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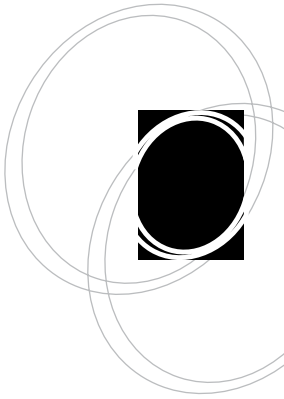
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Embedded Librarians and Scaffolding for Remote Learning

Mayumi Miyaoka, Rebecca Toolsidass, and Michael Magee

abstract: Due to the COVID-19 pandemic, the librarians at the Brooklyn Campus of St. Joseph's College New York developed a new embedded librarianship model of instruction, incorporating scaffolded information literacy modules that could be delivered remotely. To measure the new model's efficacy, the researchers administered the 15-item First Year Experience (FYE) Library Literacy Scale to 118 students at the start of the semester as a pretest and again at the end of the semester as a posttest. Results indicated a significant improvement from pretest to posttest, as supported by a significant paired sample *t*-test, $t(117) = -9.01, p < .001$. Additional analysis revealed that this result was not influenced by course modality, gender of the student, or which librarian taught the class. The benefits of an embedded librarianship model compared to the traditional one-shot session are discussed.

Introduction

New York City became an epicenter of the COVID-19 pandemic in early 2020. On March 12, 2020, the provost of St. Joseph's College (SJC) New York notified the college community that the institution would transition to remote learning. St. Joseph's developed a website called Carry On Teaching, Learning and Working to provide resources to support online teaching and campus operations.

Prior to the pandemic, the two full-time librarians at St. Joseph's Brooklyn Campus discussed restructuring the freshman seminar to make it more interactive and to enhance self-guided learning. Amid the uncertainties of how COVID-19 would impact the fall 2020 semester, the librarians realized that they needed to redesign the library instruction modules for the freshman seminar so that they could easily deliver the content remotely.

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Institutional Background

St. Joseph's College New York, which became St. Joseph's University in 2022, is a liberal arts college with two campuses: one in the historic Clinton Hill district of Brooklyn and the other in Patchogue, New York. As of fall 2021, the Brooklyn Campus had a full-time enrollment of 980 undergraduates and 177 graduate students.

SJC100 Freshman Seminar

St. Joseph's developed SJC100 in 2011 as part of the new core curriculum for the First Year Experience (FYE) Program. SJC100 is a three-credit course taught by faculty instructors from various academic departments that is offered in the fall semester each year. All incoming freshmen are required to take it. The course catalog provides the following description:

A seminar course for all first-year students which will introduce them to the academic world of college, and along with the required First Year Experience Program (FYE), will serve to engage students in the college experience at St. Joseph's. Each course section will focus on a unique and engaging topic related to the discipline or avocation of the instructor and may also incorporate interdisciplinary themes. This course will offer a laboratory experience of careful and critical reading, writing to learn, research skills, and cooperative classroom activities.¹

At the time this study was conducted in fall 2020, the college offered 16 sections of SJC100 to serve a total of 201 incoming freshmen. Fifteen of those 16 sections actively participated in the study, resulting in 188 students partaking in a version of SJC100 that incorporated an embedded librarian component.

Embedded librarianship has been a part of the SJC100 curriculum since the program launched in 2011. Embedded librarians form a close relationship with students to develop a deep understanding of their academic work and provide information services targeted to their needs. Librarians pair up with sections of the course and work as teaching partners alongside instructors. Originally, the librarians focused on teaching navigation of library resources, citation in American Psychological Association (APA) style, and source

evaluation. Over the years, they recognized the challenges in covering multiple, complex information literacy concepts within the time constraints of the FYE Program.

The goal of the embedded librarianship was to introduce freshmen to a set of basic skills needed for modern college-level research. SJC100 faculty dedicated 255 minutes to the library modules per course, or required three class meetings. To integrate the library resources with a multistep research

and writing process, the librarians used a scaffolding pedagogy, breaking up the key information literacy skills into three modules. The first library session was scheduled in September; the second, introducing research resources, was in October; and the third,

Embedded librarians form a close relationship with students to develop a deep understanding of their academic work and provide information services targeted to their needs.

to help students on their research project, was in November, when their final research assignment was due.

SJC100 library sessions consist of three parts: (1) introducing McEntegart Library and the academic research process, (2) searching for books or articles and evaluating sources, and (3) citing sources in APA style. During summer 2020, the librarians created library instruction modules based on the SJC100 learning objectives that could be delivered remotely (for the SJC100 Library Learning Objectives, see Appendix A). The modules consisted of a slideshow, a five-question review quiz, and digital learning objects, including a timeline and videos (for the SJC100 Library Modules, see Appendix B). The embedded librarian added the library modules into the SJC100 course shells on the Canvas learning management system.

Faculty could choose either synchronous library instruction, asynchronous library instruction, or a combination of the two. Synchronous library sessions were delivered by the librarians at the same time as scheduled class times via Zoom's video communications platform. Asynchronous instruction was offered as a series of self-guided modules embedded in the Canvas learning management system which enabled students to study the content on their own.

Among the three course modalities, 89 students received synchronous instruction, 21 completed the self-guided asynchronous instruction, and 8 students had a mix of both, consisting of one asynchronous module and two synchronous sessions. The library modules embedded in Canvas presented the same content across all freshman seminar course shells, regardless of modality.

Literature Review

Limitations of the One-Shot

Despite the constraints and limitations of one-shot library instruction, the one-shot model is often the only option for many academic librarians. A core concept taught in library sessions is that the nature of research is circular and interactive. It is challenging to demonstrate this idea in a one-shot session because librarians must show all the steps required for research in a sequence rather than as a series of reactive responses. Angela Sample points out that before the Association of College and Research Libraries (ACRL) adopted the Framework for Information Literacy for Higher Education in 2016, librarians tended to teach information literacy skills "in order" based on ACRL's earlier model, the Information Literacy Competency Standards for Higher Education. Sample also notes that due to time limitations, many students are exposed only to the tools to find information and may not learn how to evaluate what they find.²

One-shot library instruction provides students few or no opportunities for engagement because the sessions are merely lectures and demonstrations of tools by a librarian . . .



To meet students' needs, librarians have tended to cram as many information literacy concepts and tools as possible into one-shot sessions.³ They use this approach with both the Standards and the Framework.⁴ Dani Brecher Cook and Kevin Michael Klipfel point out that information overload inhibits retention of knowledge in cognitive science.⁵ One-shot library instruction provides students few or no opportunities for engagement because the sessions are merely lectures and demonstrations of tools by a librarian based on hypothetical examples. This approach prevents many learners from retaining the information delivered during the initial library session, such as how to navigate the search tools. The lack of engagement sets the students up for failure later when they need to use these tools to complete their research assignments.

Amy Van Epps and Megan Sapp Nelson compare the timing of content delivery in one-shot and scaffolded models and demonstrate that "frequent, short library instruction sessions produce an increased use of high-quality content."⁶ Compact, targeted content presented at the right time is more impactful for learning, making it easier for students to contextualize and put their skills into practice during their information-seeking process.

The time limitation of the one-shot library session challenges librarians to conduct meaningful assessment of their instruction.⁷ Some academic libraries seek out more comprehensive assessment by offering credit-bearing courses or a series of library sessions designed to measure student learning outcomes.⁸

Benefits of Scaffolding and Embedded Librarianship

Because of the challenges that accompany the one-shot session, librarians have explored different methods of delivering information literacy instruction, including embedded librarianship and scaffolding. Embedded librarianship involves fostering collaborative partnerships that allow for the full immersion of librarians in physical and virtual environments outside the library space.⁹ Barbara Dewey, in her article "The Embedded Librarian: Strategic Campus Collaborations," recommends that embedded librarians integrate themselves in every aspect of campus life. She stresses that "the power of embedding goes further than the library because it informs and improves the mission of the university for excellence in teaching and research."¹⁰

Rachel Wishkoski, Kacy Lundstrom, and Erin Davis discuss how librarians collaborate with faculty on designing course assignments and lectures.¹¹ Results indicate that instruction involving research techniques benefits from scaffolding. Scaffolded teaching breaks down sophisticated information literacy concepts into smaller components, such as "developing research questions and methods, reading a scholarly article, synthesis, [and] evaluating sources."¹² Students may struggle to retain concepts in a one-shot session, but multiple library sessions throughout the semester allow for deeper and better understanding of research methods. Scaffolded instruction that emphasizes embedded librarianship has proved more effective than one-shot sessions in improving students' overall attitudes toward library research.¹³ Directly linking information literacy skills to assignments by integrating multiple library instruction sessions when students need them most increases learners' confidence in the research process and overall generates positive feedback from students.¹⁴ Nadine Hoffman, Susan Beatty, Patrick Feng, and Jennifer Lee find that scaffolded instruction by embedded librarians provides students



with an “increased confidence in their ability to use research and writing skills taught in class.”¹⁵ Paula Booke and Todd Wiebe support this finding, explaining that “students participating in a course with an embedded librarian . . . reported higher levels of research confidence and demonstrated the use and understanding of selected information literacy skills.”¹⁶ James Murphy, Laura Koltutsky, Bartlomiej Lenart, Caitlin McClurg, and Marc Stoeckle acknowledge that embedded librarians in a freshman seminar delivered library research concepts at strategic times throughout the semester, which “boosted the impression of the library’s relevance to students.”¹⁷ Karen Bordonaro and Gillian Richardson find that learners demonstrated an “increase in comfort, confidence and knowledge” at the end of courses that implement scaffolded library instruction.¹⁸

Some researchers have gone beyond lectures and in-class activities to successfully incorporate assignment components into scaffolded library modules. For instance, Jennifer Saulnier, Corey Johnson, and Kathleen Whalen demonstrate that the effectiveness of scaffolded library assignments can be shown by students’ ability to retain and implement information literacy concepts, such as source evaluation.¹⁹ Andrea Baer argues that when educators pair scaffolding with “flexible pedagogy,” student learning and understanding are enhanced.²⁰ Despite these promising findings, Saulnier, Johnson, and Whalen note that research on “scaffolded information literacy instruction across courses at a programmatic level remain[s] rather minimal.”²¹ The authors of this article hope the observations and research reported herein will contribute to this growing area of study.

Library Value Articulation and Assessment

Articulating the values of academic libraries has been at the core of discussion among librarians during the 2000s. In *The Value of Academic Libraries: A Comprehensive Research Review and Report*, Megan Oakleaf argues that one way to define a library’s value is to determine its impact on users.²² For academic libraries, the main focus is supporting student success by teaching information literacy skills. As the focus of the library’s instruction shifts from tangible resources to acquisition of critical thinking and information literacy skills, librarian expertise and pedagogy used to teach these techniques have become the keys to a positive impact on students.²³

Devin Savage, Pattie Piotrowski, and Lisa Massengale suggest that assessment activities can help academic librarians articulate their value.²⁴ As demonstrated in ACRL’s program “Assessment in Action: Academic Libraries and Student Success,” instructional librarians around the United States utilize many different approaches to information literacy assessment.²⁵ Some institutions conduct large-scale, multi-method assessments spanning several years, often using focus groups, while others may be limited to more passive and indirect approaches, such as observations, during one-shot sessions.

It is critical for individual institutions to select the assessment method that yields the most meaningful results for their purposes. It is also important that the chosen methods are deliverable for individual institutions, considering such factors as funding, time constraints, human and physical resources, and existing course structures. At St. Joseph’s, the librarians involved in this study selected the within-subjects research design, an experimental approach that explores causality by comparing the scores of the same person at two points in time. In this case, the librarians compared scores on a pretest at the beginning of the semester and a posttest at the end of the semester.



The Within-Groups Pretest/Posttest Design

The within-subjects pretest/posttest research design is a commonly used method for quantitative assessment of information literacy threshold skills. Beth Tumbleson, John Burke, and Jessica Long state that this approach enables librarians to collect data either

... summative assessment, often used merely as a grading tool, can also be used for instructors to design and improve future instruction.

in person or remotely by administering the assessment as mandatory course content in a learning management system.²⁶ According to Dante Dixson and Frank Worrell, formative assessment is an informal activity conducted before or during instruction to obtain insights about students' existing knowledge and to improve teaching effectiveness by collecting feedback and designing curriculum based on the observa-

tions.²⁷ It also provides opportunities for students to become aware of the course content and learning goals.²⁸ Summative assessment is a formal, cumulative activity, such as a final exam, administered after instruction to measure students' understanding of the material.²⁹ Dixson and Worrell note that summative assessment, often used merely as a grading tool, can also be used for instructors to design and improve future instruction.³⁰

Academic libraries often use formative assessment, such as exercises before the library session, to measure students' existing information literacy skills; the results help librarians customize the content coverage of the instruction sessions.³¹ For instance, Lisa Janicke Hinchliffe, Allison Rand, and Jillian Collier identified first-year students' misconceptions about information literacy and academic research and used the information to develop learning outcomes and design instruction.³² Mfundo Masuku, Nokukhanya Jili, and Primrose Sabela state, "Formative assessments are effective for improving student learning if followed by constructive feedback and effective instructional responses."³³

Summative assessment, such as a quiz following a library session, measures students' learning after they have received the instruction. While academic librarians commonly administer only one assessment in a single session due to time constraints, Katherine Schilling and Rachel Applegate suggest "longitudinal summative assessment of practical skills is the truest measure of learning."³⁴

At St. Joseph's, information literacy is part of the FYE's core competency. The embedded librarians receive institutional support, enabling the Brooklyn Campus librarians to deliver three library sessions for each SJC100 section. David Schwieder and Lisa Janicke Hinchliffe suggest that administering an assessment for the entire freshman body would allow researchers to "examine undergraduates and seek to demonstrate correlations between library services and desirable institution-level outcomes."³⁵ Additionally, according to Jacalyn Bryan and Elana Karshmer, "The use of pre-tests enables researchers to establish a baseline level of knowledge and determine, by comparison to the post-test results, whether the instructional design produced the desired results."³⁶

The pretest and posttest design is deemed especially useful for this study because the sample is limited to traditional freshmen, enabling librarians to examine students' existing level of information literacy competency before the class receives any college-level library sessions. By conducting the pretest and posttest at the right times, the study



presented here helps measure the impact of the library instruction as well as student retention of information literacy competency, and it provides insights to improve library sessions in the future.

Transitioning from In-Person to Remote Teaching and Learning

Kathia Ibacache, Amanda Rybin Koob, and Eric Vance discuss the transition to remote library instruction during the pandemic, reporting that a majority of academic libraries switched to synchronous sessions via online conferencing tools such as Zoom.³⁷ The respondents to the authors' survey reported using content management or learning management systems, such as LibGuides and Canvas, to host their instructional content and digital learning objects.³⁸ At McEntegart Library, the librarians adjusted to remote learning by using Zoom for synchronous sessions and adapting the existing LibGuides pages and Canvas modules for presentations and supplemental materials.

Ibacache, Rybin Koob, and Vance also show that librarians used a combination of several different tools, such as video capture and slideshow software, to create instructional materials.³⁹ The three authors found that librarians employed additional means, such as interactive discussion boards, game-based platforms, and survey or polling tools, to enhance student engagement throughout the transition to remote learning.⁴⁰ The McEntegart librarians used similar tactics by creating presentation slideshows using Google Slides and embedding them on each freshman seminar course page on Canvas. The Google Slides were published on the Web and linked to the original. Only the librarians had editor privileges so that any slideshow edits or updates made to the original copy were immediately reflected on all the Canvas course shells. Additionally, the librarians created two brief how-to videos demonstrating the Discovery catalog layer and the library databases. During the synchronous sessions, the librarians occasionally used a Kahoot! quiz to add interactive content that would respond to the students' input.

Benefits and Limitations of Online Learning Objects

Elizabeth Humrickhouse recognizes the usefulness of online learning objects, such as videos, to teach students how to use the library catalog. She also emphasizes the limitations of online instruction, claiming that learning objects are often "created without the guidance of programmatic curricular goals or student learning outcomes."⁴¹ Many of the McEntegart Library LibGuides, which librarians have used as a content management platform since 2011, lack curricular or learning outcome objectives. Each guide consists of five tabs titled "Books," "Articles," "Web Resources," "Academic Research Process," and "Citations." While individual content on the guides may be useful, much of the material is not organized so that students can easily identify what would be helpful for

them in their information-seeking process. Humrickhouse says, "Thoughtfully designed online learning objects support student learning in a manner that allows students the

... librarians can impact student learning by incorporating a variety of learning objects and participating in course activities such as discussion boards in the learning management system course shell.



freedom to independently explore threshold concepts prior, and in addition to, their synchronous instruction sessions.”⁴² Tumbleson, Burke, and Long state that librarians can impact student learning by incorporating a variety of learning objects and participating in course activities such as discussion boards in the learning management system course shell.⁴³ At the McEntegart Library, the librarians designed the three Canvas modules for the freshman seminar courses to respond to this challenge.

Methodology

Prior to the first library session of the semester, the embedded librarian made the 15-item, multiple-choice FYE Library Literacy Scale available on the Canvas course shell (see Appendix C). The Library Literacy Scale was an optional assignment that was available for one week before the first scheduled library session. Students were encouraged to complete the scale outside class, in a single attempt within a 15-minute time limit, to determine their pretest scores. Upon concluding the three required library sessions over the course of two months, the librarians asked the students to take the Library Literacy Scale again to obtain their posttest scores. Once students had finished both the pretest and posttest, they could not view their scores or see the correct answers to the Library Literacy Scale questions.

The SJC100 freshman seminar course with the embedded librarian component had 188 students enrolled in the fall 2020 semester. Of 188 students, 70 failed to complete the entire Library Literacy Scale and were not included in the analysis, for a 62.7 percent response rate. A sample of $N = 118$ (25 males and 93 females) was used for the analysis. The researchers hope the results of this study will improve the FYE Program and strengthen the embedded librarian collaboration.

Results

General Observations

First, the researchers wanted to know if students’ posttest scores improved compared to their pretest scores for the entire measure, and they did. For the complete 15-item scale, the posttest scores ($M = .85$, $SD = .13$) were significantly higher than the pretest scores ($M = .73$, $SD = .14$), as indicated by a significant paired sample t -test, $t(117) = -9.01$, $p < .001$ (percentages were converted to proportions for analysis). See Figure 1.

Next, the researchers wanted to explore whether course modality affected the students’ scores. For each of the 15 items on the Library Literacy Scale, a single difference score was created for each student by subtracting their pretest score from their posttest score (again, percentages were converted to proportions for analysis). To determine if there was an effect of course modality, the difference score was used as the dependent measure in a one-way ANOVA. Among the three course modalities—asynchronous ($n = 21$; $M = .09$, $SD = .13$), synchronous ($n = 89$; $M = .13$, $SD = .15$), and mixed ($n = 8$; $M = .13$, $SD = .15$)—no significant differences were observed, as indicated by a nonsignificant one-way ANOVA, $F(2, 115) = .80$, $p = .45$.

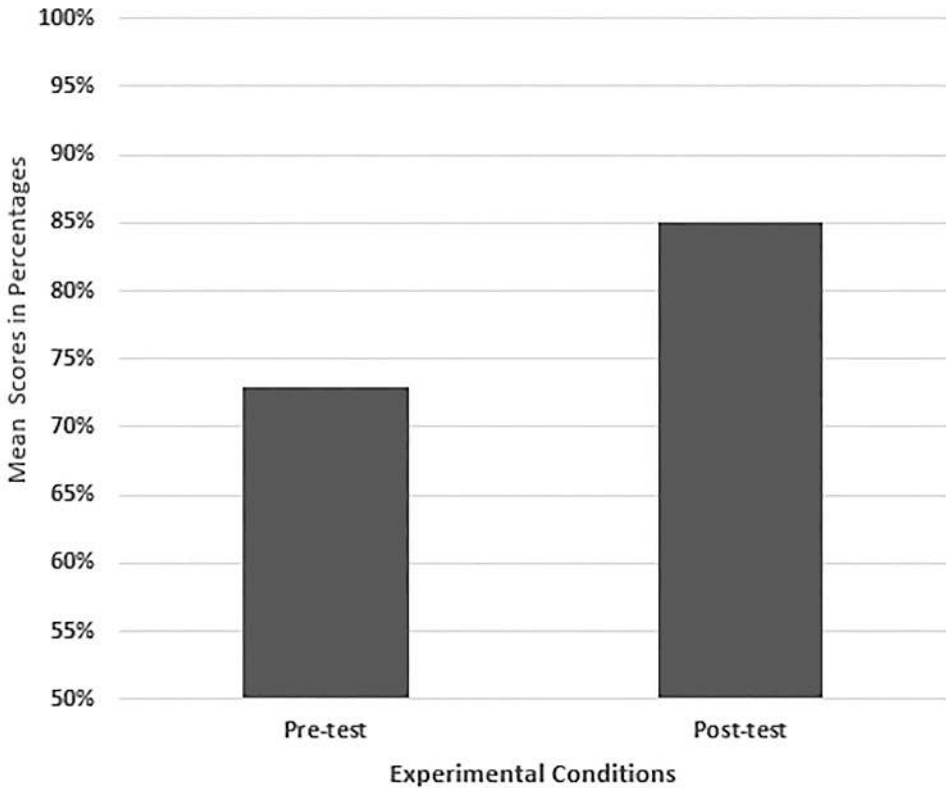


Figure 1. Mean pretest and posttest scores on the First Year Experience Library Literacy Scale of St. Joseph's College New York.

The researchers also wanted to know if there was a significant difference between the pretest and posttest scores of males and females; there was not, as indicated by a nonsignificant independent t -test, $t(116) = 1.12, p = .26$. Finally, the researchers explored whether there was a significant difference between the pretest and posttest scores in each of the two librarians' classes. There was not, as indicated by a nonsignificant t -test for independent groups, $t(116) = .14, p = .89$. In fact, surprisingly, the respective means and standard deviations were identical ($M = .12, SD = .15$).

Pretest and Posttest Scores by Question

After observing significant improvement in the posttest scores for the full Library Literacy Scale, the researchers wanted to individually examine the pretest and posttest scores for each of the 15 items in the scale. To do so, the items were analyzed with paired sample t -tests (see Tables 1 and 2).



Table 1.

Paired sample *t*-test results for the pretest and posttest scores on the 15 items of the FYE Library Literacy Scale*

Item	Pretest	Posttest	<i>t</i>	<i>p</i>
1. SJC takes plagiarism very seriously, and all students are expected to practice academic honesty and integrity. [†]	(<i>M</i> = .01, <i>SD</i> = .00)	(<i>M</i> = .01, <i>SD</i> = .00)	NA	NA
2. Forgetting to put quotation marks around an excerpt from another source is . . .	(<i>M</i> = .91, <i>SD</i> = .29)	(<i>M</i> = .92, <i>SD</i> = .27)	-.53	.60
3. For research or citation questions, who is the best person on campus to reach out to?	(<i>M</i> = .84, <i>SD</i> = .37)	(<i>M</i> = .89, <i>SD</i> = .31)	-1.28	.20
4. What kinds of sources can SJC students search via the library's Discovery layer?	(<i>M</i> = .98, <i>SD</i> = .13)	(<i>M</i> = 1, <i>SD</i> = 0)	-1.42	.16
5. What is the first step in the academic research process?	(<i>M</i> = .78, <i>SD</i> = .42)	(<i>M</i> = .86, <i>SD</i> = .35)	-1.68	.10
6. Which of the following is NOT a valid reason why you need to cite your sources?	(<i>M</i> = .93, <i>SD</i> = .25)	(<i>M</i> = .94, <i>SD</i> = .24)	-.28	.78
7. Which of the following search terms would likely retrieve the most relevant sources on the research question below when searching in a library database?	(<i>M</i> = .31, <i>SD</i> = .47)	(<i>M</i> = .75, <i>SD</i> = .43)	-9.29	<.000#
8. Which of the following statements is FALSE in terms of evaluating sources for academic research?	(<i>M</i> = .81, <i>SD</i> = .39)	(<i>M</i> = .86, <i>SD</i> = .35)	-1	.32
9. For academic research, students should ALWAYS consult the most current information no matter what the research topic is and never use sources published more than 10 years ago	(<i>M</i> = .56, <i>SD</i> = .50)	(<i>M</i> = .67, <i>SD</i> = .47)	-2.68	.008#
10. For academic research on the topic of global warming and climate change, which of the following websites is most reliable?	(<i>M</i> = .81, <i>SD</i> = .40)	(<i>M</i> = .84, <i>SD</i> = .37)	-.76	.45
11. What are the two main components of the APA citation format?	(<i>M</i> = .68, <i>SD</i> = .47)	(<i>M</i> = .86, <i>SD</i> = .35)	-3.26	.001#
12. A paraphrase is using your own words to express an author's ideas. Since you are restating someone else's idea in your own words, you do NOT need to cite the source.	(<i>M</i> = .69, <i>SD</i> = .47)	(<i>M</i> = .92, <i>SD</i> = .28)	-5.63	<.000#



13. What type of source is the following APA citation for?
14. In the APA style journal citation below, what does the number 33 indicate?
15. Which in-text citation is formatted in APA style?

(M = .48, SD = .50) (M = .70, SD = .46) -3.73 < .000#

(M = .46, SD = .50) (M = .79, SD = .41) -6.29 < .000#

(M = .73, SD = .45) (M = .80, SD = .40) -1.27 .21*

* $df = 117$ for all items.

#The pretest and posttest scores of item 1 were identical at 100% and therefore could not be subjected to a paired sample t -test.

*Statistically significant.

Table 2.
Rates of correct answers on the student pretest and posttest, by question ($N = 118$)

	Pretest		Posttest	
	Number of students answering correctly	Rate of correct answers (%)	Number of students answering correctly	Rate of correct answers (%)
Q1: SJC takes plagiarism very seriously, and all students are expected to practice academic honesty and integrity.				
True*	118	100	118	100
False	0	0	0	0
Q2: Forgetting to put quotation marks around an excerpt from another source is . . .				
Unintentional plagiarism*	107	90.68	109	92.37
Intentional plagiarism	8	6.78	9	6.78
Not plagiarism because it happened unknowingly by a mistake.	3	2.54	1	0.85
Q3: For research or citation questions, who is the best person on campus to reach out to?				
Academic adviser	13	11.02	4	3.39
Circulation Desk staff	6	5.08	7	5.93
Librarian*	99	83.90	105	88.98
No Answer	0	0	1	1.69
Q4: What kinds of sources can SJC students search via the library's Discovery layer?				
Books	0	0	0	0
E-books	1	0.85	0	0
Periodical articles	1	0.85	0	0
Videos	0	0	0	0
All of the above*	116	98.31	118	100



Q5: What is the first step in the academic research process?

Writing a draft	0	0	0	0
Finding sources	5	4.24	3	2.54
Developing a topic	21	17.8	14	11.86
Understanding the assignment*	92	77.97	101	85.59

Q6: Which of the following is NOT a valid reason why you need to cite your sources?

To give credit where credit is due	0	0	4	3.39
To give credibility to your research	1	0.85	0	0
To enable your readers to retrace your research steps	2	1.69	2	1.69
To practice academic honesty and integrity	5	4.24	1	0.85
To receive a better grade for having a long list of citations*	110	93.22	111	94.07

Q7: Which of the following search terms would likely retrieve the most relevant sources on the research question below when searching in a library database?

Research question: How does cyberbullying on social media such as Instagram, Twitter, and Snapchat affect young people's mental health?				
Cyberbullying + Adolescent + Mental health*	37	31.36	89	75.42
Effect of cyberbullying on mental health of young people	69	58.47	24	20.34
Does cyberbullying affect mental health?	12	10.17	5	4.24

Q8: Which of the following statements is FALSE in terms of evaluating sources for academic research?

You should evaluate your sources because not all information is reliable.	7	5.93	6	5.08
Evaluation of sources is not needed if the source was created within the last 10 years.*	96	81.36	101	85.59
All your sources must be evaluated because not all information is relevant to your research.	7	5.93	6	5.08
Both print and Internet sources need to be evaluated because they vary widely in their authority, accuracy, objectivity, currency, and coverage.	8	6.78	5	4.24

	Pretest		Posttest	
	Number of students answering correctly	Rate of correct answers (%)	Number of students answering correctly	Rate of correct answers (%)
Q9: For academic research, students should ALWAYS consult the most current information no matter what the research topic is and never use sources published more than 10 years ago.				
True	52	44.07	36	30.51
False*	66	55.93	81	68.64
No answer	0	0	1	0.85
Q10: For academic research on the topic of global warming and climate change, which of the following web sites is most reliable?				
http://42explore.com/jobewrm.htm	7	5.93	2	1.69
https://www.thegwpf.org/	15	12.71	16	13.56
https://climate.nasa.gov/evidence/ *	95	80.51	99	83.90
No answer	1	0.85	1	0.85
Q11: What are the two main components of the APA citation format?				
In-text citation and references*	80	67.80	101	85.59
Works cited and direct quote	29	24.58	10	8.47
Footnotes and bibliography	8	6.78	4	3.39
No answer	1	0.85	3	2.54
Q12: A paraphrase is using your own words to express an author's ideas. Since you are restating someone else's idea in your own words, you do NOT need to cite the source.				
True	36	30.51	8	6.78
False*	81	68.64	108	91.53
No answer	1	0.85	2	1.69



Q13: What type of source is the following APA citation for?

Scheff, S., & Schorr, M. (2017). *Shame nation: The global epidemic of online hate*. Sourcebooks.

Book*	57	48.31	83	70.34
Newspaper article	8	6.78	3	2.54
Web page	22	18.64	12	10.17
Journal article	29	24.58	18	15.25
No answer	2	1.69	2	1.69

Q14: In the APA style journal citation below, what does the number 33 indicate?

Mitchell, S. M., Seegan, P. L., Roush, J. F., Brown, S. L., Sustaita, M. A., & Cukrowicz, K. C. (2018). Retrospective cyberbullying and suicide ideation: The mediating roles of depressive symptoms, perceived burdensomeness, and thwarted belongingness. *Journal of Interpersonal Violence*, 33(16), 2602–2620. <https://doi.org/10.1177/0886260516628291>

Volume number*	54	45.76	93	78.81
Year of publication	1	0.85	1	0.85
Issue number	19	16.10	8	6.78
Page number	42	35.59	14	11.86
No answer	2	1.69	2	1.69

Q15: Which in-text citation is formatted in APA style?

(Smith 34)	30	25.42	22	18.64
(Smith, 2019, p. 34)*	86	72.88	94	79.66
No answer	2	1.69	2	1.69

*Correct answer.

Question 1 asked whether the statement “SJC takes plagiarism very seriously, and all students are expected to practice academic honesty and integrity” was true or false. This question aimed to determine students’ awareness of the college’s plagiarism and academic integrity policy. It received a 100 percent correct answer rate ($N = 118$) in both pretests and posttests. So, no statistical analysis was needed.

Question 2 asked students to choose the correct ending for the statement “Forgetting to put quotation marks around an excerpt from another source is . . .” This multiple-choice question aimed to determine students’ understanding of what constitutes plagiarism and the difference between intentional and unintentional plagiarism. In the pretests, 90.68 percent ($n = 107$) selected the correct answer, “Unintentional plagiarism.” The other 6.78 percent ($n = 8$) chose the wrong answer, “Intentional plagiarism.” The results of the pretest demonstrate that 97.46 percent ($n = 115$) were aware that omitting quotation marks is plagiarism, despite some confusion between intentional versus unintentional. The students who selected the answer “Not plagiarism because it happened unknowingly by a mistake” decreased from 2.54 percent ($n = 3$) to 0.85 percent ($n = 1$) from pretest to posttest. The difference between the pretest and posttest scores for Question 2 was not statistically significant, however, as indicated by a nonsignificant paired sample t -test, $t(117) = -.53, p = .60$.

Question 3 was another multiple-choice question, “For research or citation questions, who is the best person on campus to reach out to?” It was asked to determine students’ awareness of the academic librarian’s role and the services librarians provide. In the pretests, 83.9 percent ($n = 99$) answered this item correctly by selecting that a librarian is the best person on campus to consult for their research or citation questions. In the posttests, the correct response rate improved to 88.98 percent ($n = 105$). This numerical increase was not statistically significant, however, as indicated by a nonsignificant paired sample t -test, $t(117) = -1.28, p = .20$.

Students had a choice of possible answers to Question 4, “What kinds of sources can SJC students search via the library’s Discovery layer?” This multiple-choice question was asked to determine their awareness of the Discovery layer and its function. In the pretests, 98.31 percent ($n = 116$) answered correctly, selecting the “all of above” option, which indicated that Discovery includes all the sources listed: books, e-books, periodical articles, and videos. In the posttests, this multiple-choice question received a 100 percent ($N = 118$) correct answer rate, demonstrating students’ awareness of the function of the Discovery layer as well as the types of materials to which the library provides access. This numerical increase was not statistically significant, however, as indicated by a nonsignificant paired sample t -test, $t(117) = -1.42, p = .16$.

Question 5 asked, “What is the first step in the academic research process?” This item gauged students’ knowledge of the academic research process. In the pretests, 77.97 percent ($n = 92$) answered the multiple-choice question correctly, selecting “Understanding the assignment.” The pretests also showed that 22.04 percent ($n = 26$) chose the incorrect answer “Finding sources” (4.24 percent, $n = 5$) or “Developing a topic” (17.8 percent, $n = 21$). In the posttests, the correct answer rate improved to 85.59 percent ($n = 101$). This numerical increase was not statistically significant, however, as indicated by a nonsignificant paired sample t -test, $t(117) = -1.42, p = .16$.



Question 6 was “Which of the following is NOT a valid reason why you need to cite your sources?” It intended to measure students’ ability to identify the reasons for citing sources in academic writing. In the pretests, 93.22 percent ($n = 110$) answered the multiple-choice question correctly, selecting “To receive a better grade for having a long list of citations” as an invalid rationale for citing sources. In the posttests, 94.07 percent ($n = 111$) chose the correct response. This numerical increase was not statistically significant, however, as indicated by a nonsignificant paired sample t -test, $t(117) = -1.68, p = .10$.

Question 7 asked, “Which of the following search terms would likely retrieve the most relevant sources on the research question below when searching in a library database?” The research question given was “How does cyberbullying on social media such as Instagram, Twitter, and Snapchat affect young people’s mental health?” This multiple-choice question aimed to determine students’ ability to articulate a research query and extract search terms from a research question. In the pretests, 31.36 percent ($n = 37$)—the lowest correct answer rate for any item in the scale—selected the right answer: “Cyberbullying + Adolescent + Mental Health.” Most students in the pretest, 58.47 percent ($n = 69$), selected the incorrect answer “Effect of cyberbullying on mental health of young people.” In the posttests, the correct response rate almost doubled, increasing to 75.42 percent ($n = 89$). This increase was statistically significant, as indicated by a significant paired sample t -test, $t(117) = -9.29, p < .000$.

Question 8 was the multiple-choice question “Which of the following statements is FALSE in terms of evaluating sources for academic research?” It aimed to measure students’ understanding of source evaluation for academic research. In the pretests, 81.36 percent ($n = 96$) answered the question correctly, selecting the answer “Evaluation of sources is not needed if the source was created within the last 10 years.” The correct answer rate slightly improved to 85.59 percent ($n = 101$) in the posttests. This numerical increase was not statistically significant, however, as indicated by a nonsignificant paired sample t -test, $t(117) = -1.00, p = .32$.

Question 9 asked whether the statement “For academic research, students should ALWAYS consult the most current information no matter what the research topic is and never use sources published more than 10 years ago” was true or false. This question aimed to further determine students’ understanding of source evaluation. The correct answer rates, indicating those who selected “False,” were 55.93 percent ($n = 66$) and 68.64 percent ($n = 81$) in the pretests and posttests, respectively. This increase was statistically significant, as indicated by a significant paired sample t -test, $t(117) = -2.68, p = .008$. While there was a statistically significant improvement in the results, 30.51 percent ($n = 36$) still answered incorrectly in the posttests.

Question 10 was a multiple-choice item offering several possible answers to the question “For academic research on the topic of global warming and climate change, which of the following websites is most reliable?” This item aimed to measure students’ ability to analyze a website to determine its credibility and whether it would be worth consulting for academic research. The answer choices were hyperlinked so that students could visit the websites. In the pretests, 80.51 percent ($n = 95$) answered the question correctly by selecting the government-hosted National Aeronautics and Space Administration (NASA) website, and this percentage improved slightly to 83.90 percent ($n = 99$) in the posttests. This numerical increase was not statistically significant, however, as indicated by a nonsignificant paired sample t -test, $t(117) = -.76, p = .45$.



Questions 11 to 15 involve students' understanding of APA-style citation, which is a required component of SJC100. Regardless of the course topic, SJC100 sections require students to use APA style for their assignments. Question 11 asked, "What are the two main components of the APA citation format?" In the pretests, 67.80 percent ($n = 80$) answered the multiple-choice question correctly, selecting "in-text citation and references" as the two main components of APA style. The correct response rate improved to 85.59 percent ($n = 101$) in the posttest, which was a statistically significant increase, as indicated by a significant paired sample t -test, $t(117) = -3.26, p = .001$. About a quarter of the sample (24.58 percent, $n = 29$) chose the incorrect answer "works cited and direct quote" in the pretests. In the posttests, the number of students selecting the mistaken "works cited" answer decreased to 8.47 percent ($n = 10$).

Question 12 asked students to respond either "true" or "false" to the statement "A paraphrase is using your own words to express an author's ideas. Since you are restating someone else's idea in your own words, you do NOT need to cite the source." This true/false question aimed to measure student understanding of paraphrasing. The correct answer rate, those selecting "False," improved from 68.64 percent ($n = 81$) in the pretests to 91.53 percent ($n = 108$) in the posttests, which was a statistically significant increase, as indicated by a significant paired sample t -test, $t(117) = -5.63, p < .000$.

Question 13 asked, "What type of source is the following APA citation for?" The citation was "Scheff, S., & Schorr, M. (2017). *Shame nation: The global epidemic of online hate*. Sourcebooks." This multiple-choice question intended to determine whether students could recognize the parts of a citation and identify the type of source by looking at the full citation in APA style. The two most popular answer choices in the pretests were "web page" (18.64 percent, $n = 22$) and "journal article" (24.58 percent, $n = 29$), while only 48.31 percent ($n = 57$) selected the right response, "book." The correct answer rate improved to 70.34 percent ($n = 83$) in the posttests, which was a statistically significant increase, as indicated by a significant paired sample t -test, $t(117) = -3.73, p < .000$.

Question 14 was "In the APA style journal citation below, what does the number 33 indicate?" The citation was "Mitchell, S. M., Seegan, P. L., Roush, J. F., Brown, S. L., Sustaita, M. A., & Cukrowicz, K. C. (2018). Retrospective cyberbullying and suicide ideation: The mediating roles of depressive symptoms, perceived burdensomeness, and thwarted belongingness. *Journal of Interpersonal Violence*, 33(16), 2602–2620. <https://doi.org/10.1177/0886260516628291>." This multiple-choice question challenged students to identify the parts of an APA journal article citation. In the pretests, only 45.76 percent ($n = 54$) answered correctly by selecting "volume number" as their response. The correct answer rate improved to 78.81 percent ($n = 93$) in the posttests, which was a statistically significant increase, as indicated by a significant paired sample t -test, $t(117) = -6.29, p < .000$.

Question 15 gave two citations, one in APA style and the other in the style of the Modern Language Association (MLA), and asked "Which in-text citation is formatted in APA style?" This question aimed to determine whether students could identify the correct in-text citation format in APA style and distinguish between APA and MLA style. In the pretests, 72.88 percent ($n = 86$) answered correctly, selecting "(Smith, 2019, p. 34)." This number improved slightly to 79.66 percent ($n = 94$) in the posttests. This numerical increase was not statistically significant, however, as indicated by a nonsignificant paired



sample *t*-test, $t(117) = -1.27, p = .21$. That 18.64 percent of students ($n = 22$) incorrectly chose the citation in MLA style in the posttest is troubling.

Discussion

Overall, there was a statistically significant improvement between pretest and posttest scores for the entire FYE Library Literacy Scale. Course modality, student gender, and the librarian who delivered the course content did not have an impact on student performance. When analyzing the results of the Library Literacy Scale at the question level, the improvements in 6 items of the 15-question measure were determined to be statistically significant: questions 7, 9, 11, 12, 13 and 14.

The significant improvement from pretest to posttest scores for question 7 was encouraging, showing that students could more effectively pose a research question and choose relevant keywords in forming a search strategy. This item challenged students to think critically about the differences between performing searches in search engines, such as Google, and in library search platforms, such as the subscription databases and catalog. The pretest results confirmed the librarians' previous observations that students tend to enter entire sentences into a keyword search bar when they look for information in library databases or a library catalog. Students also frequently included relationship words such as *effect* or *cause* and prepositions in their searches.

. . . students tend to enter entire sentences into a keyword search bar when they look for information in library databases or a library catalog.

Library Module 1.2—Academic Research aimed to break students of this habit by discussing the steps in the academic research process and how to develop an effective keyword search strategy. Students were encouraged to brainstorm, think of synonyms and related terms, and read an entry in an encyclopedia to get background information to develop their search terms. The posttest scores for question 7 demonstrate that students gained a better understanding of how to divide a complex research question into its most important concepts.

One possible reason for the low rate of correct answers in the pretest for question 9 is that students are often instructed to use only sources published from the last 10 years. The librarians are aware that assignment instructions in some courses or disciplines, such as child study, nursing, and psychology, forbid the use of any source published over 10 years ago, and sometimes over 5 years ago. These directions could have confused some students. Library Module 2.2—Evaluating Sources covered the appropriateness of publication dates with examples and explained, for example, that it is critical to consult both older and newer sources for research on a historical topic. The improvement in posttest scores demonstrated that students learned that older sources can be relevant and useful, depending on the topic.

Questions 11 to 14 revolved around citation. The pretest results exhibited students' confusion about the differences between citations in MLA style and APA style. Many students gravitated toward answers that included MLA formatting and terminology, such as "works cited." Freshmen are typically most familiar with MLA style because it

is popular in high schools, which may have contributed to the low pretest scores for this range of questions. Library Module 3.1—Citing Sources discussed the basic elements and formatting requirements of APA style. This module introduced students to different types of sources cited in APA style, with specific examples of book, journal article, and web page citations. The librarians also introduced three different ways to incorporate an original source into student writing via direct quotation, block quotation, and paraphrase. In-text parenthetical citation formatting in APA style was also covered in this module. The vast improvement in pretest to posttest scores for these four questions demonstrates that students developed a better grasp of APA style and in-text citations after receiving the library instruction and reviewing the library modules on Canvas.

Limitations

While the pretest and posttest successfully measured the efficacy of the FYE Library Literacy Scale for this research purpose, the researchers will consider incorporating more dynamic assessment models, such as student surveys and performance-based rubrics. These methods might better measure the impact of library instruction and retention of skills learned in freshman year for broader educational outcomes throughout the students' academic career.

To gain instructor buy-in, it is critical that students learn to apply the theoretical concepts and put them into practice by using the tools introduced in the library instruction sessions. Ann Grafstein urges that faculty actively incorporate the information literacy concepts taught during library sessions, stating, "If the role of librarians is the teaching of generic IL [information literacy] skills, the role of classroom faculty is to impart those IL skills that are embedded within the research paradigms and procedures of their disciplines."⁴⁴ Currently, the librarians have no way of measuring whether faculty emphasize IL skills after their students complete the library instruction modules.

Conclusion

Combining embedded librarianship with a scaffolded multi-session approach to information literacy instruction was an effective method of helping students obtain a better grasp of information literacy concepts and library research methods. Transitioning from the one-shot session, where time constraints can often be problematic, the librarians in this study were fortunate to teach three separate sessions with this group of First Year Experience students. The three classes helped increase the students' exposure to the library and to academic research. The librarians will investigate more opportunities to expand collaboration with the SJC100 instructors to examine the transferability of information literacy skills and concepts in students' academic work. They hope to foster collaboration with other departments across campus, such as the Academic Writing Center, to extend the embedded librarian and scaffolded information literacy model of instruction beyond the FYE Program. Furthermore, to measure students' retention of information literacy skills, a longitudinal study may be considered.

The FYE Library Literacy Scale provided the St. Joseph's librarians an opportunity not only to assess the students' learning but also to reflect on their own teaching practices



and create new techniques or remodel existing activities. Overall, the improvement from pretest to posttest demonstrates the effectiveness of the scaffolded information literacy instruction by embedded librarians in the participating SJC100 sections in fall 2020. It further shows that small-scale academic libraries with limited human, financial, and material resources can achieve meaningful assessment.

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Appendix A

SJC100 Library Learning Objectives

- Familiarize with the physical resources and services available at McEntegart Library.
- Identify the location of the Reference Desk and Circulation Desk and understand the roles of these desks.
- Familiarize with the SJC Libraries web page.
- Understand the role of librarians and the ways to connect with a librarian.
- Understand the expectations for college level assignments.
- Define academic honesty and plagiarism.
- Identify common scenarios that can lead to academic dishonesty and possible consequences.
- Understand the academic research process and how each step leads to completing a college-level research assignment.
- Identify different types of sources.
- Recognize the need to examine sources.



- Critically evaluate different types of sources based on the CRAP (currency, reliability, authority, and purpose) method.
- Understand how to navigate the library's Discovery layer and individual databases to find sources.
- Define *database*, *periodical*, *scholarly journal*, and *peer review*.
- Recognize the importance of citing your sources.
- Understand the basic elements of American Psychological Association (APA) citation style.
- Identify the individual components of APA citations.
- Learn how to use and navigate [the citation management tool] NoodleTools.

Appendix B

SJC100 Library Modules

- Introduction
- Hello from your librarian
- Ungraded pre-instruction assessment
- Part 1: McEntegart Library | Academic research process
 - Module 1.1—McEntegart Library Tour
 - 1.1. Quiz—McEntegart Library tour
 - Module 1.2—Academic Research
 - 1.2. Quiz—Academic research
- Part 2: Searching and evaluating sources
 - Module 2.1—Searching for Sources
 - 2.1. Types of sources | Information timeline
 - 2.1. Video—Searching for books
 - 2.1 Video—Searching for articles
 - Module 2.2—Evaluating Sources
 - 2.2. Quiz—Evaluating sources
- Part 3: Citing sources in APA | NoodleTools
 - Module 3.1—Citing Sources
 - 3.1. Quiz—Citing sources in APA
 - Module 3.2—NoodleTools Quick Guides
 - Ungraded post-instruction assessment

Appendix C

First Year Experience (FYE) Library Literacy Scale

Note: Bold-faced answers indicate the correct answer.

1. SJC takes plagiarism very seriously, and all students are expected to practice academic honesty and integrity.
 - a. **True**
 - b. False
2. Forgetting to put quotation marks around an excerpt from another source is . . .
 - a. **Unintentional plagiarism.**
 - b. Intentional plagiarism.
 - c. Not plagiarism because it happened unknowingly by a mistake.
3. For research or citation questions, who is the best person on campus to reach out to?
 - a. Academic adviser
 - b. Circulation Desk staff
 - c. **Librarian**
4. What kinds of sources can SJC students search via the library's Discovery layer?
 - a. Books
 - b. E-books
 - c. Periodical articles
 - d. Videos
 - e. **All of above**
5. What is the first step in the academic research process?
 - a. Writing a draft
 - b. Finding sources
 - c. **Understanding the assignment**
 - d. Developing a topic
6. Which of the following is NOT a valid reason why you need to cite your sources?
 - a. To give credit where credit is due.
 - b. To give credibility to your research.
 - c. To enable your readers to retrace your research steps.
 - d. To practice academic honesty and integrity.
 - e. **To receive a better grade for having a long list of citations.**
7. Which of the following search terms would likely retrieve the most relevant sources on the research question below when searching in a library database?

Research question: How does cyberbullying on social media such as Instagram, Twitter, and Snapchat affect young people's mental health?

 - a. Does cyberbullying affect mental health?
 - b. Effect of cyberbullying on mental health of young people
 - c. **Cyberbullying + Adolescent + Mental health**



8. Which of the following statements is FALSE in terms of evaluating sources for academic research?
- You should evaluate your sources because not all information is reliable.
 - Evaluation of sources is not needed if the source was created within the last 10 years.**
 - All your sources must be evaluated because not all information is relevant to your research.
 - Both print and Internet sources need to be evaluated because they vary widely in their authority, accuracy, objectivity, currency, and coverage.
9. For academic research, students should ALWAYS consult the most current information no matter what the research topic is and never use sources published more than 10 years ago.
- True
 - False**
10. For academic research on the topic of global warming and climate change, which of the following websites is most reliable? [The links were hyperlinked so that students could visit the websites to evaluate them.]
- <http://42explore.com/globewrm.htm>
 - <https://www.thegwpf.org/>
 - <https://climate.nasa.gov/evidence/>**
11. What are the two main components of the APA citation format?
- In-text citation and references**
 - Works cited and direct quote
 - Footnotes and bibliography
12. A paraphrase is using your own words to express an author's ideas. Since you are restating someone else's idea in your own words, you do NOT need to cite the source.
- True
 - False**
13. What type of source is the following APA citation for?
- Scheff, S., & Schorr, M. (2017). *Shame nation: The global epidemic of online hate*. Sourcebooks.
- Book**
 - Newspaper article
 - Web page
 - Journal article
14. In the APA style journal citation below, what does the number 33 indicate?
- Mitchell, S. M., Seegan, P. L., Roush, J. F., Brown, S. L., Sustaita, M. A., & Cukrowicz, K. C. (2018). Retrospective cyberbullying and suicide ideation: The mediating roles of depressive symptoms, perceived burdensomeness, and thwarted belongingness. *Journal of Interpersonal Violence*, 33(16), 2602-2620. <https://doi.org/10.1177/0886260516628291>
- Volume number**
 - Year of publication
 - Issue number
 - Page number



15. Which in-text citation is formatted in APA style?
 - a. (Smith 34)
 - b. (Smith, 2019, p. 34)**

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