

The authors would like to acknowledge Brenda McDermott, without whom this pilot would not have been possible.

Preprint

From Hoffman N, Beatty S, Feng P, Lee J. 2017. Teaching research skills through embedded librarianship. *Reference Services Review*. 45(2):211-226. doi: 10.1108/RSR-07-2016-0045.

Teaching Research Skills Through Embedded Librarianship

Keywords: Embedded librarian, research skills instruction, flipped teaching, collaboration, inquiry-based learning

Introduction

The lifelong skills of research and writing are not taught explicitly in most university courses. Students typically pick up these skills in an *ad hoc* manner or, if they are lucky, may receive one or two introductory sessions. However, research and writing skills are increasingly required both in and outside of the classroom. While librarians are often called upon to teach these skills, the question is how to effectively impart these skills to students.

This paper describes one example of skills instruction through *embedded librarianship*. Rather than follow a traditional “one-shot” model where librarians have a single class to cover everything students might possibly need to know about research and writing, the authors embedded research and writing skills instruction throughout an entire course. Librarians and a writing specialist worked collaboratively with a faculty member to design an inquiry-based learning course; the result was a course that emphasized research and writing skills through in-class instruction, formative and summative assessments, and a semi-flipped teaching approach.

The institution where this case study took place is a 4-year comprehensive university. Librarians at this university are members of the academic staff and are expected to participate in teaching, research, and service. This project offered a unique opportunity to combine teaching and research on library skills development, as well as test new pedagogy, content, and modes of student engagement. Librarians had the opportunity to be researchers while expanding their skills in teaching and course design.

This article describes the process of developing a research and writing skills intensive course and reflects on the benefits and challenges of the embedded librarianship model. Following the literature review, the evolution of the course collaboration is presented along with a detailed description of the instructional activities undertaken by librarians and other learning support staff. The expanded role of librarians is also discussed. The authors then present reflections on their experiences along with data from a student survey. The article concludes with lessons learned and suggestions for future research.

Literature review

Research and writing skills are crucial elements in higher education. However, the teaching of these skills is often not systematic. While some universities require students to take prescribed research or writing courses, others have no such requirements. Furthermore, even when such courses are required, the skills imparted do not necessarily translate well into discipline-related courses taken by students. As a result, there is growing interest in including more skills

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3 instruction across the curriculum, particularly in research and writing intensive courses
4 (Elmborg and Hook, 2005).
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7 The literature review below discusses three common models whereby librarians incorporate
8 research and writing skills into university courses: (a) the “one-shot” model; (b) embedded
9 librarianship; and (c) collaboration with other learning support services. The review focuses on
10 skills instruction that takes place within a course, rather than free-standing skills instruction
11 (e.g., library workshop offered outside of class).
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14 15 *“One-shot” model and beyond* 16

17 Library literature is rife with discussion on the efficacy of one-shot library instruction sessions. It
18 seems that at minimum some instruction is better than none (Bryan and Karshmer, 2015;
19 Masuchika and Boldt, 2012). While librarians debate the delivery method and types of
20 instruction that improve learning, there is wide acceptance that the one-shot instruction
21 session is here to stay. Flaws aside, often it is one way to get into the classroom and begin
22 information literacy instruction. Spievak and Hayes-Bohanan (2013) in their assessment of
23 library-related research activity after a one-shot session, assert that students do learn and
24 while “one-shot sessions are not the best method for delivery of information literacy
25 instruction...these sessions may have a positive effect” (p. 495). However, there are many nay-
26 sayers. Owusu-Ansah (2004a) provides an insightful overview of the current state of library
27 instruction as he seeks to promote the idea of a comprehensive information literacy program.
28 Responding to critics of his overview, he notes “what I assert (and not alone) is the limited
29 effectiveness of such (50 minute) models” (2004b, p. 22-23). He urges librarians to continue to
30 work toward the “optimal.”
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37 There are many approaches to optimal one-shot information literacy instruction. For example,
38 Daland (2015) examines one-shot session vs one-shot with follow-up workshop, and concludes
39 that practical application of theory leads to better learning. Anderson and May (2010)
40 examined online, blended, and face-to-face instruction and concluded that all methods can be
41 equally effective (p. 498). Recently, Buchanan and McDonough (2014) in their book *The One-*
42 *Shot Library Instruction Survival Guide* present useful and creative teaching methods designed
43 to assist the beleaguered one-shot instruction librarian. Mery and colleagues (2014) conclude
44 from their study that one-shot is better than nothing, but an online credit course is better still.
45 And so the discussion continues, with recognition that there are ways to improve any method
46 of instruction and improved instruction increases the student learning experience.
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51 52 *Embedded librarianship* 53

54 Embedded librarianship is a relatively new concept in information literacy instruction. Barbara
55 Dewey (2004) in her seminal article on embedded librarian research concentrates on post-
56 secondary collaboration with several examples of embedding. Within the discussion on
57 teaching, Dewey argues faculty/librarian partnerships should work towards learning objectives
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3 instead of simple reliance on traditional library instruction. Gallagher (2009) suggests a service
4 model in which librarians with knowledge of pedagogy and experience of students' challenges
5 with, and expectations of, the research process, provide input into assignment design. This goes
6 beyond suggesting resources to instructors. She suggests this model could be a replacement for
7 traditional library instruction.
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11 Often considered analogous with the embedded journalist, an embedded librarian is defined as
12 locating "librarians involved in the spaces of their users and colleagues, either physically or
13 through technology, in order to become a part of their users' culture" (Drewes and Hoffman,
14 2010, p. 76). Embedded librarianship literature often describes librarians involved with
15 electronic learning management systems, instruction, or research projects (Dewey, 2004;
16 Norelli 2010; Schulte, 2012). David Shumaker (2011, 2012, 2015; Shumaker and Talley, 2009), a
17 well-known authority in embedded librarianship, coined the term "embedded instruction" to
18 adeptly describe the various types of instructional embedding for librarians found in academic
19 and special libraries. In *Embedded librarian: Innovative strategies for taking knowledge where*
20 *it's needed*, Shumaker (2012) describes the transition of subject/liaison librarians in higher
21 education to embedded librarians focusing overwhelmingly on information literacy instruction
22 "...even participating in the grading of student work" (p. 65). This comprehensive book also
23 provides embedded librarians with best practices (and pitfalls) for using new technologies,
24 ensuring student engagement, getting involved in course design and grading, and taking part in
25 larger scholarly research projects.
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29 Several practical guides exist on embedding as a librarian in various forms. Kvenild and Calkins
30 (2011) concentrate on instruction beyond the one-shot while Daugherty and Russo (2013) go
31 deeper, discussing types of embedded instructional opportunities and co-teaching, including
32 grading. Moniz and colleagues (2014) describe forms of embedding with practical checklists and
33 subject specialization, while describing collaboration with faculty members as more collegial
34 and personalized. They argue the "opportunity to add value to the classroom and facilitate use
35 of library resources is magnified by the work of embedded library liaisons" (p. 129), something
36 that resonates with the experiences described below. Thus, there are many ways in which
37 librarians can be embedded into a classroom.
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41 While embedded librarianship implies a much broader role for librarians than the traditional
42 reference librarian model, there are still limits to what embedded librarians typically do. In the
43 literature, embedded librarianship typically does not cover roles beyond instruction and
44 classroom/learning management system interactions. Embedding into research projects,
45 grading, and curricular programs are limited areas of discussion in the literature. All three are
46 briefly discussed by Shumaker (2012) while Daugherty and Russo (2013) describe grading as
47 part of ethical considerations. Partnering in evaluation is briefly described by Kvenild and
48 Calkins (2011) and Hearn (2005) grades the library-related portions of assignments. Examples of
49 research projects and curricular programs are areas for future study with preliminary analysis in
50 various *C&RL News* articles (e.g., Sullivan and Porter, 2016), conference presentations (e.g.,
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3 Dennett *et al.*, 2014), and review articles (e.g., Schulte, 2012). This article contributes to the
4 literature as a case study of a comprehensive embedded experience.
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7 *Collaboration with other learning support services*

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9 Most literature on collaborative instruction relates to library-faculty or library-writing centre
10 teams. Elmborg and Hook (2005) and Ferer (2012) highlight the need for and advances in
11 library-writing centre collaboration over the past twenty years. Elmborg and Hook argue
12 learning academic skills related to research and writing occurs outside the classroom through
13 libraries and writing centres; working together means more relevant student learning
14 outcomes. However, Elmborg (2005) also laments the segregation of research and writing
15 instruction and notes it is not "the reality of student work" (p. 11). The somewhat easier
16 collaboration between library and writing centre has been well described, with acceptance of
17 the lack of embeddedness in discipline-related courses.
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21 Many write in support of the collaboration between writing centres and libraries. Barratt and
22 colleagues (2009) describe collaborative instruction in a first-year composition course, and
23 indicate a need for further research on how to extend and develop student understanding of
24 research across the curriculum. Some support co-location as a means of encouraging
25 integration in instruction (Cooke and Bledsoe, 2008; Palomino and Gouveia, 2011). Examples of
26 instruction abound from online courses (Greer *et al.*, 2012) to an eight week workshop with
27 faculty developed by writing centre and library to revise a writing course including revised
28 learning outcomes and instructional activities (Lundstrom *et al.*, 2014).
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33 Ferer (2012) reviews the status of the collaboration between librarians and writing centres in
34 order to determine best practices. While there is co-operation in designing courses, it tends to
35 be in composition courses, rather than content/discipline specific courses. While there may be
36 some collaborative redesign and instruction with assessment in the field, a literature search has
37 not revealed an example.
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41 Montgomery and Robertshaw (2015) interviewed ten students about their research and writing
42 process and support co-location, collaboration, and peer tutoring as a way to encourage more
43 learning. They conclude with an observation about the problem of in-class instruction, noting it
44 is not common to have upper-level course instructors request library/writing in-class
45 instruction. Looking back at what Elmborg (2005) stated about the separation of learning not
46 reflecting the reality of the student, this perception of division of learning is problematic as it
47 persists ten years later. By integrating writing and research instruction into the course, this case
48 study attempts to avoid the artificial segregation of these two interrelated activities.
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52 **Embedding Librarians into University Teaching**

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54 To better integrate research and writing skills into university teaching, a team of librarians was
55 invited to collaborate in the design and delivery of a first-year university course. The result was
56 a course in which librarians and writing support staff were thoroughly embedded. Following the
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3 “ideal” embedded librarianship model described by Shumaker (2012), librarians not only
4 provided instruction but also contributed to course design, content, pedagogy, and student
5 assessment. In addition, they interacted with students throughout the course.
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9 This section describes the process of developing an embedded librarian approach. It begins by
10 reviewing the evolution of librarians’ involvement in the course over time. This is followed by a
11 detailed description of the instructional approach taken by librarians and learning support staff,
12 and a discussion of how this approach differs from traditional “one-shot” models of library
13 instruction.
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15 16 17 *Course overview and evolution of librarian involvement*

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19 *Science, Technology, and Society* is a research-intensive, inquiry-based course taken primarily
20 by first-year undergraduates. The course challenges students to reflect critically on the social
21 impact of science and technology and how developments in these fields influence and are
22 shaped by society. Learning objectives include content knowledge, critical thinking, research
23 and writing skills, and effective group work. Enrollment is typically around 50 students. As part
24 of the course, students undertake a major group research project on a topic of their choosing.
25 Students are supported in this process by librarians and other learning support staff who
26 provide research and writing support.
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31 At the time of writing, the course had gone through five iterations. Initially, in-class research
32 and writing support was limited. As the course evolved, the amount of research and writing
33 support increased and became more integrated. In the most recent iteration, the course
34 included multiple research and writing skills sessions, hands-on learning components, and drop-
35 in writing workshops. The level of librarian involvement in the course evolved from one-shot to
36 deep integration, as shown in Figure 1 below.
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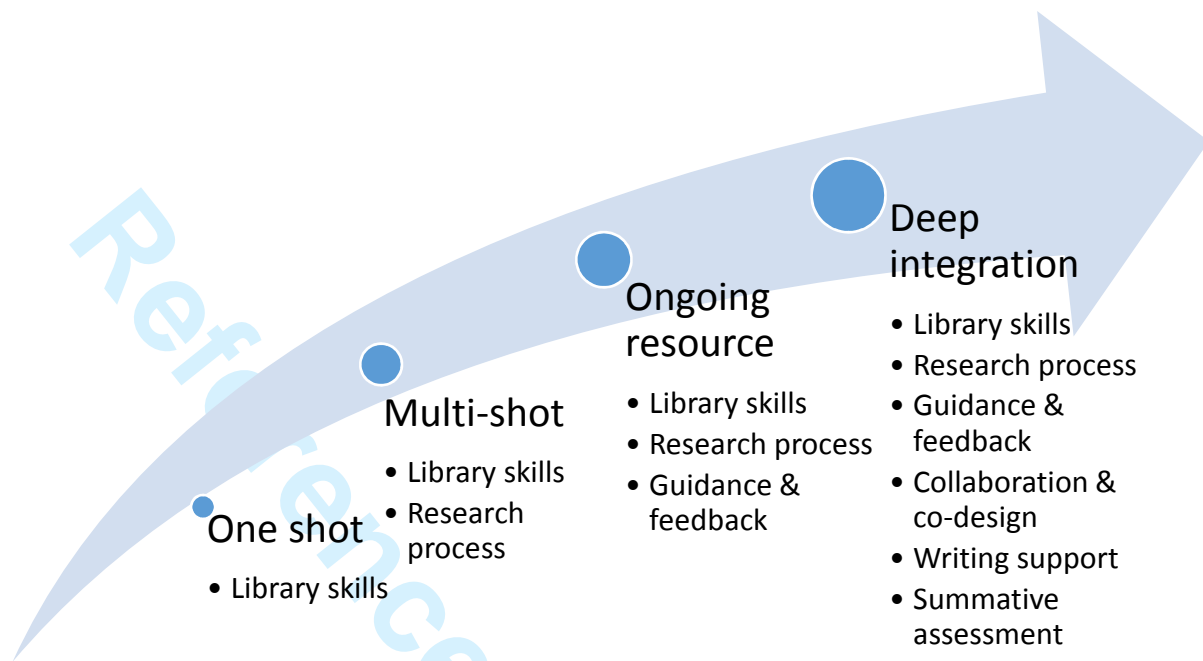


Figure 1. Evolution of librarian involvement in the course

To better understand how librarian roles changed over time, it is useful to trace the evolution of the course. In its first iteration, the course instructor invited a librarian to give a single 50-minute instruction session on using the library. This “one-shot” model lecture included an orientation to the library website, basic search skills, and how to seek reference assistance. Students had no interaction with the librarian aside from this single session and relied on the instructor to address any additional questions about research.

The following year, due to the interdisciplinary nature of the course, two librarians were invited to participate. The course schedule changed to include a quick 20-minute library tour in week 1, followed by a library instruction session in week 4, which focused on the early stages of the research process (e.g., brainstorming, narrowing your topic, preliminary research). This instruction session was repeated in week 10, when students were asked to research a second topic. Student interaction with librarians increased but was largely confined to these two instruction sessions.

The third and fourth iterations involved three librarians with a mix of disciplinary knowledge. The syllabus was adjusted to include a quick orientation tour in week 1 and two instruction sessions: (1) brainstorming, narrowing your topic, and preliminary research; and (2) refining searches, evaluating sources, and citations. Additional class time was set aside as working time to allow groups to meet informally with librarians, should they wish to discuss their projects or ask questions related to their research. Not all three librarians were involved in preparing each session; rather, each librarian delivered different instructional components, spreading the work among the team.

The most recent iteration of the course added a writing specialist to the instruction team, with all members contributing to course design and instruction. A total of four research and writing skills sessions were scheduled, details of which are covered in the following section. Additional class time was set aside for group work and writing workshops. Finally, librarians and writing staff were involved in designing quizzes and a summative skills assessment, further integrating them into the instruction team. A summary of activities undertaken in each iteration is presented in Table 1 below.

Iteration	Model	Activities	Degree of integration	Role of librarian
1	One-shot	<ul style="list-style-type: none"> • 1 x in-class instruction 	Low	External resource
2	Multi-shot	<ul style="list-style-type: none"> • Library tour • 2 x in-class instruction 	Low	External resource
3 & 4	Ongoing resource	<ul style="list-style-type: none"> • Library tour • 2 x in-class instruction • Available during working sessions in case students have questions 	Medium	Class resource
5	Embedded librarianship	<ul style="list-style-type: none"> • Library tour • 4 x in-class instruction • Available during working sessions in case students have questions • Help prepare and grade quizzes and summative test 	High	Member of instruction team

Table 1. Librarian activities and degree of integration over time

To summarize, librarians' involvement evolved from a one-shot model to an embedded and deeply integrated approach. Student interactions increased from a single instruction session to repeated interactions over many weeks. Librarians' roles changed from being an external resource to being integral members of the instruction team, helping guide students through the various stages of their group research projects. With the addition of writing support services in the latest iteration, students now have specialized support for writing. This case study illustrates how research and writing skills instruction can evolve, with collaboration and trust between librarians, faculty, and other learning support staff increasing over time.

A closer look at the embedded model

The degree to which librarians were integrated into the course can be seen by examining the instructional activities they undertook in the latest iteration. Several months prior to its start, the course instructor invited three librarians and a writing specialist to be part of the instruction team. The team addressed students' learning needs by finding ways to integrate research and writing skills instruction into the course. In order to show the importance of these skills and to

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3 ensure students took the sessions seriously, the instructor assigned 25% of the course grade to
4 research and writing skills. Students were graded based on quizzes (four total, collectively
5 worth 10%) and a summative assessment (worth 15%).
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8 Research and writing instruction occurred over four consecutive weeks, with optional in-person
9 writing workshops offered later in the term. The team developed and delivered a series of
10 research and writing skills sessions, specifically focusing on citation, research process, source
11 evaluation, and writing and plagiarism.
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14 A flipped classroom approach for the library sessions was chosen in order to improve student
15 learning, give students working time in class, active learning exercises, and provide students
16 with some knowledge before class. This approach moves away from the traditional “lecture-
17 then-homework” sequence where students listen to a lecture in class, then practice skills after
18 the lecture on their own time. A flipped classroom asks students to prepare before class and be
19 ready to apply the content and concepts already introduced to enable a deeper learning
20 experience. Preparation often means watching a short video or reviewing readings with a small
21 assessment component, which informs the activities during class. Thus, the students experience
22 the concept before attending class, and in-class activities reinforce the content and concepts as
23 learned. The increased interaction between student and instructor provides multiple
24 opportunities for feedback, and improves student learning (Educause, 2012).
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30 In this case study, pre-class content consisted of quick instructional videos and PowerPoint
31 presentations, followed by a short pre-test of four or five questions addressing key concepts.
32 Pre-tests were given before each of the four instruction sessions. These were worth 10% total
33 and were completed by most (but not all) students. Pre-tests were easy to complete, generally
34 requiring 10-15 minutes (e.g., watching a video and answering a few multiple-choice questions
35 based on the video). The institution’s learning management system was used to deliver content
36 and quizzes, with multiple-choice questions being auto-marked. Each instruction session built
37 and expanded on the content in the pre-class exercises. In-class activities incorporated content
38 from previous instruction lessons and included guides that students could use when preparing
39 their assignments.
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44 The progression and goals for each of the instruction sessions is presented in Table 2 below. For
45 each topic, the instruction team identified learning goals, developed pre-class activities and
46 quizzes, and prepared content for in-class instruction.
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Topics & Goals	Pre-class activities and quiz	In-class content and activity
1: Citations <ul style="list-style-type: none"> • Why cite? • Read & identify citation components • Identify type of resource • Cite in APA 	Video Multiple-choice questions on plagiarism and citations	Review & discussion Worksheet
2: Research Process and Accessing Information <ul style="list-style-type: none"> • Developing a research question • Choose a database • Search terms • Searching databases 	PowerPoint tutorial Search exercise	Review & discussion Worksheet
3: Source evaluation <ul style="list-style-type: none"> • Distinguish between different types of resources • Evaluating resources 	Two videos Classify sources Define C.R.A.P. acronym	Review & discussion Worksheet
4: Writing / Annotated Bibliography <ul style="list-style-type: none"> • Read and summarize a source and assess it in relation to your research 	Video Multiple choice questions on paraphrasing	Review & discussion Practice Drop in workshops

Table 2. Overview of library instruction sessions

A detailed description of each instructional session follows:

1. **Citations:** Students were assigned a video on plagiarism, quotations, and citations (Student Success Centre, 2014). The pre-test consisted of four multiple choice questions based on the video. After a quick review and explanation on how to read citations, the in-class exercise gave students references in different citation styles and asked them to re-format them into APA. Citation examples came from the course readings.
2. **Research process and accessing information:** The pre-class activity consisted of a short PowerPoint presentation which showed how to do a search, how to use Boolean AND, and how to read results. The four-question pre-test required students to record search terms, list one database, and list two found items using APA citation. In-class review included the differences between types of resources such as articles, book chapters, and books to help students better understand how to cite sources. The in-class exercise asked students to choose and note the database they used for a specific topic, then search, applying Boolean AND, and applying limits as appropriate. A chart was completed with their initial search terms, followed by refined search terms gleaned from their results. The chart also included items students found and noted how the items linked to full text (from within the database or through the library's link resolver).

3. **Source evaluation:** Two videos on evaluating sources were assigned. The pre-test presented students with three sources and asked them to classify the source as scholarly, popular, or reliable (James Madison University, n.d.); students were also asked to explain the C.R.A.P. acronym (Currency, Reliability, Authority, and Point of view/Purpose) (Bauman, 2013). Based on the pre-test results, in-class review included further explanation of databases and items found therein, as well as a discussion of reliable sources such as government publications, and association or think tank reports. For the activity, students received a handout listing examples, taken from class readings, of scholarly, popular, or reliable materials, with explanations of each. Students then used their own searches to find and classify material types.
4. **Writing an annotated bibliography:** A video on reading for abstracting, annotating, and paraphrasing was assigned (Student Success Centre, 2014). The pre-test involved reading a passage and answering five multiple choice questions to choose the correctly paraphrased sentence. After a review of paraphrasing examples and techniques, students formed small groups and wrote an annotation based on an article they had brought to class.

For each session, one librarian took the lead while the others were responsible for the pre-test and in-class exercise. In this way, the librarians participated in different aspects of each session, which helped divide the workload.

Expanded roles

As mentioned earlier, the role of librarians shifted from being an external resource to being an integral part of the instruction team. A novel feature of this collaboration was the involvement of librarians in assessing student work. Being involved in assessment gave librarians the opportunity to see what students had learned (or failed to learn) from the instruction sessions, as well as provide insights into what skills could use additional review. Unlike in one-shot models, librarians were able to see how students performed using metrics they themselves set.

As with other aspects of the course, the development of assessment instruments was a collaborative process, with librarians, writing support staff, and the instructor working together to create test questions and marking rubrics for consistency. For example, the instruction team worked together to design a summative assessment that tested students' grasp of material presented in the research and writing sessions. Each team member took responsibility for a section, but all contributed to the test's design, questions, and answer key. Furthermore, when it came to marking, the team reviewed answers as a group to ensure grading was fair and consistent across all sections.

Typically, librarians do not get involved in grading student work. This expanded role brought opportunities and challenges. On the one hand, being involved in student assessment allowed librarians to more accurately judge the effectiveness of their instruction sessions. It also

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3 provided team members with valuable experience, experience that can be applied to create
4 better in-class exercises and assessments in future endeavours. On the other hand, the
5 librarians on the team had limited experience designing tests for undergraduate students and
6 had to rely on the instructor to provide guidance on the appropriateness of test questions. Also,
7 as responsibility for grading ultimately rests with faculty, it was important that all test questions
8 be vetted by the instructor. These challenges were very manageable but nevertheless should be
9 noted.
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13 14 15 **Reflections, Student Feedback, and Lessons Learned**

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17 The instruction team frequently shared their thoughts with each other regarding experiences in
18 the course. In an attempt to systematically gather participants' reflections, team members
19 were asked to record their thoughts on the collaboration process and specific elements such as
20 prep time, in-class instruction, grading, etc. This was done after the course was completed. The
21 group as a whole then met to discuss and synthesize these individual reflections. This section
22 reports on the group's reflections and results from a student survey, in order to better
23 understand the value and limitations of the embedded model used in this case study. The
24 section concludes with lessons learned and suggestions for future study.
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28 *Participant reflections*

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30 Five major themes emerged from participants' written reflections: (1) the value of
31 collaboration; (2) the time required for collaboration; (3) the advantages of being embedded in
32 a course; (4) the value of flipped classroom techniques; and (5) the uniqueness of this
33 opportunity.
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37 There was broad consensus on the value of collaboration, with participants stating the true
38 value of this experience was the learning that occurred from each other. Participants learned to
39 be more responsive to students' learning needs and instruction became more student-centred.
40 Participants also learned pedagogical techniques from each other (e.g., scaffolding) and
41 discussed how to best use these techniques. The value of this learning extends beyond this
42 particular course, as each librarian has used scaffolding and other techniques from this course
43 in subsequent library instruction sessions.
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47 The collaboration was time-intensive with each instructor experiencing a different learning
48 curve as each element of collaboration and level of involvement came along. Generally
49 speaking, collaboration means more time is needed to develop the course. The amount of time
50 required varied for each team member. The instructor had less instruction time, but more
51 preparation time, while librarians and the writing support staff required both additional
52 instruction and preparation time. Although some elements can be leveraged from other
53 instruction sessions, there is still preparation time required to ensure student needs are met in
54 an organized manner. As Norelli (2010) notes, "[e]mbedded librarians might spend significant
55 time in the classroom and/or academic department, create course assignments and specific
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3 research guides, conduct research and engage in scholarship with teaching faculty, and have a
4 presence in course management software” (p. 69).

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7 The course demonstrated the value of an embedded librarianship model. By providing more
8 time and repeated opportunities for skills instruction, the embedded approach allowed
9 librarians to more effectively address students’ learning needs. For example, the team used
10 scaffolding and other strategies to design assignments and schedule instruction; this connected
11 research and writing skills directly to course objectives through an iterative teaching approach.
12 Content was also presented in an order that paralleled where students were in terms of their
13 group projects, e.g., searching databases was taught early in the course while writing an
14 annotated bibliography was covered later. In other words, students were provided with skills
15 instruction at the point when they needed for their projects. Integrating skills development
16 with course content allowed students to really “get it.”
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20 Librarians found the pre-tests to be valuable as it allowed them to see where students were
21 struggling and to adjust their instruction sessions accordingly. This sentiment was echoed by
22 students when they were surveyed at the end of the course (see *Student feedback* below). The
23 experience gained with pre-tests and other flipped classroom techniques was seen by librarians
24 as valuable, as it could be used in future classroom interactions.
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27 All agreed this was a unique opportunity. It is unusual for librarians to be invited to help design
28 a course in which research and writing skills are required; more often, librarians are parachuted
29 in with the request that they cover all the research and writing skills students might need in a
30 single session. In addition, the interdisciplinary nature of the course brought together a diverse
31 group of professionals that normally would not work together in such a sustained way. The
32 three librarians each brought a different perspective to the course (science, social science, law),
33 as did the faculty member and writing support specialist. While this collaboration was resource
34 intensive, it allowed for an exchange of perspectives that is unusual in large universities—
35 something that all participants identified as positive.
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40 *Student feedback*

41 At the end of the course, a survey was administered to all students in the class. The survey
42 asked students to assess the value of the instruction sessions and rate their own confidence in
43 applying research and writing skills taught in class. 33 surveys were returned out of a total
44 enrolment of 47 students, resulting in a response rate of 70%. While the survey contained many
45 questions about research and writing skills, two in particular are relevant to this paper: (1) the
46 value of the pre-tests given before each instruction session and (2) the value of the instruction
47 sessions themselves.
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52 The pre-tests were seen as valuable by students. As shown in Figure 2, a majority of students
53 (26/33 = 79%) agreed with the statement “The pre-tests were helpful in preparing for the
54 research skills sessions.” Only 5 students (15%) disagreed with the statement, while 2 (6%)
55 neither agreed nor disagreed. This echoes the sentiment expressed by the team librarians, who
56 saw the pre-tests as being valuable for their instruction sessions. It also suggests the flipped
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classroom techniques employed in this case study were viewed positively by students in the course.

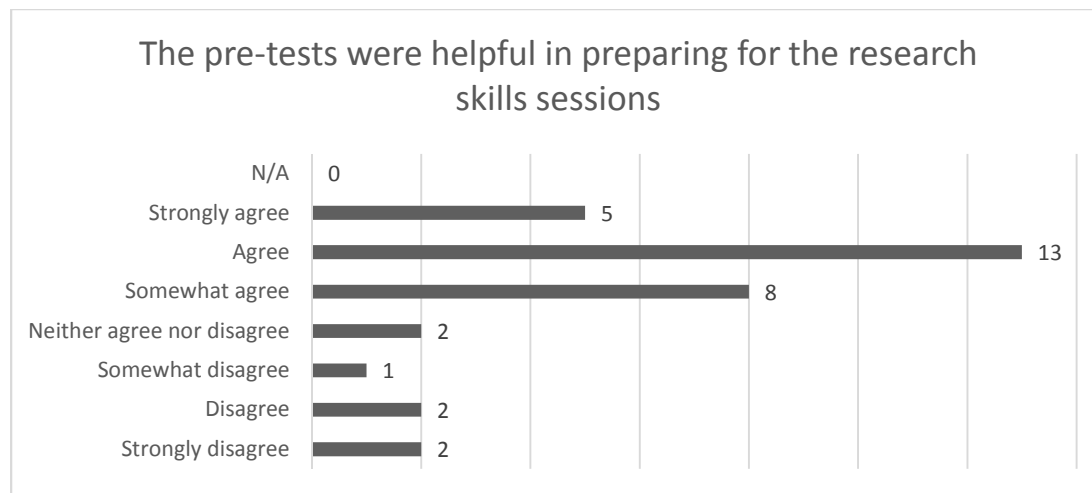


Figure 2. Responses of students on the value of pre-tests

The instruction sessions were also seen as valuable. As shown in Figure 3, a majority of students (28/33 = 85%) agreed with the statement “The research skills sessions prepared me well for the course assignments.” Only 1 student (3%) disagreed with the statement, while 4 students (12%) neither agreed nor disagreed. From the instruction team’s perspective, this is gratifying and suggests linking research skills instruction to specific course assignments increases students’ appreciation for this instruction.

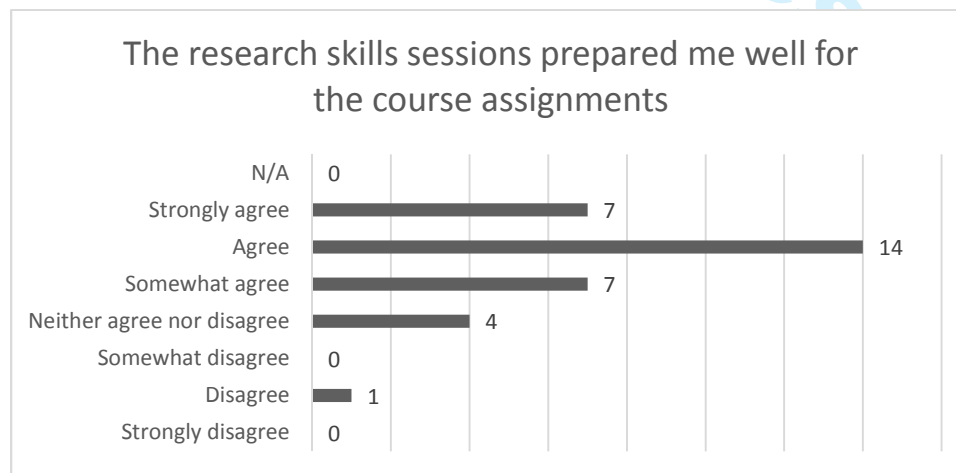


Figure 3. Responses from students on the value of instruction sessions

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3 In addition, students in the survey reported increased confidence in their ability to use research
4 and writing skills taught in class. In fact, students overwhelmingly indicated they were confident
5 in their ability to apply course skills such as finding, evaluating, and citing sources. Note these
6 are students' *perceptions* of their research skills ability, which may or may not correlate with
7 their actual ability. Nevertheless, increased student confidence is a meaningful outcome that
8 often points to real student learning.
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11 *Lessons learned*

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14 The experience of collaboratively designing a course in which research and writing instruction
15 was thoroughly embedded resulted in a number of pedagogical and practical lessons. On the
16 pedagogical side, librarians learned how to apply flipped classroom techniques to library skills
17 instruction. They also saw first-hand how hands-on learning and repeated interactions with
18 students reinforce skills development. On the practical side, librarians learned how to design
19 effective online content, pre-tests, and in-class activities. They also gained experience in using
20 the university's learning management system and collaborating effectively to support
21 interdisciplinary teaching.
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26 Overall, the instruction team saw the value of the embedded librarian model as:

- 27 • Being able to build on earlier content/learning in the course;
- 28 • Being able to better tailor library instruction to course objectives and assignments;
- 29 • The opportunity to do research;
- 30 • The opportunity to expand beyond role of "reference librarian" and develop more
31 meaningful partnerships with faculty;
- 32 • The ability to experiment with different teaching methods and approaches, particularly
33 in an interdisciplinary context.
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38 Requiring students to be more responsible for their learning has its rewards and challenges. It
39 requires continuous adjustments to instruction throughout the course. While the balance
40 between pre-class activities and in-class content was not always perfect, the instruction team
41 learned to adjust as they went along. The instructors also learned to pace the teaching of
42 content to align with student needs. Each librarian has applied lessons learned from this case
43 study to the development of other instructional content and activities. These pedagogical
44 materials are appropriate for one-shot instruction sessions as well as multiple interactions in a
45 course.
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49 While the ultimate impact of the embedded librarianship model on students is difficult to
50 measure, the survey data and reflections from the teaching team suggest this model had a
51 positive effect. From the librarians' perspective, this model allowed for better instruction, an
52 expanded role, and more opportunities to interact with students. From the instructor's
53 perspective, the approach provided students with more hands-on research and writing skills
54 instruction, which in turn increased their confidence when taking on independent research.
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3 From students' perspectives, the instruction sessions were seen as largely positive and helpful
4 for the specific content and assignments of this course.
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7 Moving forward, a number of possible topics for further study have been identified. First, a
8 follow-up survey/longitudinal study of students from this class could provide insights into the
9 long-term impact of embedding research and writing skills instruction in first-year university
10 courses. In the survey results, some of the most positive feedback came from third- and fourth-
11 year students who wrote they valued the skills taught and wished they had been offered a
12 similar course in their first year. It is possible the value of research skills instruction will become
13 more apparent to students as they progress through their studies. A longitudinal study would
14 help test this hypothesis.
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18 Second, there is little research on partnerships between librarians and other support services,
19 such as writing specialists or mental health initiatives (Schmehl Hines, 2016). More research on
20 the value of partnering librarians with university services to support student success is needed.
21 Would an integrated approach lead to better learning and/or student well-being?
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25 Third, more research on the use of flipped classroom methods in information literacy
26 instruction would be welcome. In this case study, the instruction team felt the flipped
27 classroom approach employed was useful, but there should be more systematic studies of its
28 use in library instruction. Finally, assessing embedded initiatives are often difficult to do
29 because practical tools or best practices are not readily available to library-focused programs of
30 this nature. Developing such assessment tools and/or best practices checklists could be an area
31 for future study.
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36 **Conclusion**

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38 This case study illustrates the progressive, collaborative development of an interdisciplinary
39 course in which students are taught research and writing skills. Collaborative development of a
40 skills and content-rich course benefits both students and learning partners. Students benefit
41 from the opportunity to apply their skills, while the instruction team can work together to
42 achieve integrated learning outcomes. Ultimately, the instruction team and students all benefit
43 by further developing their knowledge and skills. For example, librarians paid more attention to
44 how students' learning needs changed over time and adapted their instruction accordingly. This
45 improved students' confidence in applying the skills they had been taught. In addition to a mild
46 improvement in grades from one year to the next, students in this case study reported they
47 were better prepared for course assignments and more confident in applying the research and
48 writing skills taught in class.
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54 The embedded approach in this course had a positive impact. Students reported appreciation
55 for the skills instruction throughout the course. Equally important, the instruction team
56 reported satisfaction with their experience in the process. The most important lesson for team
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members was that of inclusiveness: participant's learned to appreciate each other's expertise and integrate the best of what each had to offer into the course.

The instruction team members can apply the lessons learned to future instruction sessions. Realistically, being able to redevelop this course was a rare opportunity. It is not often that there is time to think, work with others, re-work, and experiment over a long period of time. It is clear, however, that when the opportunity does arise, consideration should be given to who can add to the team of learning experts to make for a better student learning experience. The "reality of student work" (Elmborg, 2005) is that students require many facets of learning at the same time. They are expected to learn content and, at the same time, demonstrate what they have learned through their research and writing. An embedded librarianship model can support student learning by providing librarians with the space to observe and adjust to students' needs as they evolve over time. While this case study does not necessarily achieve Owusu-Ansah's (2004a) "optimal" information literacy program, it is a positive step forward that goes beyond the one-shot model, integrating librarians and other learning specialists into course design to more effectively meet students' learning needs.

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