

CO-TEACHING AS MENTORS: MAXIMIZING INSTRUCTOR AND LIBRARIAN COLLABORATION FOR TEACHING INFORMATION LITERACY SKILLS

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This article describes a co-teaching collaboration between an instructor and an academic librarian, working together to deliver an innovative, inquiry-based course offered to first- and second-year university students. The authors describe the context for this relationship and the methods that were used to ensure that this collaboration intentionally and purposefully met the course objectives and students' needs. The interaction between the instructor and librarian could best be described as a co-teaching mentorship in which both were responsible for teaching and working with the students as well as reflecting on the learning benefits that this opportunity provided for students as well as for each other.

Scholarship of Teaching and Learning (SoTL) literature explores best practices that impact and improve student learning. One of these practices involves academic librarians working with instructors to teach specific content to students.

Traditionally, co-teaching collaborations have involved two instructors working together in the same physical space with shared responsibility for the design, delivery, and assessment of instruction (Cordie & Lin, 2020). Friend and Bersuck (2009) identified six types of co-teaching arrangements - one teaches while the other observes; station teaching or the teaching of specific content to different groups of students; parallel teaching of the same content to half the class; alternating teaching where one teaches a large group and the other works with a small group of students; team teaching where both present different perspectives of the content to the entire class; and assistive teaching where one teaches and the other assists. A combination of co-teaching methods was used in this collaboration.

Due to the complexity of the co-teaching relationship, there is a need for intentionality and purposefulness (Clancy et al., 2015). Laughlin et al. (2011) outline the necessity for thoughtful preparation and planning, clear definition of roles, selection of appropriate teaching strategies, and reflection on challenges or successes. Both professional and pedagogical benefits can result from such partnerships (Ferguson & Wilson, 2011), enabling co-teachers to discuss ideas, perspectives, and approaches and reflect on these as co-learners and peer mentors (Morelock et al., 2017).

Peer mentoring can be considered “two or more people, often similar in experience or rank, interacting as equal mentoring partners to achieve mutually determined goals” (Nowell et al., 2017, cited in Barrette-Ng et al., 2019, p. 17). Like co-teaching, peer mentors operate in a relationship that is based on equanimity and reciprocity, trust, respect, and the knowledge, ideas, and reflections that each brings to their discussion and interactions (Goosney et al., 2014).

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Cordie and Lin (2020) claim that the process of planning and engaging in ongoing dialogue, negotiating teaching roles and learning objectives, taking advantage of each other's expertise, actively and equally participating in the course, and incorporating self and collaborative reflection, can result in new synergistic ways of thinking, teaching, and learning. According to these authors, co-teaching as mentoring can help promote student learning and academic success in higher education. Co-teaching also promotes "rich opportunities for ... learning and growth as teacher-scholars" (Monson & Kenyon, 2018, p. 47).

While most co-teaching models at the postsecondary level have been based on academic instructors working with their colleagues, there is a growing trend towards faculty working with embedded librarians. Embedded librarianship involves having academic librarians interact with students and instructors, whether physically or technologically (Drewes & Hoffman, 2010). McClurg et al. (2019) propose four models of librarian engagement in the scholarship of teaching and learning: librarian as consultant, developer, partner, or scholar. With regards to pedagogic strategies, Shumaker and Talley (2009) describe various ways that librarians can support teaching and learning from delivering one-shot lectures, creating online teaching resources, to being in the classroom as a co-teacher and facilitator. In this collaboration, the librarian was considered an equal co-teaching partner.

According to Hoffman et al. (2017), any role librarians can play in teaching and scaffolding research skills has valuable learning benefits for students. While even one-off sessions are valuable for students (Masuchika & Boldt, 2012), others have shown that having librarians in the classrooms on an ongoing basis was more successful at promoting student learning (Murphy et al., 2020). Similarly, Bausman et al. (2014) found that faculty appreciated the collaborative support that academic librarians provided particularly when librarians were directly involved with students.

Courses that are designed around inquiry-based strategies for teaching and learning lend themselves particularly well to co-teaching opportunities. Inquiry-based learning is the systematic focus on and investigation into a problem, issue, topic, or idea (Friesen et al., 2015). Using a disciplinary or interdisciplinary approach, inquiry-based learning invites students to engage deeply with the knowledge and skills that real world professionals utilize in their practice. "People learn best when trying to do things that are challenging and of deep interest to them." (Jacobsen et al., 2013, p. 1). As such, inquiry-based courses provide ideal co-teaching opportunities for librarians and instructors to build students' foundational skills in information literacy (Murphy et al., 2020).

Information literacy (IL) is defined by the Framework for Information Literacy for Higher Education (American Library Association, 2015) as "a set of integrated abilities encompassing the reflective discovery of information, the understanding of how information is produced and valued, and the use of information in creating new knowledge and participating ethically in communities of learning" (p. 1). To become critical self-reflective consumers and creators of information, students are expected to acquire an overarching set of metacognitive abilities or meta-literacies. Some scholars have suggested that this "ability to think critically about information and research" may lead to higher completion rates among university students (Bolton et al., 2009, p. 21).

Although students have easy access to information, particularly via the Internet and social media, they often don't have the skills to search out and evaluate the most credible sources that will support their studies as well as their everyday decision-making (OECD, 2018; Bolton et al., 2009; Murphy et al., 2020). Awareness of and competence in critical research and IL skills must

be taught. However, these competencies are not being taught in a systematic manner at the postsecondary level, possibly due to the fact that some faculty lack the expertise or confidence to teach them (Hoffman et al., 2017).

On the other hand, academic librarians do have expertise in the critical research and information literacy skills that are necessary for students to succeed in this ‘Information Age’ (Spitzer et al., 1998; Bolton, et al., 2009). With the support of a librarian, students are able to assess their own strengths and weaknesses around information use (Murphy et al., 2020) and tackle concepts such as bias and credibility within sources, plagiarism, and ownership of ideas.

The Context

In an introductory university course, first and second year students were invited to engage in inquiry-based learning to explore solutions to a complex, socially relevant problem using knowledge, evidence, and methods from multiple disciplines. Five sections of the course were offered to approximately 120 students.

In this iteration of the course, an embedded librarian model was used. Two librarians worked with four instructors in various configurations and a third librarian taught the fifth section. The learning outcomes for the course were presented in five learning bundles centered on the following themes: *Foundational Knowledge of the Global Challenge, Knowledge Dissemination, Reflection, Collaboration, and Research*.

In the course section that is the focus of this article, the instructor asked the embedded librarian to help students accomplish the learning outcomes in the research-learning bundle, with particular emphasis on evaluating research-informed evidence stemming from both peer-reviewed and popular sources. To demonstrate their learning, students were asked to complete reading summaries from an assigned text, design an infographic around a research question, issue or gap in the field of study, engage in a collaborative research project with a group of their peers, and complete a series of three critical individually written reflections and one peer evaluation. As a final overview assignment, students were asked to collaboratively research and present a targeted proposal to tackle the overall topic in an evidence-based way.

The Co-Teaching Mentorship

Academic librarians were invited to work with the instructors in four of the five sections of the course while a librarian taught the fifth section on their own. Instructor/ librarian dyads were given considerable freedom on how to deliver the course. The instructor and librarian for this course section met prior to the beginning of the course to participate in and discuss the following aspects of the course.

Orientation to the Course

Both instructor and librarian were involved in a daylong orientation to the course. Given that the librarian had been involved in an earlier version of the course and it was the first time for the instructor to teach the course, it was important for the instructor to hear the librarian’s perspective on how the current version of the course had evolved and some of the challenges/successes with the previous course. This orientation provided the instructor with the background context for the development of the current course and a foundational knowledge on which to plan course delivery.

Area of Expertise and Disciplinary Knowledge

Having taught several inquiry-based and design-thinking courses previously and having a science background, the instructor was comfortable with the content in the course and the pedagogical strategies needed to promote student engagement. The instructor and librarian agreed that the librarian was the expert in information literacy and therefore would focus on the knowledge and skill sets required of students within the research bundle.

Definition of Roles and Responsibilities

Although the course was designed to involve embedded librarians, the instructors were responsible for the overall delivery of the course content as well as the assessment of students' work. In this collaboration, the instructor and librarian agreed that the librarian would be involved in several instructional sessions so that students would feel confident to approach and ask the librarian for support. As such, the librarian was considered a co-teacher, mentor, and partner (McClurg et al., 2019) with regard to instructing and facilitating student learning.

Time Commitment, Frequency of Meetings and Frequency of Attendance

Librarians in this academic setting have a busy workload in which they deliver services to an assigned group of faculties and/or departments. The role of embedded librarian was an additional responsibility. In light of this, it was important to determine how much time the librarian could devote to the class and their frequency of attendance.

The academic librarian in this course section agreed to do four lectures on information literacy knowledge and competencies, and attend a full class nine times over the duration of twelve weeks. In addition, the instructor and librarian agreed to meet bi-monthly to plan, reflect on their progress, and adjust any content or teaching strategies as needed.

Focus on Learning Objectives

The instructor and librarian involved in this collaboration agreed that competency in critical information literacy should be an integral part of all introductory postsecondary courses. With expertise in this area, the librarian agreed to teach these sessions.

The sessions on research and information literacy skill development included: introduction to the library catalogue; deriving appropriate key words for searching; searching relevant databases; locating, evaluating, and retrieving relevant research information; differentiating between library sources and popular sources; and learning how to properly attribute sources using an approved citation style.

Other skills sets that the co-instructors emphasized were: developing research questions and methods; learning how to read, analyze, synthesize, and annotate scholarly articles; public speaking; infographic and poster design; and giving and receiving constructive feedback. All these skills sets are vitally important in an inquiry-based learning course where research and critical thinking skills are being nurtured.

Pedagogical Strategies and Teaching Styles

Since both the librarian and instructor were familiar with inquiry-based learning strategies, they discussed and agreed upon the methods they would use to engage students. They both had similar teaching philosophies and approaches to student learning, espousing to experiential, constructivist, and student-centered learning.

Authenticity of the Tasks

An important aspect of inquiry-based courses is for students to engage in active, authentic tasks that clearly replicate what experts might do in their discipline or field. Wishkoski et al. (2019) reiterated this notion of “create[ing] student learning opportunities that reflect what actual practitioners in a field or discipline do, encompassing both research processes and products” (p. 108). In this course, students were exposed to authentic learning activities such as discussions, question and answer with guest research scientists, hands-on experiments, structured controversy, brainstorming/design thinking activities, in-depth research and source evaluation tasks, developing research projects based on evidence-based scientific processes, and written reflections

Assessment of Studies on Information Literacy Knowledge and Skills

The instructor held the overall responsibility for assessing students’ knowledge and skill levels based on defined course rubrics. Nevertheless, after instructing students on information literacy skills, the librarian provided opportunities to practice these skills in class and was able to give formative feedback to the students during this time. Also, getting students to reflect on how they benefited from the co-teaching and embedded librarianship helped students apply what they had learned about information literacy in their course assignments and projects.

Participation in an Embedded Librarian Study

The librarians involved in the course conducted a study on the effectiveness of the embedded librarian model. They assessed a majority of the students’ reflection assignments to determine how librarian interactions with students had impacted their learning. The instructor in this collaboration agreed to participate in this study to gauge the effectiveness of this specific co-teaching partnership (Stoeckle et al., 2022).

Results from Participation in the Embedded Librarian Study

The participating librarians saw an opportunity to study their impact across a variety of involvement levels. The study received ethics approval from the sponsoring university, and one of the librarians who was not involved in any instruction, joined the classes to introduce and obtain consent from students and instructors. As part of their coursework, students completed three reflection assignments through the course, at Weeks 2, 7, and 11. Instructors and students who consented to participating in the study allowed their reflection assignments to be text analyzed to assess information literacy skill development across a variety of levels of librarian involvement (Stoeckle et al., 2022). The types of librarian involvement included: a single librarian session, two levels of embedded librarian co-instructing, and a librarian as instructor of record.

The results of the study revealed that the most impactful collaboration between librarian and instructor for developing information literacy skills occurred in the course section described in this article (see Instructor 1 in Tables 1 and 2), in which the instructor and librarian acted as co-teaching mentors, each contributing and supporting common learning objectives. Table 1 presents an overview of the study results. Twelve keywords were chosen (expert, reliable, research, information, source, bias, plagiarism, cite, citation, librarian, library, resource) and searched for using text analysis in the NVivo software program. The frequency results below are

across all reflection assignments, indicating that the co-teaching partnership between the instructor and embedded librarian in this course section resulted in the highest number of keywords appearing in student reflections on what they had learned (Stoeckle et al., 2022).

Table 1

Information literacy keyword frequency across 4 course sections based on librarian involvement.

**Instructor 1 represents the course section highlighted in this article.*

	Instructor 1*	Instructor 2	Instructor 3	Librarian
Keyword Frequency	364	243	184	192

Table 2 provides an overview of the level of librarian involvement in each course section.

Table 2

Varying levels of librarian involvement across 4 sections of the inquiry-based learning course.

**Instructor 1 represents the course section highlighted in this article.*

	Instructor 1*	Instructor 2	Instructor 3	Librarian
Librarian Involvement in Course Section	Librarian met with instructor prior, during, and following course. Librarian attended class nine times. Librarian and instructor co-taught information literacy concepts.	Librarian met with instructor prior and during course. Librarian attended class eight times. Librarian taught information literacy concepts.	Librarian gave one-hour presentation on information literacy concepts to class.	Librarian taught all but one class through the semester.

These study results suggest that the most impactful collaboration for developing student critical information literacy skills is one in which the instructor and librarian work together to better understand each others' perspectives with regard to course learning objectives and support these through a co-teaching mentorship. Inviting librarians to contribute to course design or development, or as an information literacy consultant, and having them participate in course delivery can foster optimal student learning results as well as promote professional development.

Perhaps the most exciting result of the collaboration was observing and realizing the benefits to student learning that co-teaching appeared to invoke. As time progressed, students

showed greater understanding and engagement with critical information literacy skills such as seeking out quality information sources, determining what is quality evidence, finding the bias in sources, knowing when to acknowledge sources, and using appropriate citation/reference strategies. In addition, they learned new digital literacy and design skills.

Discussion

The authors believe their co-teaching relationship was successful due to the priority they placed on ongoing communication and planning before, during, and after the course delivery. As Lock et al. (2016) submit, dialogue and feedback are required for not only improving the student experience but for the professional development of the co-instructors. Openness to each other's ideas was integral for building a trusting relationship.

While it might seem logical that having more than one person teach in the classroom would reduce the workload for each participant, it does not (Plank, 2010). Planning time is critically important in co-teaching. In this partnership, the instructor and librarian spent considerable time meeting and reflecting on what was working or needed emphasis. Prior to the beginning of the course, the instructor and librarian talked about common learning goals, who was going to teach what, the amount of time the librarian was going to spend in class, and what their respective roles in the classroom would be during the co-teaching sessions.

Recognizing the strengths of each partner solidified the co-teaching partnership. In this collaboration, the instructor and librarian decided to teach to their areas of expertise. This helped to showcase their knowledge, plan content delivery, and maximize student-instructor interactions. They also provided complementary instruction and reinforced what the other person had taught in subsequent classes. During the co-teaching sessions, the person not teaching would ask questions, model good learning behaviour, participate in discussions, and work with students. "The diversity of knowledge and experience that each instructor brings to the class adds to the richness of the learning experience for the students" (Lock et al., 2016, p. 30).

In this case, the librarian provided students with interactive IL problems to solve during which formative feedback was offered. As well, the librarian was encouraged to work directly with students, both individually and in groups, to ensure that students understood the material that had been presented.

Another important component of this collaboration was reflection, i.e., assessing instructional practice and its impact on students as well as on teaching practice. Towards that end, the instructor and librarian devoted part of their planning conversations to discussing what worked in past sessions, and what more could be done to improve students' understanding and mastery of the course learning outcomes. Reflection reinforces the idea of co-teaching as both an instructional and learning process (Goosney et al., 2014). While these discussions were beneficial, one way to improve them would be to systematically schedule a time for reflection and devise a set of questions to ask and guide these conversations. Samples of reflections are below.

Because I hadn't taught the course before, I was so grateful to have the librarian's support as a knowledgeable expert and teacher in the field of information literacy. The fact that we both felt strongly about providing students' with 21st century competencies that would help them become better scholars reinforced our partnership. I even learned some new things about IL like the *CRAP Test* (Beestrum & Orenic, 2008), for evaluating websites, that I will use in

future classes. Also, getting feedback from the librarian about my pedagogical strategies was invaluable for strengthening my practice. (Instructor, Post course reflection)

As an academic librarian, creating collaborations with instructors and faculty is one of the most rewarding aspects of our work, in that it provides a platform where we can engage with and support students in their coursework. One of the most impactful aspects of this collaboration was the instructor's interest in and support for developing student information literacy skills. As librarians we sometimes only present to a class once and often wonder how impactful the content has been, so being able to spend more time through the course with students to see their progress was invaluable. It was clear in our study data that having a supportive and engaged instructor as co-teaching partner made a significant impact in student information literacy skill development, a skill that has become even more essential in today's world of overwhelming amounts of both good-quality and poor-quality information. (Librarian, Post course reflection)

In regards to the students' work and reflections, many of them commented on the valuable research and information literacy skills they had learned and were transferring to their other courses. They also spoke about their increased confidence in finding, evaluating, and citing information sources. Increased interaction between the student and co-instructors provided multiple opportunities for discussion, question and answer, and formative feedback. Having an embedded librarian in the classroom to engage with students on a regular basis helped to build and reinforce their research and IL skills. Upon reflection, the instructor and librarian concluded that to make these co-teaching partnerships more equitable, it would be ideal for the embedded librarians to be involved in more aspects of course design, delivery, and assessment.

Given that this was a specific instance of co-teaching in a course that welcomed such collaboration, the results cannot be generalized to other co-teaching scenarios or postsecondary contexts. Each postsecondary setting or course has its own unique characteristics that impinge on and impact students' learning outcomes. Even within this context, variations in librarian involvement appeared to influence students' mastery of IL competencies. To draw more definitive conclusions about how this co-teaching arrangement impacted students' understanding and long-term use of information literacy skills, the study would need to be repeated and analyzed further.

Conclusion

The key aspect for a successful co-teaching experience between an instructor and academic librarian in this case was the desire to work together to improve student learning. In addition, the instructor and librarian took the time to communicate, plan, prepare, and deliver the course and learn from each other. Having a similar philosophy around inquiry-based learning and information literacy were also driving forces in the success of this particular co-teaching mentorship, which was based on mutual respect, trust, and a shared focus on helping students gain the knowledge and skills needed to succeed in their studies and careers.

Time, competing responsibilities, and sustainability are challenges in implementing a program where librarians and faculty work together to build students' knowledge of 21st century competencies. Academic librarians are often open to collaborating with faculty and can play a key role in supporting them to better understand their students' information needs and learning potentials. As Wishkoski et al., 2019 espouse, "Shifting faculty perceptions to view librarians as interlocutors and collaborators is a key step in developing sustainable information literacy interventions and partnerships" (p. 117). Based on this one-time experience, the authors have become strong advocates for instructor/librarian collaboration and mentorship in the pursuit of excellence in teaching and learning.

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