-person and online groups. Students in both conditions demonstrated an extremely significant increase from pre-test

to post-test scores, suggesting that librarian-led instruction in either format can lead to substantial learning of online health literacy skills. Survey results showed no significant differences in confidence levels following instruction and suggest both methods of instruction provide a positive learning experience for students.

### Originality/value

This study provides evidence that synchronous online instruction can be as effective as face-to-face instruction in teaching students to evaluate health-related information resources. These findings are valuable for librarians in a variety of settings who are considering providing health literacy education in an online environment.

## **Introduction**

The proliferation of online health information has given individuals the opportunity to play an active role in their own healthcare and the healthcare of their loved ones. According to a report from the PEW Research Center, 72% of Internet users searched for health information online at some point in the previous year (Fox and Duggan, 2013). However, in an increasingly diffuse health information landscape, it is more important than ever that individuals are able to distinguish between sources of varying authority and quality. Health literacy is defined as “the degree to which an individual has the capacity to obtain, communicate, process, and understand health information and services in order to make appropriate health decisions” (Patient Protection and Affordable Care Act, 2010). The development of health literacy skills related to understanding and evaluating online sources can mitigate consequences that may occur from

acting on incorrect or irrelevant health information (Crocco *et al.*, 2002). In addition to potentially harming oneself or others, taking online health information at face value can also lead to ill-informed understandings of important public health issues that affect broad communities of individuals.

Librarians are in an ideal position to address the online health literacy skills of their user populations. Whether in a university, medical, or public library, they have the expertise to provide information literacy instruction geared towards navigating the plethora of online health and medical resources. Reaching user populations online has great potential for increasing the impact of librarian-led instruction within these communities. In higher education, the growth of online programs has propelled librarians to investigate alternative methods of instruction, including both online asynchronous (i.e. tutorials, research guides, videos) and online synchronous (live web conferencing) techniques. Synchronous online instruction is a method of teaching that allows librarians to connect with distance learners in a personalized way while being relatively easy to implement. It is also more feasible to teach advanced information literacy topics with synchronous online instruction because students are able to ask questions in real-time and communicate confusion as soon as it arises. However, few articles have used research methodologies to compare student learning in one-shot online synchronous classes versus traditional, face-to-face classes.

This article uses a quasi-experimental research design to examine how the method of instruction impacts student learning of health literacy skills in an undergraduate course. Assessing the success of different instructional techniques in fostering online health literacy learning can guide

pedagogical choices, provide evidence to support the development of innovative instructional opportunities, and demonstrate the essential role of librarians in addressing the problematic lack of health literacy skills that exists in a variety of library user populations. This article compares student learning in two synchronous methods of instruction: traditional, face-to-face (F2F) instruction and synchronous online instruction (SOI) through web conferencing.

## **Literature Review**

### *Online health literacy*

The availability of seemingly endless sources of health information from smart devices and personal computers makes health-related research a deceptively quick and painless task. The convenience of searching online for answers to health problems or for general health inquiries seems to outweigh other factors involved, including trust. A study that used data from the Health Information National Trends Survey found that although 62% of individuals claim they trust their doctors and 50% would prefer to use their doctors as an initial source of health information, only 11% actually went to their doctors as an initial source of information, choosing instead to individually research the symptoms or condition online first (Hesse *et al.*, 2005).

When searching online, the majority of users (77%) begin at general search engines rather than by navigating to a trusted online health source and searching from there (Fox and Duggan, 2013). While general search engines connect users quickly to the terms they are looking for, this search process favors the natural language of the user over reliable source recognition. If keywords used by the individual do not directly match the technical terms that are used in authoritative health websites, the first page of results will largely reflect sources that also use this

natural language. This is a problematic possibility given the fact that research shows online information seekers rarely navigate past the first page of search engine generated results (Eysenbach and Köhler, 2002).

However, the use of search engines to discover health-related information is a powerful tool when individuals have the ability to appropriately evaluate the results. The skills required to find, understand, and appropriately use health information to make informed health decisions falls under the umbrella of health literacy (Patient Protection and Affordable Care Act, 2010). For researchers interested in examining health literacy as it relates specifically to online information, Cameron Norman of the University of Toronto coined the term “eHealth literacy.” Norman defines the term as “the ability to seek, find, understand, and appraise health information from electronic sources and apply the knowledge gained to addressing or solving a health problem” (Norman and Skinner, 2006). For the purposes of this article, the term “online health literacy” will be used in order to broaden the scope of eHealth literacy to include evaluating health information not only to make appropriate health decisions, but also to better understand broader health topics.

It is important for researchers to examine online health literacy because of the potential for harm that may occur from poorly informed health choices. Individuals with insufficient online health literacy skills may inadvertently harm themselves or others by acting on poor information or by misunderstanding important health topics. This harm may directly relate to one's physical health, but it could also include psychological or financial harm (Crocco *et al.*, 2002). Decisions ranging from whether or not to treat a medical condition, vaccinate family members, or purchase certain

supplements, may be heavily influenced by a diverse array of online information conveying variable information, perspectives, motivations, and levels of authority on a given topic.

While the plethora of online health information necessitates the exploration and evaluation of multiple online sources, research shows that many Internet users do not demonstrate this behavior. A review of the literature on the behaviors of online health information seekers found that health information is often used without the individual consciously evaluating the content or the information source (Crespo, 2004). To complicate matters further, many seekers of online health information report that they do evaluate what they find online, but this is not demonstrated during observations by researchers. For example, a study by Eysenbach and Kohler (2002) observed 21 individuals searching online for answers to a set of health questions. After completing the search, participants reported they had evaluated the information used to develop their answers by learning more about the source of the information. However, observations did not show participants navigating to the homepage or the “about” section of the websites where they found answers, even when participants were entirely unfamiliar with the source.

Overconfidence is another recurring issue among online information seekers, especially in undergraduate student populations. Due to the fact that younger generations in general prefer online information sources (Heuberger and Ivanitskaya, 2011), they are also particularly vulnerable to thinking they have all the Internet-related skills they need. Several studies have demonstrated a disconnect between perceived and actual abilities in undergraduate students evaluating online health sources (Hanik and Stellefson, 2011; Ivanitskaya *et al.*, 2006). van Deursen and van Dijk of the University of Twente measured health-related Internet skills in the

Netherlands and found younger generations had no advantage over the general population in searching for or evaluating online information (2011). In another study that assessed the basic health information literacy competencies of 400 undergraduate students, only 50% were able to identify websites with trustworthy features (Ivanitskaya *et al.*, 2006).

### *Synchronous online instruction*

Strategic integration of learning opportunities within educational programs has been recommended to improve online health literacy skills in undergraduate college students (Stellefson *et al.*, 2011; van Deursen and van Dijk, 2011). Intervention is necessary because these skills do not increase over time from continuous use of the Internet (van Deursen and van Dijk, 2011). When reaching out to dispersed populations, medical librarians in many settings have shifted with the changing landscape of health-related instruction by offering library services at a distance (Scherrer, 2004). Synchronous online instruction is an instructional method that can be used to provide live instruction, research consultations, office hours, and cultural or educational programming (Badia and Colosimo, 2013) while maintaining a personal connection with students.

Little research exists comparing student learning in SOI and F2F environments. However, research is readily available for asynchronous online instruction (online learning objects that can be viewed at any time) and blended instruction (a combination of both online and in-person). While most of the asynchronous library research points to its equivalence with F2F instruction in terms of student learning (Anderson and May, 2010; Shaffer, 2011; Zhang *et al.*, 2007), other differences emerge from the literature. For example, a study of 232 undergraduate students in a

communications course found that although there were no significant differences between online tutorials and F2F instruction in knowledge gains and attitudes toward instruction, students in the online condition were able to find 10% more empirical articles than the in-person condition (Silk *et al.*, 2015). The authors explain this finding may be a beneficial result of teaching online skills in an online environment. However, a study of graduate students found that when library instruction was offered as a tutorial or as an in-person library class, the F2F group was more satisfied with the instruction in comparison with the tutorial group (Shaffer, 2011).

Blended or hybrid instruction offers both online (usually asynchronous) and in-person instruction in order to meet the needs of a variety of learning styles. Zhang, Goodman, and Xie (2015) examined the impact of online asynchronous modules combined with optional F2F librarian-led sessions in a first year engineering course. Due to low attendance of the optional in-person sessions (14 out of 252 participants attended an in-person class), the finding that students made significant improvements from pre- to post-test predominantly reflects the efficacy of the asynchronous learning modules. In a first year writing course at Oakland University, Kraemer, Lombardo, and Lepkowski (2007) compared student learning in three different environments: asynchronous online instruction only, in-person instruction only, and a combination of both. This study found that although significant improvement from pre- to post-test was seen in all three environments, the blended group showed the greatest improvement in mean scores.

Library-related research on synchronous online instruction weighs heavily towards case studies that document the implementation of web conferencing instruction in academic libraries. These case studies often report on the benefits and drawbacks of web conferencing software options

such as Skype or Adobe Connect (Carlson, 2011; Nicholson and Eva, 2011) and gather user feedback from attendees through surveys. In one such article, Barnhart and Stanfield (2011) describe implementing a web conferencing instruction pilot for graduate students using WIMBA software. They found that clear communication with faculty and students about the nature of the class was essential to a successful SOI implementation. The authors also discussed the need to reduce the amount of content covered during the class in order to adjust to the use of new technology. Both Kontos and Henkel (2008) from Regent University Library and Riedel and Betty (2013) from Regis University Library found that their web conferencing pilots resulted in low levels of attendance but high participant satisfaction. This suggests that although there may be difficulties encouraging users to participate, many ultimately find SOI to be a helpful learning tool.

Library-related case studies also include articles that document tips and “best practices” for SOI implementation. For example, Smith and O’Hagan (2014) from the University of Alabama at Birmingham described lessons learned during the implementation of “Express Training” online classes for distance students, clinicians, researchers, and faculty. The authors shared guidelines for choosing web conferencing software, recommended sharing the recordings of live online classes to users who could not attend the SOI session, and suggested that a second librarian participate in the class to monitor chat and manage technical issues.

While case studies can provide useful guidance for librarians considering this type of instruction at their library, the purpose of this article is to fill a need for evidence-based research that compares student learning from one-shot SOI and F2F instruction.

### *Background*

“Exercise, Fitness, and Health” is a lower division, general education kinesiology course at California State University San Marcos that fulfills the graduation requirement for Lifelong Learning and Information Literacy. The Health Sciences and Human Services Librarian provides an in-person information literacy instruction session each semester focused on finding and evaluating different types of online health information to support the completion of the course assignment. The course assignment requires students to “Check the Facts” on a controversial health topic by comparing information from online sources of varying authority on the topic. Beginning in Spring 2015, the course began being offered entirely online and as a hybrid (part in-person, part online). In order to meet the needs of students enrolled in the online and hybrid courses, the author began delivering one-shot synchronous online instruction sessions through web conferencing. After implementing a pilot during the Spring 2015 semester, the author worked with the course instructor and campus assessment specialist to assess student learning in Fall 2015. The purpose of this assessment was to determine whether SOI or F2F information literacy instruction resulted in greater achievement of student learning or confidence in completing the course assignment. The author was also interested in gathering feedback from students to uncover the extent to which the student experience varies between methods of instruction.

### **Methodology**

A quasi-experimental design was used to compare one-shot information literacy instruction techniques in two hybrid (partially online) sections of the same undergraduate course. Students

were assigned to a condition based on their course enrollment. To minimize variation based on the instructor, both classes were taught by the same course instructor and the one-shot library session was taught by the Health Sciences and Human Services Librarian. Both classes received 75-minutes of instruction covering identical content, including finding, evaluating, and citing online health resources. One class was delivered F2F in a library computer classroom. The second class received a SOI session using Zoom web conferencing software. For students in the online experimental environment who were unable to attend the web conferencing session, a recording of the class was posted on the learning management course page. The instructional faculty was present in both sessions, physically in the F2F classroom and logged into the SOI class and able to communicate through chat.

### *Participants*

All participants were undergraduate students enrolled in hybrid courses of Kinesiology 306. Participants were required to attend the instruction session and received class participation points for completing the assessments. Each class had a total enrollment of 32 students. In the F2F group, all 32 students attended, with 32 completing the pre-test and 31 completing the post-test. In the SOI group, attendance was slightly lower with 27 students completing pre-tests and 26 completing post-tests.

### *Tools*

Both groups received a pre-test (Appendix A) to measure baseline knowledge and a post-test (Appendix B) to measure student learning. The tools were administered through Google forms at the beginning and at the end of the librarian-led instruction. The assessments included a set of

four links to online health sources and asked students to identify whether the sources were popular, authoritative, or scholarly. As a result of using live links as part of the assessment, there was a technical problem with one of the pre-test links in the F2F class and an alternative webpage link was provided from the same online resource. It is doubtful that this change had any impact on the pre-test scores, since the two pages were nearly identical and from the same online source. Identical post-tests were administered at the end of each class that included a new set of online health resources for students to evaluate. Before completing the post-test, students completed a survey (Appendix C) measuring perceived clarity of instruction, instructor responsiveness, confidence levels, and attitudes towards the instructional method of the library session.

### *Instructional Content*

Both experimental groups were guided by the same content, including an identical PowerPoint presentation, lesson plan (Appendix D), and search demonstration. The assessments functioned as active learning activities during the first and last 10 minutes of class. Following the pre-test, the author explained the differences between three categories of online health information. The categories included scholarly peer-reviewed journal articles, authoritative sources (i.e., from reputable organizations or agencies with expertise on the topic), and popular online health information (i.e., sources without recognized or reliable expertise on the topic). After this review, examples from the pre-test were used to elaborate on the differences between sources in the three categories. Search strategies for finding popular and authoritative sources and for using appropriate library databases to find scholarly articles were addressed. The example sources used throughout the lesson were revisited to identify the information needed to successfully credit the

source in APA format. Students in both environments were able to ask questions at any time during the class. In the SOI group, students used the chat box to send questions or comments throughout the session.

## **Findings/Results**

### *Pre- and Post-Test*

Before analyzing the pre- and post-test dataset, the author removed submission scores of students who did not complete both assessments and removed any duplicate submissions. SPSS statistical software was used to run a paired samples t-test measuring student learning from pre-test to post-test in both learning environments. In the SOI class, an extremely significant difference was found from pre- to post-test,  $t(24)=4.69$ ,  $p<.0001$ . In the F2F class, there was also an extremely significant difference from pre- and post- test,  $t(31)=9.46$ ,  $p<.0001$ . These findings suggest that librarian-led instruction in either format can produce significant learning of online health literacy skills in undergraduate students.

In addition to measuring student learning within each environment, the author compared pre- and post-test scores across the two learning environments to measure baseline knowledge differences and compare averages after instruction. An unpaired samples t-test conducted to reveal disparities between groups before instruction showed no significant differences between pre-test scores in the SOI group ( $M=2.79$ ,  $SD=0.93$ ) and the F2F group ( $M=2.42$ ,  $SD=0.85$ ),  $t(55)=1.55$ ,  $p=0.128$ . This suggests that differences in student performance on the post-tests are a result of the instructional intervention rather than a reflection of baseline disparities between the two groups. A comparison between the SOI ( $M=3.75$ ,  $SD=0.44$ ) and F2F group ( $M=3.77$ ,  $SD=0.43$ )

post-test scores also show no significant differences between the learning environments,  $t(55)=0.206$ ,  $p=0.838$  (see Table 1). In fact, the percentage of students that correctly identified each source type (popular, authoritative, or scholarly) after librarian-led instruction was nearly identical across environments, regardless of slight variation in pre-test averages (see Table 2).

**[Insert Table 1 and Table 2 here]**

### *Student Surveys*

Student surveys were administered immediately following instruction. Students were asked to rank three statements (Table 3) and respond to three open-ended questions. Ratings for the first two statements showed that the clarity of the instruction (F2F=95.4%, SOI =94.8%) and instructor responsiveness (F2F=96%, SOI =97%) were fairly even across instructional environments. Both groups reported high levels of confidence in completing the class assignment as a result of the library instruction (F2F=94%, SOI=91.8%). While the F2F group rating was slightly higher on this measure, the difference was not statistically significant,  $t(57)=0.692$ ,  $p=0.492$ .

**[Insert Table 3 here]**

Open-ended survey responses from the F2F group (Appendix E) were generally positive and demonstrated that students had the opportunity to work through the main concepts of the class. In response to the question, “Do you have any comments or thoughts on the delivery method used? (ex. liked or disliked the activities, had technical problems, etc.),” several students responded

they had no comments and the remaining student responses positively referred to the usefulness of the quiz activities, going through the search process step-by-step, or other positive remarks.

When asked “What did you find most helpful about the class?” several students responded that the most helpful part was learning the differences between source types. Other notable responses to this question referenced the quizzes, learning how to find sources, and APA format. There were no substantive responses to the final question, “What is still confusing?”

Open-ended responses from the SOI group (Appendix F) help to uncover the student experience in the web conferencing class. Responses to the survey question, “Do you have any comments or thoughts on the delivery method used? (ex. liked or disliked the activities, had technical problems, etc.),” demonstrated that most students enjoyed the format of the class and appreciated the web conferencing features like audio, video, and chat. Only one student reported experiencing technical difficulties joining chat. Examples of student responses included:

- This was my first time doing a webinar, and I think it's pretty cool and convenient!
- I like this better than sitting in the library.
- This was a really cool experience. I would enjoy online classes much more if this was the layout.
- I loved having the chat box during the web seminar. The instructor was very prompt with answering and responding to questions.

When asked “What did you find most helpful about the class?” notable student responses included learning to distinguish between the source types, seeing examples of different sources,

and the structure or format of the class. Students also found the APA review, screen sharing, and the quiz activities to be helpful. Responses referring to the structure or format of the class included:

- The structure was great
- What was most helpful was the easy layout it was straight to the point and easy to learn how to use.
- I found that following along with the instructor made it more easier to understand

In comparison with the F2F class, there were more substantial responses to the question, “What is still confusing?” While most students responded N/A or nothing, two students mentioned APA citations, one student expressed they wanted to “spend some time exploring on the library website”, and another student was still unsure of how to tell the difference between source types.

Overall, the SOI class survey responses show that most students were satisfied with the format of the class. Several case studies in the library literature describing the implementation of web conferencing instruction report this same high rate of satisfaction from attendees (Kontos and Henkel, 2008; Riedel and Betty, 2013).

## **Discussion**

Previous studies have established that undergraduate populations are in need of educational interventions built into the higher education curriculum to improve online health literacy skills and abilities (Heuberger and Ivanitskaya, 2011; Ivanitskaya *et al.*, 2006; van Deursen and van

Dijk, 2011). The results of this study reaffirm this finding. Combined pre-test scores fell to just below 65%, revealing that in the absence of instruction, students struggle to distinguish between health information of varying authority and reliability.

In order to address this need, librarian-led instruction was inserted into two sections of a semester-long kinesiology course as an in-person and web conferencing class. Both methods increased students' ability to evaluate online health information. The success of SOI in teaching online health literacy skills opens the door for librarians seeking a way to deliver interactive instruction to dispersed populations.

For example, public and medical libraries can adapt existing in-person instructional programs for the synchronous online environment to reach individuals who cannot physically come to the library. Xie and Bugg (2009) described a collaborative project between a public library system and library science graduate students that offered in-person computer classes to older adults focusing on finding high quality health information online. These instructional opportunities were so successful that many potential participants were put on a long waiting list for a space in the class. Web conferencing classes could potentially resolve this space issue and accommodate more participants than a class confined to a library computer lab. At the Barnett-Briggs Medical Library in San Francisco, researchers provided 50-minute instructional interventions to HIV-positive individuals to promote health literacy skills and increase confidence in online health information evaluation (Robinson and Graham, 2010). Participants in this study reported higher levels of confidence in their ability to find and use health information online. Librarians offering these types of classes in a medical or public library setting could potentially reach a greater

number of individuals in need of this type of instruction by offering synchronous online versions of these classes.

SOI provides the benefit of instantaneous communication, which is ideal for teaching conceptually difficult topics that require clarification and discussion. When compared with the time and expertise required to create pedagogically sound tutorials, web conferencing instruction is user friendly and relatively less time-intensive. It also creates a personal connection between the students and the teacher. In the academic library setting, this connection is important for encouraging students to feel comfortable seeking help from a librarian if they have questions about research in the future.

Student perceptions of library instruction did not differ dramatically between the two teaching environments in this study. While it is important to keep in mind the differences between SOI and F2F instruction during the instructional design process, the student perception of instruction should reflect a comparably positive experience. The survey results reflected a positive experience in both environments. Both groups rated the clarity of instruction and the responsiveness of the instructor highly (see Table 3). Notably, the average rating of the instructor's responsiveness to student questions was slightly higher in the SOI group than in the F2F group by 0.05 points on a 1-5 scale. While this is a small difference, just the fact that students in the SOI class rated instructor responsiveness so highly reflects instant communication is a major benefit of web conferencing. In terms of student confidence levels after instruction, there were no significant differences between groups. Students in both sections reported that the library instruction prepared them to complete their course assignment.

The web conferencing software used for the SOI class was effective and easy for both the students and the instructor to use. Only one student experienced any kind of technical difficulties, while several students specifically noted the success of the technical features of the class, such as audio, video, and chat box functionality. While the author managed the SOI class alone, this was not a first attempt at providing web conference classes. Previous experience allowed for the management of any technical issues without the help of another librarian. However, it is generally advised that when implementing SOI for the first time, another librarian is present to monitor chat and manage technical issues.

Themes brought out in the open-ended survey questions reflect the unique strengths of each environment. Even when the same content is taught, the learning environment has an impact on how the instruction is experienced. For example, a robust conversation including several students, the librarian instructor, and the instructional faculty occurred in the F2F class on the topic of APA citations. This in-depth discussion very likely clarified student concerns about citing their sources, which could explain why there were no substantive responses to the survey question, “What is still confusing?” In the SOI session, while there were some clarifying questions asked through the chat box, those questions were less likely to turn into larger discussions involving the instructional faculty. This created a much more structured learning environment, which was noted by several students as being a positive aspect of the class. However, when covering the complexities of APA citations in scholarly articles versus documents from websites, it seems the structure was not as helpful as an in-depth class discussion. This may explain why “APA citations” were mentioned twice in response to the

survey question, “What is still confusing?” in the SOI class. Based on this feedback, it is recommended that when providing curricularly integrated health literacy instruction at the college level, the instructional faculty member participate in the web conferencing class not only through chat, but also through audio so more robust conversations can take place in response to student questions.

### **Conclusion**

The proliferation of freely available online health information has increased the difficulty of finding quality health information. Since online health literacies do not improve over time from continuous use of the Internet (van Deursen and van Dijk, 2011), librarians play an essential role in educating students and library patrons in online health literacy. In university, medical, and public library settings, librarians have access to large populations in need of skills that will allow them to make appropriate health care decisions and develop informed understandings of controversial health issues. The ever-changing role of the health sciences librarian is becoming less and less inhibited by location while still focused on teaching the value of information and how to use it (Wakeham, 2009).

Overall, this research provides evidence that synchronous online instruction through web conferencing can be as effective as face-to-face instruction in teaching undergraduate students to evaluate online health information. The growth of online programs and courses in the health sciences makes higher education an ideal place for librarians to intervene with online health literacy instruction. However, the findings of this study are valuable for librarians in a variety of settings who are considering providing health literacy education in an online environment.

*Limitations and Future Research*

Although this study used a quasi-experimental research methodology, there are some factors that reduce the generalizability of the results. The author controlled for variation in the course subject, course format (outside of the one-shot instruction intervention), course instructor, and librarian instructor. However, because each sample was a section of a course with a limited number of sections offered per semester, the sample size was small. Future research with a larger sample including multiple sections of the same course is needed to support these findings. Also, this study took place in a university setting and results therefore cannot be directly applied to non-university settings. However, conclusions drawn from this study should interest librarians in a variety of settings who are trying to provide health literacy education to physically dispersed populations. Future research in these non-university settings is needed to measure the degree of success SOI would have in improving health literacy skills in various user populations.

It is also noted that course instructor feedback is not included in this article due to the focus on student learning and the student experience. For librarians considering implementing SOI in an academic setting, future research on the course instructor's experiences, expectations, and preferences concerning librarian-led online instruction would be beneficial.

Finally, it is important to acknowledge the significance of pedagogy in creating a successful SOI experience. The purpose of the present study was to evaluate online and in-person synchronous instruction techniques, not the pedagogy behind the instruction. The author kept the content depth and breadth equivalent in both groups, but engaged students in ways appropriate to the

learning environments. The pedagogical soundness of any online class should be the first priority for librarians interested in providing SOI to their library users. Future research should explore how pedagogical choices in librarian-led SOI affect student learning of health literacy concepts.

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## Appendix A: Pre-test

*Note: Supplementary identifying information for sources is added to this appendix. Student tests only include the links, not the source information.*

Click on each link below and skim through the text to determine what category the source falls into. Answer the corresponding question.

\* Required

**Name \***

### Source 1

Kalb, C., Springen, K., & Underwood, A. (2002). How to lift the mind. *Newsweek*, 140(23), 67-71.

<http://ezproxy.csusm.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=aph&AN=8560547&site=ehost-live>

This source is... \*

- popular
- authoritative
- scholarly/peer-reviewed

### Source 2

Kinser, P. A., Bourguignon, C., Taylor, A. G., & Steeves, R. (2013). 'A feeling of connectedness': Perspectives on a gentle yoga intervention for women with major depression. *Issues In Mental Health Nursing*, 34(6), 402-411.

<http://ezproxy.csusm.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=aph&AN=88428781&site=ehost-live>

This source is... \*

- popular
- authoritative
- scholarly/peer-reviewed

### Source 3

National Center for Complementary and Integrative Health. (2013, June). *Yoga for health*.

<https://nccih.nih.gov/health/yoga/introduction.htm> Alternative Link:

<https://nccih.nih.gov/health/stjohnswort/sjw-and-depression.htm>

This source is... \*

- popular
- authoritative
- scholarly/peer-reviewed

**Source 4**

*Studies offer evidence supporting yoga as an effective way to combat depression.* (2015).  
<https://www.yogauonline.com/yogau-wellness-blog/studies-offer-evidence-supporting-yoga-effective-way-combat-depression>

This source is... \*

- popular
- authoritative
- scholarly/peer-reviewed

**Submit**

## Appendix B: Post-test

*Note: Supplementary identifying information for sources is added to this appendix. Student tests only include the links, not the source information.*

Click on each link below and skim through the text to determine what category the source falls into. Answer the corresponding question.

\* Required

**Name \***

### Source 1

Medline Plus. (2015, June 17). *Zinc*.

<http://www.nlm.nih.gov/medlineplus/druginfo/natural/982.html>

This source is... \*

- popular
- authoritative
- scholarly/peer-reviewed

### Source 2

Mathes, A., & Bellanger, R. (2010). Herbs and other dietary supplements: Current regulations and recommendations for use to maintain health in the management of the common cold or other related infectious respiratory illnesses. *Journal of pharmacy practice*, 23(2), 117-127.

<http://jpp.sagepub.com.ezproxy.csusm.edu/content/23/2/117>

This source is... \*

- popular
- authoritative
- scholarly/peer-reviewed

### Source 3

Office of Dietary Supplements, National Institutes of Health. (2013, June 5). *Zinc: Fact sheet for health professionals*.

<https://ods.od.nih.gov/factsheets/Zinc-HealthProfessional/>

This source is... \*

- popular
- authoritative
- scholarly/peer-reviewed

### Source 4

Levine, H. (2015, February 19). 4 things you should know about zinc and the common cold. *Health*.

<http://news.health.com/2015/02/19/4-things-you-should-know-about-zinc-and-the-common-cold/>

This source is... \*

- popular
- authoritative
- scholarly/peer-reviewed

**Submit**

## Appendix C: Survey

### Kinesiology 306 Library Instruction Feedback

\* 1. The instructor clearly explained difficult concepts, methods, and subject matter.

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
<input type="radio"/>				

\* 2. The instructor was responsive to questions.

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
<input type="radio"/>				

\* 3. I feel more confident completing the class assignment as a result of this instruction session.

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
<input type="radio"/>				

\* 4. What instructional delivery method was used?

- In person
- Live webinar (online)
- Tutorial (online)

5. Do you have any comments or thoughts on the delivery method used? (ex. liked or disliked the activities, had technical problems, etc.)

6. What did you find most helpful about the class?

7. What is still confusing?

Done

## Appendix D: Lesson Plan

75-minute class

Quick quiz (pre-test) *10 minutes*

- Type into your browser
- This will get you thinking about types of sources
- You have 8 minutes (maybe 10). Look for clues; don't slowly read through the whole source. What is your feeling about the source?

Welcome (online class only)

- Take a minute to get used to the Zoom layout.
- When I share my screen, your Zoom window will go full screen, you can change that. I will be in the upper right. You can hide me by clicking the left side icon above my head
- Q & A box – if you have a question at any time go ahead and type it into that box.
- Time for questions at the end too.

Introduction *5 minutes*

- Who I am, contact information
- Ask a Librarian Chat
- Our plan for today
  - Preparing for our “Check the Facts” assignment
  - Distinguishing between, finding, and citing popular, authoritative, scholarly sources

Popular vs. Authoritative Sources *15 minutes*

- Can be difficult to distinguish between
- Look for:
  - User context
    - Is this source informing or selling/entertaining?
  - Content
    - Is it useful?
  - Author/institution -source
    - Reliability & Authority
      - Your professor is looking for national level information/institutions for this assignment
      - Expertise?
  - Appearance
    - Professional/unprofessional website design
  - Currency
    - How recent is this information
    - Can you find a date?
    - Can you tell by the appearance?
  - References
    - Authentic information with facts supported
  - Bias

- Opinion or other motivations behind information?
- URL
  - What it does and doesn't mean

#### Review of popular and authoritative pre-test sources

- Discuss the following points for the pre-test sources that are either popular or authoritative. Highlight differences in the points below.
  - Appearance
  - Context/content
  - Author/authority
  - Organization
  - Currency
  - References
  - Bias
  - URL

#### How to find these kinds of sources

- Advanced Google search
- Authoritative websites supplied by instructor and on library course guide

#### Scholarly sources *10 minutes*

- What is a scholarly article?
  - Articles published in academic journals, not general websites
  - Peer-review
  - New ideas
  - Written by scholars, for scholars
  - Jargon-specialized language
  - Structured/visuals
  - References

#### Review of scholarly pre-test sources

- Discuss the following points:
  - Appearance
  - Context/content
  - Author/authority
  - Organization
  - Currency
  - References
  - Bias
  - URL

#### How to find scholarly sources *5-10 minutes*

- Library databases
- Kinesiology 306 library course guide
- Sample database search

*APA citations 5 minutes*

- Step one: figure out what you're looking at!
- Resources on the course guide will help you build a citation

*Summary 5 minutes*

- Popular sources
  - Glossy pictures
  - Written for general public
  - Written BY journalists/anyone/non-experts
  - Can include opinion or unsupported facts
- Authoritative sources
  - Websites ok
  - Professional language
  - Detailed/in-depth
  - Written for general public
  - Written by experts, but not new information, a compilation of what exists on a topic.
  - Facts supported with references or links to original sources
  - Accountability/trustworthy: government, national/state org, well known, reputable
  - **Remember: this is not a checklist! Not all authoritative sources will include all these aspects! You have to be the judge.**
- Scholarly articles
  - Academic journal
  - Peer review
  - For scholars by scholars
  - 7-15 pages on average
  - Bibliography
  - Article structure

*Questions? 5 minutes*

- (online class) type in group chat box

*Survey 5 minutes*

- Take this survey: type it into your browser
- You can always email me for help!

*Quick Quiz (post-test) 10 minutes*

- Similar to the first but with different examples – Will help me figure out if we learned something today!

## Appendix E: Open-Ended Survey Results (F2F session) – Questions #5-7

5. Do you have any comments or thoughts on the delivery method used? (ex. liked or disliked the activities, had technical problems, etc.)

1. I really liked how you went through all of the sources and actually told us the differences!  
Thanks
2. I liked the exaMPLES AND MINI QUIZZES
3. Enjoyed the delivery method. Never had a moment where I tuned out. Time went by fast.
4. I liked the way this class was taught.
5. was a great presentation!
6. Liked the quizzes
7. n/a
8. nope
9. N/A
10. no
11. N/A
12. I liked how we took a before and after quiz to see what we thought we knew and from what we learned after the class.
13. no problems
14. i liked the interactive quiz
15. No, keep up the energy!
16. I liked how she went through it step by step
17. no
18. none
19. good lecture-learned alot

6. What did you find most helpful about the class?

1. It was really helpful that all of the information for sources and how to look for them can be found on the library website!
2. it cleared up my questions on what articles were scholarly and authoritative
3. Getting a better understanding on different types of sources.
4. Being able to use the computer to follow along with the instructors lesson.
5. breakdown of what the important sources the teacher wanted.:)
6. apa format
7. Distinguishing between popular, scholarly, and authorative sources
8. n/a
9. quizzes
10. Quiz before and after the material
11. The pre and post quiz
12. Learning how to identify sources as popular, authoritative, or scholarly.
13. Determining the differences between popular, authoritative, and scholarly articles.
14. The differences on the sources
15. the formatting
16. it showed the difference between a scholarly article and an authoratative article.
17. quizzes and review of them
18. It was clear and concise.
19. I was able to understand how to identify the different type of sources.
20. reuse of quizzes
21. The quizzes of before and after
22. nothing
23. visuals

24. Differentiating different articles

7. What is still confusing?

1. no
2. Have a pretty good understanding.
3. N/A
4. Awesome!
5. nothing
6. N/A
7. n/a
8. none
9. N/A
10. nothing
11. N/A
12. None of it is confusing
13. nothing
14. nothing
15. Nothing.
16. nothing
17. nothing
18. nothing

## Appendix F: Open-Ended Survey Results (SOI session) – Questions #5-7

5. Do you have any comments or thoughts on the delivery method used? (ex. liked or disliked the activities, had technical problems, etc.)

1. I did not experience any technical problems. I personally liked it, especially being able to see a face and not just audio.
2. I had some trouble trying to join the chat, but overall it was fine
3. This was my first time doing a webinar, and I think it's pretty cool and convenient!
4. I like this better than sitting in the library.
5. I liked this method since it was easy to follow.
6. No, it went well.
7. Nice to put links in the chat box so we don't have to type them and make errors.
8. It was different to have it online, but I liked it.
9. No problems, easy to follow
10. This was a really cool experience. I would enjoy online classes much more if this was the layout.
11. Really enjoyed this method it was easy to understand.
12. I would rather the class was in person, but this seemed to work out well. It also helped that there were other students here with me going through the steps.
13. No I felt it was very easy to follow along and the instructor did a great job of going at a pace that was easy to follow.
14. I liked it. It was nice change.
15. No technical difficulties, very easy to use and follow
16. I loved having the chat box during the web seminar. The instructor was very prompt with answering and responding to questions.
17. Liked having a visual and audio
18. No
19. N/A

6. What did you find most helpful about the class?

1. Being able to distinguish the difference between the sources we need for kine 306.
2. I was able to clearly see the difference between the different types of sources available.
3. how to tell the type of article by checking the author recognition.
4. The librarian was knowledgeable and nice. Thank you!
5. I thought how to get to the course guides and find scholarly article and search engine optimization were most helpful.
6. The structure was great.
7. Distinguishing the difference between authoritative and popular sources
8. Clear explanations and examples of source materials.
9. Showing articles in the database that can be noscholarly
10. Being able to see the differences between the sources and on how to log into our kine 306 section for more resources that we can use
11. everything
12. What was most helpful was the easy layout it was straight to the point and easy to learn how to use.
13. The Google search shortcuts.
14. The source information
15. search shortcuts
16. The shared screen component.
17. The quiz in the beginning really prepares you for the knowledge you are about to receive
18. I liked that the instructor used examples and visuals.
19. I found that following along with the instructor made it more easier to understand

20. I really enjoyed that Tricia went over APA. It was like a review which was very helpful.
21. Step by step run through
22. All
23. Being able to see where to click and what the pages should look like.

7. What is still confusing?

1. Everything seems clear.
2. No
3. I'm not really confused on anything, but I just don't want to site anything wrong. It seems so technical, but I understand the need for it.
4. nothin
5. i am still not hundred percent sure of how to see the difference with the differences in popular , authoritative , and scholarly. I need to see more examples.
6. I want to actually spend some time exploring on the library website.
7. Nothing.
8. Nothing.
9. Nothing
10. Nothing
11. nothing is confusing at the moment
12. N/A
13. Nothing to me, she did a good job at covering everything I was a little confused on.
14. When there is a link on the screen but we weren't able to click it.
15. Nothing, it was to the point. I was a little scared at first with doing a love tutorial but it was actually very helpful and easy to use/follow
16. APA format
17. Nothing
18. N/A