Information Literacy Instruction Programs: Supporting the College of Agriculture and Life Sciences Community at Virginia Tech

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Abstract

When developing instructional programs related to information literacy at a university, a logical audience to focus on is undergraduates. However, information literacy spans far beyond the traditional ability to find, access, evaluate, use, and properly cite information. It also encompasses the ability to evaluate the impact of scholarship, determine appropriate data-management practices, understand author rights, promote ethical use of scholarship, and maintain an awareness of changes in scholarly communication. Between 2010 and 2016 librarians at Virginia Tech have focused on developing programs to strengthen several of these information literacy skills across the continuum of students, faculty, and extension agents in the College of Agriculture and Life Sciences (CALS). Starting with undergraduates, traditional information literacy skills were incorporated into the two CALS First-Year Experience programs. A scientific writing workshop and online information literacy course were designed for CALS graduate students. Extension agents and faculty were introduced to both traditional and more advanced applications to explore how changes in the information landscape impacts their work. This paper will discuss how these librarians have partnered to create and promote these information literacy initiatives.

Introduction

Developing information literacy programs for specific university programs requires a great deal of planning, partnering, and flexibility. Considerations include the size of the campus, the staffing available, and the ability to develop programmatic outcomes that address the needs of the depart-

ment, college, and university. Librarians typically serve as college, department, or subject liaisons to deliver instruction services related to information literacy; this model has been effective in universities across the country for the past fifty years (Miller & Pressley, 2015).

Virginia Tech is a public, land-grant, research university comprised of over 25,000 undergraduate, 4,700 graduate students, 1,400 tenured teaching faculty, 4,500 administrative/professional faculty, and 3,400 staff members (Virginia Tech, 2015a, 2016). Additionally, the university plans to grow by 5,000 undergraduate and 1,000 graduate students by 2022 (Sands, 2014; "Board of Visitors," 2015). The College of Agriculture and Life Sciences (CALS) is comprised of twelve departments that provide one associate's degree, thirteen undergraduate majors, and eighteen undergraduate minors (Virginia Tech, 2015b). In addition to serving over 2,700 undergraduate students, the college enrolls over 400 graduate students in master's and doctoral programs across the twelve departments. There are 470 faculty, 480 staff, and 223 extension agents; approximately 600 of these employees are located across the eleven Agricultural Research and Extension Centers (ARECs) and 107 unit extension offices located throughout the state (M. Christian, personal communication, January 19, 2016).

Librarians serving in subject liaison roles provide a number of core library services to support the research and instructional needs of faculty, students, and staff in each assigned academic department. One of the fundamental responsibilities of the CALS librarians includes providing traditional information literacy sessions, which at Virginia Tech are also referred to as "inquiry skills." The skills encompassed at Virginia Tech by these two interchangeable terms include developing effective search strategies, accessing sources through proprietary and open source databases, evaluating the quality of information, and citing sources properly.

Providing information literacy training that targets the specific needs for the wide variety of members across the CALS community has been a focus of the CALS librarians for a number of years. Undergraduates in the CALS programs are expected to be able to parse through controversial topics to utilize the sources that best address their work in a variety of agricultural settings. Graduate students and faculty conduct in-depth studies on campus, in the field, or at one of the AREC stations to further advance the scientific knowledge of food and production systems. Extension agents translate the scientific findings to practitioners to promote effective changes in practice. While the information skills required to conduct each of these aspects are different, each CALS community member is expected to have mastered inquiry skills in order to perform his or her work in an efficient and effective manner. However, there was a gap in determining where these skills were initially obtained, as well as defining opportunities to further develop specific inquiry-related skills.

The ability to create, implement, and maintain inquiry and information literacy initiatives to support the academic needs of each department, as well as the college as a whole, was not without significant challenges. As student groups were the predominant audience that librarians were asked to provide instruction for, a logical starting point for an analysis was defined. Upon examination, it became clear that while many of the one-shot classes supported the instructional needs of the course, from the students' standpoint these sessions created a hodge-podge of learning experiences, with no systematic approach throughout a degree program. Furthermore, in reviewing the assessment strategies of the instruction program as a whole, the librarians discovered that the majority of the instructional services were focused on the development of inquiry skill sets for students; very few opportunities existed for faculty, staff, or extension agents. It also became evident that there was very little knowledge as to what information skills would be of most benefit to those constituents.

Librarians focused on developing partnerships with faculty that requested one-shot sessions to explore options into providing additional instructional services. Over time, librarians became embedded in the planning, assessment, and delivery processes of the courses that morphed into multitiered instruction sessions. Through discussions with faculty, the CALS librarians realized that many of the information skills designed to augment coursework for students were equally useful to course instructors. In other conversations, extension agents articulated a need for developing more effective inquiry skill sets. Additionally, with new trends and challenges emerging across the scholarly communication landscape, the CALS librarians recognized the potential for incorporating specialized information skill sets that pertained directly to the research and publication dissemination of faculty and extension agents. With a need defined, the CALS librarians developed inquiry skills–based workshops addressing author rights, open access, scholarly impact, and data-management practices, providing an avenue to develop additional information literacy skills for these community members.

Using the Virginia Tech CALS community as a case study, this paper discusses how the programmatic outcomes were developed to support, advance, and enhance the information literacy skills across the spectrum of learners within the community, including undergraduate and graduate students, extension agents, and faculty.

UNDERGRADUATE STUDENTS

Utilizing librarians to teach class sessions that promote the development of information literacy skills at the undergraduate level is common practice throughout college and university campuses and is well-documented in the literature. Librarian-led classes range from one-shot sessions where librarians serve as guest speakers to provide instructional content, to full, embedded partnerships in which librarians are involved in the develop-

ment of the course, learning outcomes, and assignments or final projects (Fain, 2011; Kessinger, 2013; Wang, 2011). Regardless of the institution, common information literacy skills are taught at the undergraduate level. These skills incorporate similar learning objectives, including refining topics of interest, building effective search statements, selecting appropriate databases to search, accessing resources using specific library tools (for example, "Get VText," Virginia Tech's article-linking service), applying evaluation criteria to selected sources, and properly citing sources using a particular citation style. Each of these information skills relate to the Association of Colleges and Research Libraries (ACRL) protocols, including the former "Information Literacy Competency Standards for Higher Education" and the current "Framework for Information Literacy for Higher Education" guidelines (ACRL, 2000, 2015).

The majority of the librarian-led sessions for undergraduates taking classes in CALS were conducted by request of the course instructor. Many of these information skills sessions were structured to develop students' awareness and skills related to finding, accessing, and citing information sources for their particular assignments and projects. While the CALS librarian–led sessions had always been developed to complement course objectives, the librarians often had difficulty ascertaining which students had attended a librarian-led session in another class, what inquiry skills were addressed in those sessions, and which students had never attended a librarian-led session prior to the current encounter. With these issues in mind, in 2011 the CALS librarians collaborated to develop a programmatic set of learning objectives and proficiencies for each undergraduate course level (1000, 2000, 3000, and 4000) as part of a new initiative within the University Libraries to pilot a curriculum-mapping project across a variety of disciplines.

To start this project the CALS librarians examined a scaffolded information literacy curriculum already established within the department of Human Nutrition Foods and Exercise (HNFE). This series of librarian-led instruction sessions was developed over a decade ago and continued to be successful with an evolving set of information literacy skills for students as they progressed through their degree program (see appendix A). In order to achieve this goal, specific courses were targeted so that information literacy outcomes could be blended with the course objectives in a systematic approach. Using this HNFE curriculum mapping as a model, the CALS librarians outlined an initiative to identify relevant courses in each of their departments in which similar inquiry instruction could be offered, creating a progressive series of information literacy development.

First Year Experience Program
As the curriculum mapping project was about to begin in 2011, the university's First Year Experience (FYE) program was just entering its second year. While FYE programs at different institutions vary, the foci of Virginia

Tech's FYE programs were designed to improve students' proficiencies in exploring the preprofessional and academic requirements of their majors. A course offered through the FYE program had to incorporate three specific areas: inquiry, problem solving, and integration. The inclusion of librarians as a required collaborative partner in every FYE program gave the CALS librarians an easy point of entry into the course curriculum. However, even with this mandated access, the librarians still had to address some significant challenges.

Since their inception the CALS FYE courses have been evolving. Biochemistry was the first CALS department to offer an FYE course in 2010, but it was limited to students majoring in biochemistry. In 2011, the second year of campus-wide FYE implementation, six of the ten CALS departments joined together to create a college-wide Agriculture and Life Sciences (ALS) FYE course; two more departments joined this group in 2015. However, in 2013 the Animal and Poultry Sciences (APSC) department withdrew from the college-wide course and created its own FYE course, establishing three distinct CALS FYE programs. This created the first challenge for librarians: developing and modifying content to best fit the needs of each individual course with unique projects and objectives, while also addressing the FYE programmatic learning outcomes of the inquiry component. The second challenge related to the curriculum-mapping project: determining how the introductory skills common across the CALS FYE courses could be built on at the 2000-level course and above. This was complicated by different levels of librarian involvement in the three FYE programs. Additionally, not all departments require an FYE course as part of the degree program. Therefore the third challenge addressed the potential of a greater divide in skill development at junior- and senior-level courses among students that had taken an FYE course and those that had not. Two of the CALS FYE programs will be used in this paper to illustrate how the above challenges were addressed.

Agriculture and Life Sciences FYE Course
During the inaugural college-level ALS course, librarians were asked to present five information skills that students would need to complete their course project in one thirty-minute segment. These skills included

- developing a topic;
- selecting databases to search;
- building search strategies;
- evaluating information; and
- citing sources.

Not surprisingly thirty minutes was not enough time to develop any proficiency of those skills. In 2012 librarians became more embedded in the course, attended the course planning meetings, and received three fifty-

minute sessions to cover the same five information literacy skills. The course project was revised to make stronger connections between the agricultural components and the relevancy of information skills. However, even with the extra time allocated, librarians found that they were discussing the inquiry skills in a lecture format rather than providing opportunities to work on developing skills in an effective manner. During the third year of the ALS course, the CALS librarians tried a new pedagogical method (see appendix B). By incorporating a flipped classroom approach, students were asked to complete an online module prior to each librarian-led session. Then each fifty-minute class session incorporated more discussions by students and exercises designed to support and enhance the shortened lecture content. The active-based learning exercises were designed so that they could be conducted in small groups, led by student peer leaders, with librarians roaming the classroom to answer specific questions posed by the groups. An unexpected benefit to this approach was that students found the librarians more accessible and approachable compared to when they were standing in front of the classroom delivering content.

The inquiry component of the university-wide FYE program requires students to complete pre- and posttest assessments. During the first two years of the ALS course, students demonstrated growth of 11 and 12 percent of skills, respectively, from the lecture-based content delivery methods. With the flipped classroom and active-based learning pedagogies, students' scores for the next three years showed growth of 18 percent consistently over their pretest scores. The improvements in their test scores, along with responses in the qualitative reflections that students are required to submit regarding their inquiry skill development, have indicated that students enrolled in the ALS FYE course gained significant growth in their information literacy skills.

One other aspect of the ALS FYE course is that upon completion, students can apply to become peer leaders for the ALS FYE course offered the following year. However, over the past three years, faculty and librarians discovered that while the test scores indicated an increase in aptitude, a significant number of peer leaders demonstrated weaknesses in their own inquiry skills by providing inaccurate information to the ALS FYE students, primarily with instructions on how to cite sources using a prescribed format and identifying credible information sources. To resolve this issue, in 2015 the CALS librarians partnered with the peer-leader class instructor to offer a workshop and provide feedback on a graded assignment to ensure that all the peer leaders had similar information literacy skills and correct information before they assisted others in the ALS FYE class. An unexpected benefit was that peer leaders became more confident in seeking additional assistance from the CALS librarians for other research and course projects.

With these successes, however, concerns emerged about the potential

for an increased gap between students who received sufficient experience developing their inquiry skills compared to those who had not. As noted above, while there are exceptions, the incorporation of active-based learning pedagogies proved to be successful in developing inquiry skills for CALS students. Additionally, while students are expected to demonstrate growth of baseline information literacy proficiencies as they progress through each level of their academic careers, faculty recognize that opportunities to improve these skills are often limited by insufficient exposure and time in the higher course levels. Based on the variety of student proficiencies in a given class, the CALS librarians have discovered that flexibility also plays an important role in determining which inquiry skills are introduced and which further developed. Using the success of active-based instruction, one example of how CALS librarians have addressed the widening skills-gap challenge has been by including small-group activities in other one-shot classes at the 2000 level and above. In these sessions CALS librarians have been able to exploit the variety of research experiences and inquiry skills to their benefit by having students work together to accomplish a particular task during the class lesson. Students with stronger inquiry skills are able to assist those with less developed skills, giving both students a solidification of skills at varying levels. By providing these types of learning opportunities, the CALS librarians continue to cultivate, enhance, strengthen, and support further development of inquiry skills.

In an ideal environment, librarians would be able to map each student's course work to the information literacy skill sets needed in a progressive manner for each department and degree offered. Currently, several variables prevent this type of analysis at the college level; however, this type of mapping is possible at the departmental level, as demonstrated in the next case study involving the APSC FYE program.

Animal and Poultry Science Courses
Prior to the development of the FYE courses, the only formal exposure that students had to a librarian-led information skills development session as part of the Animal and Poultry Sciences degree program was during the students' required senior (4000-level) capstone course. In this 110-minute session, students were taken through the entire literature review and research process primarily in a lecture format and expected to develop proficient inquiry skills to complete their research projects. Before 2011 80–90 percent of students indicated that the librarian-led session in the senior capstone course was their first opportunity to develop information skills. By spring 2013 a few of the ALS FYE students cycled into the capstone course, and by fall 2014 a quarter of the class indicated that they had had a previous research session led by a librarian; by spring 2015 the number was closer to 40 percent. This change of exposure to basic inquiry skills at an

earlier stage in students' academic careers required a significant overhaul of the librarian-led capstone session for the fall 2015 semester.

As noted above, the first step was to identify which course or courses students had previously taken that incorporated a librarian-led session and which skills were covered. This was conducted by asking a series of questions and answered by a show of hands. The biggest shortcoming to this approach was the lack of recall by students to identify where in their academic careers they had previous experience with developing information literacy skills. However, when the APSC FYE course began in 2013 it became a required course for both freshmen and transfer students in the animal and poultry science degree program. Consequently, several students in the fall 2015 and even more in the spring 2016 capstone courses had prior experience with developing information literacy skills, primarily in the areas of

- topic selection;
- keyword development;
- identifying types of information sources;
- incorporating information as a paraphrase or summary of the original text; and
- properly citing sources in a designated format.

While the above skills were addressed by the APSC librarian in one fifty minute session, to successfully complete class assignments and the final course project, students had to demonstrate acceptable levels of progress and proficiencies related to each of those skill sets. Thus far this approach seems to have provided a solid foundation for students now entering the capstone course.

The capstone course itself has been redesigned from lecture-based format to an interactive session with exercises and discussions. The modifications ensured that the librarian-led session enhanced and further developed the basic inquiry skills that students now entered the course with, rather than introduce the skills for the very first time. In addition to a brief recap of the skills that students should already have mastered in the FYE course, the learning outcomes and activities focus on developing greater proficiencies into

- developing targeted research questions about a topic;
- creating effective search statements using Boolean operators, wild cards, and other search tools available;
- identifying and selecting databases that encompass different aspects of animal sciences;
- accessing resources using library-specific services;
- evaluating and justifying the sources selected for a project;
- utilizing database features, such as creating search alerts; and
- exporting citations to a bibliographic manager.

Students in the fall 2015 and spring 2016 APSC capstone classes commented that they had gained a better comprehension of the complexities surrounding information literacy and felt more confident in finding appropriate and credible sources going forward. A few expressed interest in learning more about the different database features that could enable them to conduct research more efficiently and effectively; others indicated a greater appreciation for the discussions into identifying credible sources beyond reciting a definition of *peer review* (for example, the impact of retractions and comments to articles posted in scholarly journals).

Graduate Students

Librarians often develop the information literacy skills of graduate students in a class, seminar, or workshop setting (Baruzzi & Calcagno, 2015; O'Clair, 2013). However, librarians recognize that graduate students enter into programs with a wide range of preexisting skill sets depending on a number of factors, such as the amount of exposure to librarian-led sessions during their undergraduate years, the type of inquiry training received from previous employment, and the number of years between undergraduate and graduate coursework (Blummer, Watulak, & Kenton, 2012; Quinn & Leligdon, 2014). In addition to ensuring that all students in a particular class have what are considered to be basic levels of information literacy skills for searching, accessing, and citing information, graduate students are expected to develop multifaceted inquiry skill proficiencies throughout their academic careers (Hoffmann, Antwi-Nsiah, Feng, & Stanley, 2008). Examples of these competencies include

- examining the ethical uses of information sources related to thesis and dissertation work;
- selecting appropriate outlets for scholarly dissemination within a field of study;
- navigating through grant requirements and protocols; and
- utilizing tools available to assist with the creation of scholarship (Critz et al., 2012; Exner, 2014).

Each of these skills requires a foundational piece of information literacy. For example, graduate students are often presented with bibliographic tools to assist with the creation of works cited as part of the scholarly output, but this is based on the assumption that they know how to write a citation in a prescribed format and will therefore be able to identify if mistakes by the tool have been made. While these types of tools are extremely beneficial, they rely heavily upon users possessing knowledge of underlying principles in order to truly be used efficiently and effectively.

For many years the CALS librarians conducted graduate instruction sessions at the request of a faculty member teaching the course, similar to requests for undergraduate sessions. Likewise, many of these interactions

were limited to one-shot sessions. Given the wide range of inquiry skills and research experiences possessed by each master's and Ph.D. graduate student entering a program, the CALS librarians sought new approaches to offer instructional opportunities that would enhance and augment basic-through-intermediary inquiry skill sets. Two projects evolved from this exploration. The first, a one-credit graduate course, restructured an existing program to provide an introduction to additional inquiry competencies that graduate students were expected to demonstrate throughout their academic careers. The second project became the Scientific Writing Workshop.

Graduate Course on Developing Information Skills
In 2007 the University Libraries began to offer a one-credit pass/fail course through the graduate school in order to deliver information literacy skills over the course of a full semester (see appendix C). Five subject-oriented sections were offered to address information topics in those specific disciplines. The inquiry skills covered in all sections included

- navigating the library's website;
- utilizing library services;
- accessing articles;
- exploring disciplinary databases;
- using a bibliographic manager; and
- examining the graduate school's honor code.

In 2013 a CALS librarian conducted a comprehensive analysis to evaluate the course design and learning outcomes in relation to the inquiry skills that faculty expected graduate students to exhibit when conducting research. Using students' feedback from that investigation as the starting point for improvement, two CALS librarians collaborated to pilot a redesigned course specifically for the CALS course. The primary goal was to incorporate new and emerging inquiry skills that would supplement the traditional information literacy skills previously focused on in the course.

Using the newly designed learning outcomes, activities and exercises were formulated to blend the former course goals with the new course objectives. To balance the amount of work required for each module with the amount of credit earned for the course, the CALS librarians divided the content into four units across twelve weeks. The redesigned course incorporated six weeks of content from the original course; the rest of the content addressed the following newly added information literacy skills:

- Outlining appropriate data-management plans related to the research project
- Determining university protocol requirements based on the type of research conducted

- Explaining the traditional and alternative metrics used in the scholarly landscape to measure impact
- Describing the expected format for dissemination of scholarly outputs
- Identifying changes in the scholarly landscape
- Utilizing a wide variety of collaborative, organizational, storage, and management tools available to assist in the creation of scholarly outputs

The final week of the course required the submission of three projects: a formatted bibliography of the sources obtained for a research project; a corresponding research log of searches conducted; and a reflection of how the inquiry skills addressed in the course impacted the student's research practices going forward.

The decision to use the CALS section for this pilot course was based in part on two reasons. First, it fit with the CALS librarians' desire to offer an alternative method of inquiry skills to their constituents; an added benefit was that the duration of the course offered the librarians the capability to go into greater depth toward developing each of those skills sets. Second, based on the diverse research topics of previous students, life sciences were not the only areas of focus of CALS graduate students; often, their research areas extended into the social or physical sciences. Therefore the CALS librarians could determine the scalability and applicability of the newly designed content and learning outcomes and how they would translate to other sections of the course. This proved to be a successful model; during the following year the other disciplines adopted the new format of the course for their sections.

Scientific Writing Workshop
While the graduate course provided an effective way to develop information literacy skills, the semester-long commitment deterred some students. Based on the cases brought forward to the Honor Court, a CALS faculty member recognized that some of them were a result of inadvertent mistakes and misunderstandings of how to properly paraphrase or attribute the content from a source into a new work, not egregious forms of cheating. Seeking to address this issue, the faculty member initiated a discussion with a CALS librarian, and the idea for a workshop began to form. The Scientific Writing Workshop (SWW) was conceived as a way to proactively, rather than punitively, address the prevalence of plagiarism cases that were being submitted to the graduate Honor Court.

When the initial CALS librarian working on the project retired, the new librarian was tasked with completing the project. As those conversations progressed, additional CALS faculty were brought in to determine a delivery platform for the content, establish learning objectives, and create an exercise to ascertain participants' comprehension of the materials. Maintaining the SWW as a writing-intensive workshop was imperative. This goal

stemmed from the primary need to develop the skills necessary to properly summarize, paraphrase, and cite sources and to identify components that constituted plagiarism. While the initial concept of the SWW was designed primarily for graduate students, both faculty and librarians determined that the sessions would be made available for anyone associated with CALS that had an interest in developing the skills offered (see appendix D).

There were several other components incorporated into the SWW before it was initially offered. The first was developing additional partnerships to support the workshop. As the graduate school recently required departments to include a course covering ethics into their graduate degree programs, the dean of the graduate school was invited to provide the opening introduction and remarks for the inaugural and subsequent SWWs. Initially, only the CALS librarians offered expertise and assistance, but it became quickly apparent that librarians with other disciplinary and copyright expertise should be involved in the SWW to provide additional insights and experiences, broaden perspectives, and create ties back to individuals' own experiences and perceptions in agricultural topics.

Librarians decided that the SWW would be offered as an eight-hour, stand-alone training, with no links to certificates or other courses for credit. This promoted an environment for participants to truly experiment, as there would be no penalty associated with their scholastic or research activities if mistakes were made during the skill-development exercises. The content of the workshop sessions focused primarily on applying proper paraphrasing and summarizing techniques; the associated activities were conducted individually and within small groups. However, because these skills do not stand alone, other related inquiry skills were quickly identified for incorporation. Additional workshop sessions discussed best practices on identifying authoritative sources, recognizing several facets of plagiarism, and properly citing sources using in-text citations and a bibliography. Each of the exercises was designed to take a particular inquiry skill, dissect it to minute details, and bring thoughts forward to the group for further discussion. The final session was a faculty panel that discussed gathering permissions and accurately attributing sources into theses, dissertations, and other publications. While the workshop could have been designed to solely go through specific examples to foster the development of various skills in one full day, a unique aspect of the SWW was the incorporation of a practical assignment that connected each of the skill sets covered in the sessions. This component required that the workshop incorporate a long-enough break for the assignment to be completed and so that feedback could be provided in a timely manner. Therefore the workshop was designed to be offered as a four-hour morning session on the first day, followed by another four-hour session in the afternoon of the following day.

The practical assignment was developed specifically to address the issues of inadvertent plagiarism—the catalyst for creating the workshop.

The goal of the activity was to mimic a literature review in a controlled environment. Assisting CALS faculty and librarians provided three articles related to an agricultural discipline that matched an area of his or her expertise. Students were required to select an area of interest, read the three articles, and submit a short paper of 350–500 words that incorporated a paraphrase and proper citations from each of the three original sources by 11:55 pm of the first day of the workshop. Librarians and faculty reviewed the submissions before the second session of the workshop began in the afternoon of the second day. They then served as group leaders for the afternoon discussions, providing opportunities for discipline-specific idiosyncrasies to be discussed by those knowledgeable in a given field. This method promoted a "safe sandbox" approach, where students would not be penalized for any errors in paraphrasing the text. Instead, they were given in-depth feedback pinpointing where mistakes were made so that they gained a better awareness of how to properly incorporate statements and ideas from original sources into their own work. Additionally, students would see how others in the same group paraphrased the content, which provided additional insights as to how the text could be properly incorporated into a new, original work.

The first SWW was offered in January 2015, the week before spring semester began. This time frame was chosen because a number of graduate students were on campus to prepare for the spring semester, yet were presumably free from course obligations and able to attend. The classroom space limited the workshop to seventy-two students, which provided the ten assisting faculty with eight or fewer student assignments to critique. However, when the registration form went out, enrollment significantly exceeded capacity. To accommodate the amount of interest and balance the time- and classroom-availability constraints, a second SWW was scheduled for May, just after the semester concluded. During the inaugural SWW everything went smoothly. The feedback gathered was used to make minor adjustments for the second SWW. However, despite similar planning, that session did not go as planned. New and unforeseen challenges arose, including a leaky pipe that forced the workshop to move to an open area on a floor that was not designed to accommodate presentations, a variety of communication snafus that compounded confusion, and end-of-semester burnout that significantly decreased the number of students who actually attended. As unfortunate as these circumstances were, they provided the CALS librarians with new insights into what was truly beneficial and led to the decision to offer the SWW once a year, in January, for maximum impact.

The third SWW took place in January 2016. Those involved deemed this particular SWW to be the most successful, even though new challenges became apparent. The format of the SWW was an in-person training session held on the Blacksburg campus. However, several others in the CALS

community located offsite indicated interest in participating but were not able to travel to the main campus to attend. To address this gap the CALS librarians are in the process of investigating online options, which will also address a second challenge that has emerged: scalability. Although the SWW is designed specifically for the CALS community, librarians in other disciplines have shown interest in offering similar workshops for their constituents. Additionally, as more librarians outside of CALS have become involved to address topics that cut across disciplines, online modules would allow for certain portions of the content and activities to be incorporated and delivered, reducing the duplication of efforts. This would also allow more time for customizing certain components of the workshop sessions in order to focus on specific characteristics related to a given discipline. And finally, the previous SWWs have included both native and nonnative English speakers. The content has been delivered with an assumption that participants are aware of the basics of plagiarism, but librarians discovered that this was not an accurate assumption. The CALS librarians plan to create introductory-level materials for nonnative, or English as a second language, speakers to assist with navigating the often nebulous areas of paraphrasing and further defining what constitutes as plagiarism.

Extension Agents

Extension agents play a pivotal role in transferring knowledge from the scientists of land-grant universities to the community at large. In some regards their work to provide accurate and reliable sources to address a specific question are akin to the information literacy skills librarians develop in others. However, while extension agents are often trained to enhance their skills, knowledge, and abilities within specific disciplines, very little training is offered for acquiring, accessing, or promoting the libraries' resources (Rozum & Brewer, 1997). Enhancing the information literacy skills of the extension and AREC community members is imperative to ensure that they can continue to serve as the link between the research community at a university and the practitioners who need to put that new knowledge to use.

Extension agents are commonly located throughout the state at county offices, sometimes known as unit offices, rather than at the main campus of their university. This creates an additional challenge when attempting to provide information literacy instruction to a group that requires high-quality, authoritative information in a short amount of time to address their constituents' needs (Simonsen, 2015). Furthermore, the techniques needed to find and disseminate information are not a skill set that extension agents can afford to assume is static (Jernigan, Edgar, Miller, & Cox, 2015). When promoting the development of inquiry skills workshops, addressing the transient nature of an extension agent's working environment is paramount. Therefore to ensure skill development for those not

able to attend trainings, incorporating a "train the trainer" instructional model has been a successful approach (Liang, 2010). Extension agents have used this model themselves, primarily when training producers, various specialized groups, and members of the general public about applying new methods or knowledge derived from the research findings of their home institutions.

In March 2013 CALS librarians were given an opportunity to deliver an information literacy skills training session during the extension agents' annual In-Service Day conference held on the Blacksburg campus. This was the first formal workshop request by this group in over a decade. As with previous initiatives, it was a response to defined needs and fortuitous timing. One of the CALS librarians had assisted a variety of agents to quickly locate credible information sources written in layman's terms to address questions posed by their local communities. During the course of these interactions, agents repeatedly stated that the librarian possessed many of the inquiry skills they required as a part of their daily work with the public. Ensuing conversations led to an invitation for all three CALS librarians to attend and present at the annual conference. Because agents from across the state attend the conference, the librarians were able to reach out to those who had not previously interacted with a librarian or used the library's resources. The session was initially developed to introduce attendees to the library's website, databases commonly used in agriculture, and useful searching techniques; it provided a forum for the librarians to ascertain agents' information needs and begin new conversations about support services that librarians could offer. Because eight concurrent sessions were offered each day, the inquiry skills session was given three times to maximize contacts. Over forty agents attended the 2013 presentations, and the evaluation responses indicated that the library sessions were deemed highly useful and the training should be offered each year. As a result similar introductory sessions were presented during the 2014 and 2015 conferences. By 2016 many agents were aware of the library's general services and had met at least one of the CALS librarians. To remain relevant and continue to provide inquiry skill development, the librarians will offer two presentations: one that provides the introductory session to new agents, and a second session that will develop additional information literacy skills in greater depths for those ready to build on their previous skill sets.

While the annual conference proved to be an effective mechanism for connecting librarians with agents to develop general information literacy skills, not all agents are able to attend the sessions. Similar in nature to other extension programs across the United States, extension agents and researchers often work in research stations located throughout the state. In Virginia these research stations are called ARECs (Agricultural Research and Extension Centers) and referred to as both experiment sta-

tions and research farms. ARECs are staffed with faculty, staff members, graduate students, and seasonal workers, all of whom have varying levels of information needs. With such a small and tight-knit population, many personnel at ARECs work with one another, leveraging the experiences and expertise each brings to the community to promote professional development. Senior researchers train laboratory assistants on how to perform specific duties; yet, with the constant evolution of technology, new graduates often train established faculty in new and emerging techniques. This method of information exchange works well in the AREC environment, but because the librarians are stationed on the main campus, they are not involved in these interactions and therefore often not viewed as a resource that AREC community members can use to develop their skills. In order to identify and define the research and information needs of such members, one of the CALS librarians undertook a project during 2014–2015 to visit each AREC in the state. In addition to establishing relationships between the new CALS librarian and members of AREC stations, the primary goal of this project was to discern the most beneficial information literacy skills for this particular CALS community, and to articulate an appropriate method to develop these skills.

When the CALS librarian began these visits, a few key learning objectives were incorporated into the presentations to ensure that each AREC had a consistent baseline of information literacy skills (see appendix E). Other skills covered included

- developing keywords that incorporated language variations between the scientific literature and layman's terms (for example, ascorbic acid and vitamin C);
- selecting appropriate subject-specific databases;
- utilizing database functionality, including saving records of interest and creating search alerts; and
- accessing or requesting delivery of required materials through the interlibrary loan system's extended campus services.

Utilizing the train-the-trainer model and providing information on how and where to get additional help, the CALS librarian was able to deliver content in an effective manner to those who could disseminate it to others who were unable to attend the session. Part of the success in meeting with members at *all* of ARECs stemmed from the librarian demonstrating that she came from an agricultural practitioner background. This established her credibility as more than just someone who could search information sources: she exemplified how those sources would be of use to others. While this background is potentially unique, for others looking to build similar relationships it is imperative to identify the types of connections between services and practicality that will develop credence and acceptance as an equal collaborator in order to cultivate future partnerships.

In the course of meeting with members of each AREC it turned out that many were already aware of the two methods for accessing the library's resources remotely. However, this project revealed significant networking difficulties that were not experienced by researchers working at the main campus. Slow, intermittent, or nonfunctioning internet access was a common occurrence, which creates additional challenges for those attending virtual meetings or attempting to complete online coursework, let alone use the library's databases or online reference services.

Awareness of these issues is critical, particularly as CALS librarians develop more instructional content to be hosted in an online environment. To best serve members of AREC stations, the online instructional modules must be downloadable so that constant online access is not required. This lack of reliable internet access also implies that future in-person visits are a requirement to ensure that the information literacy skills of AREC communities are being delivered in a manner that best meets their unique needs.

Faculty

Faculties present a unique audience when it comes to developing inquiry skills. Similar to both graduate students and extension agents, they present a myriad of previous experiences and levels of exposure to formal information literacy–based instruction sessions. Because faculty members have conducted extensive research projects, it is assumed that they are experienced in conducting literature reviews and implementing other information literacy skills. However, as noted above, there are several other facets to information literacy that go beyond finding and accessing information. While very little is present in the literature, a study by Kuruppu and Gruber (2006) indicates that faculty are unaware of the library's research tools, services, and subject databases or best practices to search for and access appropriate studies. After teaching both undergraduate and graduate sessions, the CALS librarians frequently heard faculty members comment that they had learned something new at each information literacy session. Additionally, faculties are often required to provide metrics throughout the promotion and tenure process to measure their engagement and impact within their discipline. Because they are unaware that librarians can assist with compiling and analyzing these types of bibliometric data, they do not receive training on how to properly gather the scholarly metrics used in these decisions (Adams & Bullard, 2014; Galloway, Pease, & Rauh, 2013). Furthermore, with the scholarly communication environment continually evolving, providing workshops to keep faculty up-to-date on new and emerging trends was another opportunity for librarians to participate. These revelations prompted the CALS librarians to examine what other aspects of information literacy pertained directly to faculty but were not being delivered to this particular community.

During summer 2013 the CALS librarians held discussions with CALS faculty and administers to determine what types of information literacy skills would be most valuable to them. As anticipated, faculty members indicated that they could benefit from a number of inquiry workshops that covered several aspects across the information landscape (see appendix F). Thus a need was defined, but there was also the question as to what to call the series to garner additional interest. This name had to be differentiated from another university-wide training program, formerly called the Faculty Development Institute, now named the Network Learning Initiatives (NLI). In an attempt to appeal to faculty and provide a marketing mechanism, the CALS librarians chose to call the multifaceted inquiry skills workshop series "Seminar for Scholars."

New programs are often plagued by uncertainty, particularly when examining how to allocate limited resources and personnel already stretched to cover other successful and ongoing projects. What can be set aside to provide time or space for the new program? Will the end result be worth the time and investment? How will the program be sustained? With no data other than anecdotal statements and general comments and discussions that indicated that inquiry skills for faculty were important, there was little evidence to confirm that faculty would actually attend the workshops once they were offered. The CALS librarians chose to run the Seminar for Scholars series as a pilot project. They determined that this designation would encourage support from the library administration, in addition to promoting flexibility and experimentation in order to determine what would be most beneficial for all involved.

The next few challenges quickly surfaced: determining the workshop topics, times, locations, and frequency. The initial approach was to offer three distinct workshops in the fall. The same topic was delivered twice in one month; one session was presented in the library, the other in a building closer to the majority of the CALS departments. This was in response to faculty preferences, which were split relatively equally between attending sessions inside or outside of their normal work environment. In order to determine which location would be best going forward, the CALS librarians were willing to tax their resources for the pilot year. Additionally, while it was impossible to find a time that would work for all faculty, using the bursar's timetable of classes offered a nonintrusive method to identify peak times of availability.

The first session was held in September. As new faculty members had been on campus for about a month, the CALS librarians chose to focus that workshop on library services and resources, partly as an extended orientation, partly as a marketing tool to highlight services geared specifically for them. The second workshop was designed to incorporate hands-on activities to demonstrate how citation managers could be used to assist with writing research articles, along with the pros and cons of different

managers. The CALS librarians decided that the last workshop for the semester would be developed based on feedback from attendees at the first two workshops as to what would be of most use for them.

The workshops were promoted primarily through email listservs. The first two-hour workshop held in the main CALS building had no attendees, but the second on the same topic held in the library had four. Three attended the workshop on bibliographic managers offered on the CALS side of campus, while seven attended the one at the library. A short survey went out to participants to determine the usefulness of these sessions. Responses indicated that the sessions were relevant and beneficial, but none suggested topics of interest for the final workshop of the semester, so that one was cancelled. To bolster attendance and determine additional topics of interest for the spring 2014 series, a short survey was sent out via the CALS listserv. Responses indicated three sessions of most interest: creating effective search strategies, applying traditional methods of measuring impact, and examining the emergence of altmetrics in the scholarly landscape. All workshops, except one that was rescheduled, were held in the library, and the attendance of these sessions improved to six, eleven, and nine attendees, respectively. A similar survey to the one delivered in the fall, coupled with anecdotal statements and emails from participants, confirmed that the content of each spring workshop was valuable to the development of information literacy skills.

Although the Seminar for Scholars initiative seemed to be moving slowly though steadily forward, this was the only academic year in which the workshop series was offered to the CALS community. During summer 2014 a number of transitions took place that hindered further development of the program. The two primary factors were changes in CALS librarian personnel and a significant reorganization of library departments; these directed time, energy, and efforts toward developing new services in data management, scholarly communications, and institutional repository expansion. However, these areas are also indicative of information literacy skills, so while the Seminar for Scholars workshop series stalled in its originally conceived state, the idea behind it did not disappear completely.

One other factor that altered the growth of the seminar series was a consequence of changes to the university-wide NLI training program. The end result of the revamped program provided stronger partnerships and pathways for librarians to offer faculty training opportunities across an even greater expanse of inquiry skills to a wider audience. The CALS librarians have continued to promote and develop information literacy skills in a wide variety of contexts through the NLI course offerings, but instead of focusing specifically on those in CALS, the workshops are open to the university's entire faculty population. This has leveraged the CALS librarians' desire to provide inquiry skills to assist faculty in a programmatic manner that enables the project to continue, although in a slightly

different manner than before. Thus far, the information literacy skills covered in these workshops have included

- defining and selecting appropriate literature-review types for projects;
- identifying best practices for data management;
- creating a researcher profile to manage professional identity; and
- utilizing bibliometric and altmetric data to measure scholarly impact.

CALS librarians have offered additional outreach and instructional services through the NLI program, including hosting a forum to promote discussions surrounding OneHealth research and initiatives across campus; an integrated workshop on how to conduct systematic reviews; and adherence to literature-review protocols for Institutional Animal Care and Use Committee applications.

Conclusion

This case study demonstrated the baseline of information literacy skills required by each affiliation discussed in order to succeed in his or her role in the CALS community. Undergraduate students need to develop foundational and traditional inquiry skills to build on as they progress through their academic and professional careers. However, the development and incorporation of information literacy skills go well beyond the ability to articulate a research question, identify appropriate resources to search, formulate an effective search statement, evaluate information critically, and use information in an ethical manner. While there were obstacles to overcome, by partnering to create sessions for courses or workshop and seminar series designed to go beyond the traditional information literacy skills, the CALS librarians developed new avenues to specifically address the information skills needed by graduate students, faculty, and extension agents that provided tremendous benefit to the work they conduct.

As the information landscape continues to change and the amount of research available continues to grow rapidly, enhancing the information literacy skills of the CALS community at multiple levels is imperative. The one user group that was not offered specific inquiry skills training were support staff members, because previously their work did not normally require these types of skills. However, as staff members are increasingly becoming involved with research in several departments throughout CALS, offering this constituent inquiry skills training is a new endeavor on the horizon. Given the nature of the work conducted by students, faculty, extension agents, and staff in agricultural disciplines, and the numerous connections of that work into other disciplines, effective inquiry skills are vital.

Developing effective information literacy programs for a community with diverse backgrounds and experiences is challenging. However, the rewards are well worth the time, energy, and resources invested in the project. Throughout all of the programs offered to the CALS community,

the CALS librarians made a concerted effort to identify learning opportunities related to developing and enhancing inquiry skills that would have a beneficial impact on each constituent's needs. They started with sessions that had a proven success record, and worked with faculty, extension agents, and administrators to promote deeper partnerships that allowed for new ideas and initiatives to emerge. Using the successes of the above programs, the CALS librarians will continue to seek new ways to implement additional and more complex information literacy skills that will further support and best meet the needs of each member of the CALS community.

Appendices

The following appendices are available online at http://hdl.handle.net /10919/73190:

Appendix A: Human Nutrition, Foods, and Exercise Information Literacy Program

Appendix B: Learning Outcomes for the First Year Experience (FYE) Agriculture and Life Sciences (ALS) Course

Appendix C: GRAD 5124 Lesson Plan, Learning Objectives, and Weekly Assignments

Appendix D: Scientific Writing Workshop: Synthesizing and Paraphrasing What You Read

Appendix E: Learning Outcomes for AREC and Extension Visits

Appendix F: "Seminar for Scholars" Workshop Series (Topics and Learning Outcomes)

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