# Building a Sustainable Life Science Information Literacy Program Using the Train-the-Trainer Model

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## Abstract

*The train-the-trainer model has great potential for expanding information literacy programs without placing undue burden on already overextended librarians; it is surprisingly underused in academic libraries. At the University of Kentucky, we employed this model to create a new information literacy program in an introductory biology lab. We trained biology teaching assistants (TAs), each of whom was responsible for teaching two lab sections, to teach scientific database searching and Endnote Online to undergraduates. Over the first two semesters, we taught or co-taught 78 sessions of BIO 155 (nearly 2,200 attendees), with the librarian only in attendance at TA training and a total of 14 class sessions. Here we describe the program from its inception in late 2012 through the present, covering such topics as course coordinator buy-in, class design, active learning exercises, and assessment. Of particular note is the progression of our training program, which evolved from a style encouraging imitation toward one inspiring TAs to personalize the subject matter. We believe this approach inspired TAs to reflect on the importance of information literacy in their own research and to emphasize its relevance to undergraduates.*

## Introduction

Science faculty members largely agree that information literacy within their field is essential to success as students and professionals. While undergraduates may receive general information literacy sessions during their freshman year, they often do not view the skills learned in English composition as transferable

to their science courses. Given that syllabi are packed full with content, science instructors are typically more concerned with covering subject content than they are with teaching how to find and evaluate scientific literature (Hardesty 1995); in many cases, they do not consider themselves responsible for doing so (Scaramozzino 2010).

As a result, science librarians are given the responsibility of building information literacy programs within their disciplines. Seldom do they receive additional time or resources to do so. This is a real challenge in large universities, where the number of students may exceed one thousand in a given science major. Given this reality, decentralization of information literacy education must occur on some level, and it is essential to reach out to faculty and ask them to share the responsibility with librarians (Gwinn 1980).

One way librarians can reduce teaching loads is to implement a train-the-trainer program, an approach to teaching in which an expert in a given field trains a group of teachers who are not experts in a subject. These teachers act as intermediaries who relay the information to students. Train-the-trainer (TTT) frequently has been used and shown to be effective in education (e.g., Warner et al. 2005; Marchant et al. 2010; Zipp & Olsen 2010), as well as such fields as health science (reviewed in Pearce et al. 2012), business (e.g. Baron-Donovan et al. 2005; Stoyan 2008;), and the military (e.g., Reivich et al. 2011). Given the growing demand for subject-specific information literacy sessions in colleges and universities, it is surprising that this approach has not received more attention in the professional literature from academic librarians (but see Gregory 2013). We describe the creation and evolution of an information literacy program in an introductory biology lab built upon the TTT method. We detail the program from its conception in November 2012 to the present, discussing its challenges and evolution along the way.

## The Need

With approximately 1,600 declared undergraduate biology majors, biology is the second largest major at the University of Kentucky. Until January 2013, it lacked an information literacy program. Though the library liaison to biology recognized the department as underserved, she was already stretched thin with ongoing commitments to other departments and lacked the time and other resources necessary to implement a new program. To solve this problem, she teamed with a library graduate intern, who was also a former biology teaching assistant, and brainstormed how such a program might be established. We (library liaison and graduate intern) wanted to create a program that would not further extend the liaison and could continue beyond the graduate intern's graduation at the end of the semester. We needed to create a largely self-sustaining information literacy program for the Biology Department with relatively little liaison effort over the long term.

## Planning

We decided to focus on an introductory biology lab (BIO 155) required for all biology majors and taught by biology teaching assistants (TAs) under the supervision of the BIO 155 course coordinator. With 80% freshmen and sophomores, this is an ideal course to target because students are just beginning their studies, providing them with a solid information literacy foundation upon which to grow. Additionally, our biology-TA-turned-library-graduate-intern had insider knowledge of course content and knew that it included a writing assignment. Upon reviewing the literature, we discovered a number of successful course-integrated information literacy programs for introductory biology labs with similar course structures at universities comparable or larger in size (Bowden & DiBenedetto 2001; Reichardt & Campbell 2001; Lee & MacMillan 2004; Kearns & Hybl 2005; Spackman 2007; Weiner et al. 2012). While Reichardt and Campbell (2001) and Bowden and DeBenedetto (2001) accomplished it using instruction teams, the other programs mentioned above accommodated large numbers of students by using web-based instruction. Seeking an alternative to the web, we explored multiple possibilities until the TTT approach emerged.

Once we had the idea, we needed to establish faculty buy-in. While this is essential to the establishment of any successful information literacy program (Ferrer-Vinent & Carello 2008), it is especially important for acceptance of the TTT approach because it takes away from both undergraduate class time and training time for teaching assistants (TAs). We approached the BIO 155 course coordinator in November 2012. Although the course content had evolved somewhat since the Library Graduate Intern taught the lab in the past, much of it remained the same. One thing that held steady was a session on the scientific research process (question, hypothesis, predictions, etc.) which failed to instruct on how to locate or evaluate scientific research articles. This forehand knowledge gave us some ideas on how to promote information literacy instruction and how to integrate it into the particular lab.

The BIO 155 course coordinator was very receptive to our ideas at our initial meeting and she shared course materials that would give us a better idea of how to fit into her course. When we met with her a second time, we presented our ideas, but also listened carefully and compromised on some of the content, particularly in regard to the amount of material we thought was feasible to cover. We established mutually agreed-upon, measurable goals focused on the *ACRL Information Literacy Standards for Science and Engineering/Technology* related to constructing effective search strategies and identifying relevant information sources (ACRL 2006). This level of collaboration allowed for the creation of a truly integrated class with the goals and skills students needed to succeed.

## Implementation

During the first semester, we took a step-by-step approach to training the TAs, starting with the general TA training session and building up to TAs as primary instructors. First, we conducted a general one-hour training session during weekly TA meetings, which took place in the lab classroom. At the meeting, we demonstrated the presentation and course materials, course guide, and online polling software used to engage students, preparing them to conduct the class as we had planned. We gave them the answers to the in-class worksheets and allowed time for questions at the end.

One of the challenges of working with graduate students in this general training session was that they seemed unaware of how much they did not already know, even some of the basic concepts. During the training session, TAs generally behaved as if the material was overly simple and they did not need information literacy training; rather, they just needed to be familiarized with class materials and structure. Though this was undoubtedly true of some TAs, we suspect others may have been reluctant to admit their lack of knowledge in this area. That said, we did receive informal feedback from several TAs indicating they had learned new tricks for searching databases or about the existence of certain databases. For instance, one TA was even unaware of science databases until our presentation; the only research tool she had used was Google Scholar.

Second, because each TA was responsible for teaching two sections of the course, a library representative (library liaison or graduate intern) taught each TA's first section while the TA assisted. In order to cover the many sections, we recruited additional library graduate interns to "model" and assist with some sections. Our intent with modeling was to avoid problems of inconsistency reported by others, who noted that differences in instructor delivery and content have led to student frustration and library avoidance in the past (Reichardt & Campbell 2001). These library-led sessions provided TAs with the opportunity to observe the class in the live laboratory environment and better understand how we wanted the class to be conducted. TAs also assisted students with in-class exercises, which gave them a better idea of the kinds of questions students might have.

Third, the TA and library representative reversed roles for the second section, with TAs as primary instructors and library representatives as assistants. In these cases, the person from the library was introduced at the beginning of class as an expert in searching for and locating the kinds of research articles

students needed for their assignments. Both the TA and the library representative worked with students during in-class exercises.

Our two information literacy sessions took place during laboratory sections over two consecutive weeks. The first and second sessions were 90 and 60 minutes, respectively. The classes met in a room with a seating arrangement that facilitated group work. Each student had access to a MacBook, allowing us to actively engage with the students. The delivery of information was similar to Ferrer-Vinent & Carello (2008) in that we used a blended learning approach -- alternating between interactive lecture with PowerPoint, live literature searches with student participation, in-class exercises, and graded worksheets. To create an interactive environment during the lecture, we posed questions to students, who responded via free PollEverywhere online survey software. Students were also asked to follow along on computers and brainstorm for keywords, which we then used in our live searches. The information was reinforced with in-class exercises using examples from the previous week's lab experiment. What was most critical to its success was student buy-in: they realized there were library databases as easy to use as Google and they could save time while searching for literature.

We created a customized course guide using LibGuides from SpringShare to reinforce information literacy concepts both inside and outside of class (available at http://libguides.uky.edu/BIO155). The inclusion of the course guide was important in that it reinforced material both for students and TAs. TAs mentioned that understanding the differences between databases and the ability to find seminal works as two especially helpful aspects of the course material. In this first semester of the program, we co-taught 17 sections twice, reaching 462 students over a two-week period (thus, 34 sessions and over 934 attendees). The liaison only attended the group training sessions and four of these class sessions, which freed up a considerable amount of her time to focus on other obligations.

## Assessment

We assessed the classes in three ways. First, we asked for input at the end of class by asking students to each tell us one thing they learned. Answers typically fell into one of the following categories: 1) learning the existence of science databases; 2) refining keyword searches; 3) accessing articles; and 4) using the library web site. We did not find any differences in comments between library-led and TA-led sessions. Overall, comments were very positive:

- "I did not know that UK had so many services that they offer for research. I did not know about the Web of Science web site and it will definitely help me with my future research."

- "I had no idea that the University of Kentucky had so many resources. I always thought google was the answer but with all of the resources that this site has to offer, I might start using this."

- "I learned how to search for information on web of science and how to narrow my search in different ways so as not to have to sift through thousands of articles."

- "I learned how to use web of science, how to truncate keywords, and how to more effectively use the boolean phrase techniques"

Second, we gathered formal assessment data using questions based on the University of Kentucky Libraries' Information Literacy Learning Outcome 2.1 (Table I), which was derived from ACRL's *Information Literacy Competency Standards for Higher Education* (ACRL 2000). Our first attempt at assessment in Spring 2013 did not yield meaningful results due to improper wording on our part. Upon reviewing the results, it was unclear whether students did not understand content taught during the sessions or the assessment topic and instructions due to wording. We met with the UK Libraries' information literacy coordinator and new undergraduate learning librarian to discuss how we could simplify language. We applied what we learned and improved the wording of the assessment questions and instructions for the

Fall 2013 assessment, thus gaining more meaningful data, as shown in Table II.

**Table I: Learning Outcome 2.1 and Rubric**

| 2 Constructs effective research strategy | 0 Emerging | 1 Developing | 2 Proficient | 3 Distinguished |
|---|---|---|---|---|
| 2.1 Constructs search terms and phrases | Uses everyday language to describe key concepts. | Uses everyday language to describe key concepts.<br><br>Lists synonyms to expand key concepts. | Uses everyday language and synonyms to describe key concepts.<br><br>Translates everyday language and synonyms into appropriate subject terms for key concepts. | Uses everyday language and synonyms to describe key concepts.<br><br>Translates everyday language and synonyms into appropriate subject terms for key concepts.<br><br>Combines key concepts to formulate a search strategy. |

**Table II: BIO 155 Fall 2013 Assessment Scores Summary**

| Score | Students |
|---|---|
| 0 | 12 (2%) |
| 1 | 70 (13%) |
| 2 | 180 (33%) |
| 3 | 290 (52%) |
| **Total Responses** | **552** |

Third, we assessed the Spring 2013 BIO 155 sessions based on our in-class observations and the course coordinator's discussions with the TAs. Additional discussion and negotiation with her yielded improvements for course content and delivery during Fall 2013. First, we reduced the amount of material covered. As previously mentioned, we had expressed our concerns about the amount of material in the planning stage, but decided it was best to compromise. Looking back now, we feel it was important that the course coordinator arrived at this conclusion independently and that our initial compromise further strengthened our relationship with her. We paid particular attention to the structure of the session, streamlining the PowerPoint and class outline to make it easier for the TAs to teach. We also ensured vocabulary was consistent throughout the process, including the PowerPoint presentation, active learning exercises, and assessment. These revisions improved TAs' delivery of information.

## Revisions: Train-the-Trainer Part 2

As anticipated, the first library graduate intern graduated and moved on. Prepared for that probability, an experienced library graduate intern stepped up to coordinate the second semester classes. Having assisted during the previous semester, her participation made for a seamless transition.

Per the BIO 155 course coordinator's request, we altered the training method for the general TA training

sessions. In this second iteration, we treated TAs as if they were undergraduate students sitting in class. This allowed us to move away from the lecture and demonstration tactics of the previous semester toward a more authentic and interactive approach, which has been found to be more effective in other TTT programs (Pearce et al. 2012). The TAs were not accustomed to receiving information in this manner and did not appear to appreciate being treated like undergraduates; however, by performing the exercises themselves, they gained insight into student needs, making them better teachers. It also engaged them on a more personal level and made them reflect on how information literacy applies to their own work.

Following the group training, we skipped the modeling step so that TAs led both of their sessions. Again, the assisting library representative was introduced as an expert and assisted students during the in-class exercises. As part of the introduction, TAs emphasized the importance of literature reviews in the experimental design process, which established both our authority and our relevance from the outset. Though class dynamics and examples differed between classes, each TA shared the common experience of being "an undergraduate for a day" and knew the material more thoroughly than from the simple demonstration of the previous semester. Taking the lead role also seemed to instill greater confidence in the TAs to interject more of their own personalities and experiences into the instruction. For example, one emphasized the value of the sessions, claiming she wished she had a similar class as an undergraduate. Another used his own articles in a sample search, while others used examples from their own research topics.

During this second semester, we taught 22 sections and 633 students (thus, 44 sections and 1,266 attendees). The library liaison attended only the two group training sessions and 10 of the class sessions. In the Spring 2014 semester, she anticipates only attending three or four sessions.

## Discussion

Lower division science labs present an excellent opportunity to try out the TTT approach to creating information literacy programs at large universities. By employing it, we taught or co-taught 78 sessions of BIO 155 (nearly 2,200 attendees total), with the overextended library liaison only having to attend 14 sessions. It allowed us to reach students early in their academic careers in an active learning environment with relatively small class sizes. Owing to the large number of sections, we would not otherwise have been able to accomplish it. The program continues to have strong support from the Biology Department and began its third semester in Spring 2014. It has also gained considerable interest from the UK information literacy instruction team and is being adapted to support instruction efforts in other departments.

We feel that the success of our program is largely due to the strong collaborative relationship we established with the BIO 155 course coordinator at the outset. Her obvious enthusiasm served to boost TA buy-in, which was then amplified when they realized they also were respected as collaborators. Not only did they show their interest through more personalized instruction, but we suspect they were more likely to promote the library throughout the semester as well. The course coordinator's support now extends beyond her own course as she has become an advocate for information literacy within the Biology Department in general.

Though some may argue that using graduate students to teach library material undermines the librarian's role in instruction, we believe that undergraduates may be more receptive to the information from their TAs. In our case, it spurred TAs to reflect on the importance of information literacy and provide specific examples of their own experiences (also noted by Carlson and Miller 1984). As Winterman (2009) points out, graduate students are typically closer in age to undergraduates and have already established credibility with them; they also know that TAs have control over their grades.

## Conclusions

We realize that not all institutions will have access to a willing group of MLIS graduate students to share some of the teaching responsibility. We see several possibilities for adapting the approach to individual situations. First, the most obvious is to seek assistance from other librarians or staff members. One especially helpful aspect of TTT is that any willing colleague who is familiar with the resources can fill in. Presenting colleagues with class materials and asking them to assist rather than teach would not require as much time on their parts, and students would still have a face to associate with the library. Second, it is possible to go it alone. Alex Watkins, art and architecture librarian at the University of Colorado, has successfully accomplished this in large art history classes by participating in each TA's initial session and basing further involvement on the performance of the individual TA. If the TA covers the material correctly (usually the case), the librarian simply introduces himself at the beginning of class, then leaves the TA alone to cover the materials. Third, a less ideal option is for TAs to teach the classes without the assistance of a library representative; many labs have backup TAs, who provide additional assistance during in-class exercises. Although we would not be able to monitor quality and it would do less to promote the library to undergraduates, it would still ensure that students are getting appropriate, timely, and consistent information literacy instruction. It would also continue to forge bonds between librarians and faculty/graduate students.

We believe the application of the train-the-trainer model is unique among other information literacy instruction methods. By training TAs to lead their own classes in library instruction, we are recognizing the value of their own experiences and observations in the research process. We are asking them to do more than stand back and assist or parrot back the lessons we provide them; rather, we are asking them to be respected co-instructors. By employing this collaborative approach, which asks TAs to reflect more carefully on the importance of information literacy, we believe we can reach more students than ever. Though the effect is less tangible, it will help us create more lasting partnerships with existing faculty. Perhaps more importantly, we can establish collaborative relationships with TAs, building a new base of faculty members who recognize the importance of librarians, library resources, and information literacy in their field.

## Acknowledgments

## References

**American Library Association (ALA)/Association of College and Research Libraries (ACRL)/Science and Technology Section (STS) Task Force on Information Literacy for Science and Technology.** 2006. Information Literacy Standards for Science and Engineering/Technology. [Internet]. [Cited 2014 March 7]. Available from: http://www.ala.org/ala/mgrps/divs/acrl/standards/infolitscitech.cfm

**Association of College and Research Libraries.** 2000. *Information Literacy Competency Standards for Higher Education.* [Internet]. [Cited 2014 March 7] Available from: http://www.ala.org/ala/mgrps/divs/acrl/standards/standards.pdf

**Baron-Donovan, C., Wiener, R.L., Gross, K., and Block-Lieb, S.** 2005. Financial literacy teacher training: A multiple-measure evaluation. *Financial Counseling and Planning* 16(2): 63-75.

**Bowden, T.S. and DiBenedetto, A.** 2001. Information literacy in a biology laboratory session: An example of librarian-faculty collaboration. *Research Strategies* 18(2): 143-149.

**Carlson, D. and Miller, R.H**. 1984. Librarians and teaching faculty: Partners in bibliographic instruction. *College & Research Libraries* 45(6): 483-492.

**Ferrer-Vinent, I. and Carello, C.A.** 2008. Embedded library instruction in a first-year biology laboratory course. *Science & Technology Libraries* 28(4): 325-351.

**Gregory, K**. 2013. Laboratory logistics: Strategies for integrating information literacy instruction into science laboratory classes. *Issues in Science & Technology Librarianship* [Internet]. [Cited 2014 March 7];74. Available from: http://www.istl.org/13-fall/refereed2.html

**Gwinn, N.E**. 1980. Academic libraries and undergraduate education: The CLR experience. *College & Research Libraries* 41(1): 5-16.

**Hardesty, L**. 1995. Bibliographic instruction and faculty culture. *Library Trends* 44: 339-367.

**Kearns, K. and Hybl, T.T.** 2005. A collaboration between faculty and librarians to develop and assess a science literacy laboratory module. *Science & Technology Libraries* 25(4): 39-56.

**Lee, J. and MacMillan D**. 2004. Evolving instruction in biology: Using the web to improve in-class instruction. *Reference Services Review* 32(4): 374-382.

**Marchant, M., Christensen, L., Womack, S., Conley, L. and Fisher, A**. 2010. Strengthening positive school discipline practices through professional development. *Education Research and Perspectives* 37(2): 38-63.

**Pearce, J., Mann, M.K., Jones, C., van Buschbach, S., and Bisson, J**. 2012. The most effective way of delivering a train-the-trainers program: A systematic review. *Journal of Continuing Education in the Health Professions* 32(3): 215-226.

**Reichardt, R. and Campbell, S**. 2001. Mass instruction that works: Teaching 900 first-year biology students in five days. In: Dewey, Barbara I., Ed. *Library User Education: Powerful learning, powerful partnerships*. Lanham, MD: Scarecrow Press, 144-149.

**Reivich, K.J., Selignman, M.E.P. and McBride, S**. 2011. Master resilience training in the U.S. Army. *American Psychologist* 66(1): 25-34.

**Scaramozzino, J.M**. 2010. Integrating STEM information competencies into an undergraduate curriculum. *Journal of Library Administration* 50(4): 315-333.

**Spackman, E.S**. 2007. Utilizing focus groups to evaluate an information literacy program in a general biology course. *Science & Technology Libraries* 27(3): 3-28.

**Stoyan, R**. 2008. "PM for all[TM]" -- Intensive small group teaching in leadership and PM, for many students at a low cost. *International Journal of Project Management* 26: 297-303.

**Warner, D.G., Olney, C.A., Wood, F.B., Hansen, L., and Bowden, V.M**. 2005. High school peer tutors teach MedlinePlus: A model for Hispanic outreach. *Journal of the Medical Library Association* 93(2): 243-252.

**Weiner, S.A., Pelaez, N., Chang, K., and Weiner, J**. 2012. Biology and nursing students' perceptions of a web-based information literacy tutorial. *Communications in Information Literacy* 5(2): 187-201.

**Winterman, B.** 2009. Building better biology undergraduates through information literacy integration. *Issues in Science & Technology Librarianship*. [Internet]. [Cited 2014 May 14]; 58. Available :

**Zipp, G.P. and Olson, V**. 2010. Use of train-the-trainer sensorimotor group experience (TTSMGE) to promote functional motor skill development in an urban US preschool environment. *Contemporary Issues in Education Research* 3(1): 83-93.