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putting the pieces together: theory and practice

Mentoring for Emerging Careers in eScience Librarianship: An iSchool - Academic Library Partnership

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Abstract

Objective: Cornell University Library and the School of Information Studies at Syracuse University established a partnership to offer a mentorship program to students enrolled in the eScience Librarianship program at Syracuse. We assessed the success of the program in meeting intended program outcomes.

Design and Setting: Each of eight students was matched with a Cornell Librarian mentor. Other components of the program included program-specific activities and events, virtual communication, and an open invitation to students to participate in Cornell University Library events.

Methods: We conducted an exit survey of both students and mentors at the conclusion of the program. The survey was administered online, with seven of eight students and all mentors completing the survey.

Results and Conclusions: The program was successful in attaining professional acculturation outcomes and professional development outcomes. Results for employment outcomes were mixed (though it was too early to expect most students to have successfully obtained a job), and also mixed for outcomes related to opportunities such as internships and projects. We offer some suggestions for improvement in these areas. Overall, students and mentors had a very positive experience with the program.

Introduction

EScience Librarianship Program and the Syracuse – Cornell Partnership

EScience librarianship is emerging as a new specialty for academic librarians with a handful of LIS schools offering programs specializing in eScience and related areas such as data curation. Syracuse University's eScience librarianship program is a dedicated curriculum within the M.S. in Library and Information Science program and includes courses in scientific data management, cyberinfrastructure, and data services, as well as an eScience "lab" that focuses on such themes as institutional data policies, models for data publication and sharing, and scientific workflow tools (Qin 2010; Qi*n et al*. 2010). With funding from the Institute for Museum and Library Services Laura Bush 21st Century Librarian Program, Syracuse University (SU) recruited prospective students with a background in the sciences, and enrolled eight people in the fall of 2010 as eScience fellows.

The geographic proximity of Cornell and Syracuse Universities (the institutions are 55 miles apart) as well as established connections between the them afforded us the opportunity to develop a mentorship program to support a cohort of students enrolled in SU's eScience Librarianship program.[1] With es-

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tablished projects such as VIVO,[2] DataStaR,[3] arXiv,[4] the Cornell University Geospatial Data Repository (CUGIR),[5] the USDA Economics, Statistics and Market Information System,[6] and the Research Data Management Service Group,[7] Cornell's track record in eScience and support for the research enterprise is well established. In addition, a number of CUL librarians are alumni of the SU iSchool, and CUL staff members often teach courses or give guest lectures.

This paper reports on a two-year mentoring program led by the Cornell University Library for eight eScience fellows at the Syracuse University iSchool. The mentoring program was designed to help the cohort make a smooth transition from science to librarianship by offering access to a network of mentors, as well as a variety of activities, events, and opportunities to interact both in-person and virtually. We describe the elements of the mentoring program and discuss the results of our end-of-program assessment.

Mentoring for Academic Librarianship

Mentoring is one form of support that provides "off-line help by one person to another in making significant transitions in knowledge, work or thinking" (Megginson and Clutterbuck 1995). It can be an effective way of introducing newcomers to a profession or organization, as well as promoting professional development and advancing the careers of individuals. Mentoring librarians working within a single institution is a fairly well-established practice (e.g. Wittkopf 1999, Ghouse and Church-Duran 2008, Lee 2009, Farmer *et al.* 2009, Osif 2008, Chapman 2009). While not explicitly referred to as mentoring, a recent SPEC Kit describes libraries' efforts to socialize new hires (Ladenson *et al.* 2011). Socialization is one of the frequently cited goals of mentoring programs within an institution. Professional organizations have also stepped up to the plate to mentor new professionals in the face of the much-anticipated wave of baby boomer retirements. Hines (2007) describes various mentoring initiatives within American Library Association (ALA) organizations with a particular focus on the New Members' Round Table (NMRT), and DeZelar-Tiedman *et al.* (2006) describe an effort focused on mentoring new catalogers within the context of ALA's Association for Collections and Technical Services (ALCTS).

Less common are mentoring programs for library and information science (LIS) students. Stephens (2011) advocates for mentoring LIS students by practicing librarians as a means to "diminish the perceived divide between practice and library schools" and as something quite distinct from academic advising, and a few mentoring programs have been aimed at LIS students. Earl *et al.* (2004) describe a program that matches alumni with LIS students for mentoring "at a distance," with a wide variety of optional activities suggested for mentor-mentee pairs, including site visits, discussions of coursework and projects, job-shadowing, reading and conference recommendations, and assistance with professional networking. Mentoring students can also be integrated into their training as library interns or employees in the form of opportunities for coaching on professional skills and job seeking tactics (Thomsett-Scott 2012). A deliberate effort to mentor an entire cohort of students by partnering with academic libraries is described by Saylor *et al.* (2011), from the perspective of one of the participating library departments which placed students with library units to complete specific projects.

1. http://eslib.ischool.syr.edu/
2. http://vivo.cornell.edu/
3. http://datastar.mannlib.cornell.edu/
4. http://arxiv.org/
5. http://cugir.mannlib.cornell.edu/
6. http://usda.mannlib.cornell.edu/
7. http://data.research.cornell.edu/

EScience Librarianship Mentorship Program: Intended Outcomes and Program Elements

Our intention was for the mentorship program to expose students to eScience-related work in a major research library, support professional acculturation by exposing students to the profession of librarianship, to assist students with identifying and obtaining projects, internships, or volunteer opportunities, to support professional development, and eventually to find employment. We didn't expect all outcomes to be attained for all students, but we did want to assess our success in attaining each. A complete list of intended outcomes follows.

Professional acculturation outcomes:

- Describe typical elements of a science and eScience librarian's work.
- Define ways in which academic libraries currently engage in eScience or data curation support.
- Explain the professional culture and norms of academic librarianship.

Project, internship, and other opportunity outcomes:

- Develop a project idea/plan (e.g. for a course assignment).
- Execute a project idea/plan (e.g. for a course assignment).
- Obtain feedback on a project, publication or presentation.
- Present or publish the results of a project.
- Obtain an internship opportunity.
- Obtain a volunteer opportunity.

Professional development and employment outcomes:

- Identify personal career strengths and priorities.
- Develop professional contacts.
- Obtain career advice.
- Obtain feedback on employment application materials.
- Obtain a professional reference.
- Obtain an employment opportunity.

Note that two of the three professional acculturation outcomes were focused specifically on eScience. Project, internship and other opportunity outcomes could be related to eScience assignments, projects or opportunities, but not always, hence the more general wording of those outcomes. Professional development outcomes were also written more generally, although the expectation was that most of these outcomes would be related to students' development as eScience professionals. With these outcomes in mind, we planned a program that included individual and "network" mentoring, group activities, events and site visits, opportunities for virtual interaction, and opportunities for students to explore their career interests by using two well-known career development instruments.

One-on-one mentoring and the mentorship network

We paired each student with a CUL science librarian. Pairs were established at the first face-to-face event at Cornell, with students listing their mentor preferences after speaking with each of the mentors and participating in other activities. A non-participating librarian reviewed the students' preferences and matched each student with a mentor, making every effort to give students one of their highly ranked choices while keeping those preferences confidential. Each pair then completed a mentoring program pair plan based on a similar document developed by the American Library Association's Library Leadership & Management Association (ALA-LLAMA 2012). The purpose of the plan was to establish the pairs' preferred frequency and modes of communication, responsibilities for initiating communication, and strategies for sustaining a healthy mentoring relationship. The substance of the interaction was left up to program participants, but the program coordinator occasionally suggested activities or topics for discussion.

EScience is a relatively new area for academic libraries, and we knew from the outset that CUL did not have enough individuals working in the areas of eScience or data curation to provide each of the eight fellows a mentor with that professional specialization. Our pool of mentors included a public services department head, two engineering librarians, a physics and astronomy librarian, a library director, a public services librarian, a chemistry librarian (later replaced by a life sciences librarian), and a research data librarian. Of this group, half had significant expertise with research data and/or eScience. We adopted two strategies to address that fact. First, we stressed to program participants that the focus of the mentorship program was not on technical skills. Students stood to gain insight into the profession of academic science librarianship in general, as well as to take advantage of other professional development opportunities such as resume/vita and cover letter review, and job search tips. Second, and more importantly, we made deliberate efforts to make all mentors available to all students, encouraging students to treat the program as a mentorship network and not to rely solely on their assigned mentor. That way, all students had access to the smaller number of CUL librarians with eScience and data expertise, and some students did projects or internships under the supervision of a participating mentor other than their own. Furthermore, students met non-participating CUL staff and librarians at Cornell events and were encouraged to contact other CUL staff if they thought they would benefit from doing so. In some cases, mentors facilitated these contacts for students.

Group activities and site visits

We planned group activities for program participants to allow for face-to-face meeting time for as many program participants as possible. The most significant events were the day-long program launch at Cornell in fall 2010, attended by ESLib fellows, program faculty, and two SU librarians involved with the eScience Librarianship program, and another visit to Cornell at the conclusion of the program. The launch event included a series of "lightning talks" to introduce students to a broad array of projects at Cornell, a discussion of program ideas and elements, a speed networking session to introduce all students to all mentors, student-mentor matching and completion of a program pair plan, a tour of Mann Library, and a tour of the recently completed Weill Hall, home to the Weill Institute for Cell and Molecular Biology, the Department of Biomedical Engineering, and a hub for the life sciences at Cornell. Lightning talk topics included an introduction to arXiv, the well-known preprints repository, VIVO, the semantic web application for research networks, the Translational Librarianship Consortium, a collaboration between Cornell librarians and evaluation researchers, DataStaR, a data staging repository in development at Mann Library, TEEAL and AGORA, projects aimed at delivering academic literature in agriculture to developing world researchers, and other projects.

Additional planned visits between the two sites included attendance of several CUL mentor-librarians at the students' initial program orientation session in Syracuse, and at the students' final project presentations for the eScience lab in May 2011.

At the conclusion of the program, SU participants traveled again to Cornell. Students gave presentations on their final projects for the data services course. The day also included a presentation by staff of the Cornell Institute for Social and Economic Research, a presentation of small gifts to the students by their mentors, and a tour of the Macaulay Library of Natural Sounds at the Cornell Laboratory of Ornithology.

Cornell events

In addition to events planned specifically for the mentorship program, students were invited regularly to attend Cornell and CUL

events that might be of interest to them. These included regular meetings of the Data Discussion Group, the Metadata Working Group, various seminars, and CUL's annual Career Development Week. We distinguish this program element from the second (contact with other mentors and CUL librarians/staff) because while students may make contact with staff at an event, it is also possible that by attending one or more events, they derive some benefit whether they interact with staff or not.

Virtual communication: "Greetings from Cornell" messages and the "Day in the Life" blog

While CU and SU are close enough to make face-to-face interaction possible, it wasn't entirely convenient. Busy schedules and individual preferences made virtual, asynchronous communication a good supplement to in-person interaction. To that end, we established a "Day in the Life" blog, with at least one contribution per month by a CUL librarian describing a typical work day. Librarians also contributed entries on conferences they attended, entries related to the job search process from the perspective of a hiring institution and from the perspective of a recent hire, and an entry from a new data librarian reflecting on her first few months on the job. Students contributed as well, writing about their internships and projects following the first summer of the program. All authors had the option to password-protect their entries to allow them to write more candidly about their work than they might otherwise in a completely open forum. Over the course of the entire program, librarians and students contributed 29 entries to the blog.

In addition, the program coordinator sent out biweekly email messages on timely topics, interesting developments in eScience and librarianship, the job search and interview processes, news from CUL, and other topics. To the greatest extent possible, we also tried to facilitate virtual attendance in meetings of the CUL groups noted above.

Career development instruments

We offered students the option of completing two career development instruments to help them identify and understand their own strengths and priorities, with the option to follow up with a library human resources professional to discuss and interpret the results. *StrengthsQuest* helps participants identify and understand their own strengths and offers strategies on how to apply that understanding to work and career. *Career Anchors* helps participants understand what motivates them to make the choices they make about careers – whether they are more highly motivated, for example, by the possibility of ever greater challenge, managerial opportunities, work-life balance, autonomy, or other factors.

Mentorship Program Assessment: Survey Design and Administration

We developed and administered a survey at the conclusion of the program to assess the degree to which the mentorship program helped students achieve intended outcomes in the areas of professional acculturation, projects/internships/other opportunities, and professional development and employment. We asked students to comment on what worked or could be improved upon for each aspect of the program. Mentors were asked to complete a shorter and more open-ended survey. Mentors were not asked to rate program elements in the same manner as students because our intent was to assess outcomes for students, not mentors; however, we did wish to seek general program feedback from mentors to inform possible future programs. Both surveys were administered online using Cornell's installation of the Qualtrics survey software, and most respondents (students and mentors) completed the surveys at the final site visit at Cornell, although a couple of program participants completed the survey later (within one month of the event). Both instruments are available as supplementary files to this paper.

Table 1: Professional acculturation program outcomes. Outcomes are listed in the left column; mentoring program elements are listed across the top. The score for each outcome (and number of responses, excluding "not applicable" responses) is reported for each program element. Scoring scale: 1=very helpful, 2=somewhat helpful, 3=not helpful. "---" indicates there was no survey question for that program outcome and program element combination.

Program outcomes:	One-on-one mentoring	Mentorship network	Group activities	Cornell events	"Greetings from Cornell" messages	"Day in the Life" blog	Career devt instruments
Describe typical elements of a science and eScience librarian's work	1.5 (6)	1.29 (7)	1.71 (7)	1.2 (5)	1.57 (7)	1.17 (6)	---
Define ways in which academic libraries currently engage in eScience or data curation support	1.5 (6)	1.29 (7)	1.43 (7)	1.2 (5)	1.57 (7)	1.33 (6)	---
Explain the professional culture and norms of academic librarianship	1.33 (6)	1.2 (5)	1.57 (7)	1.0 (5)	1.57 (7)	1.33 (6)	---

Each question on the student survey was meant to assess the degree to which applicable outcomes were achieved by the relevant program elements. We didn't consider all outcomes for all program elements, only what we thought were the most logical combinations of outcomes and elements. For each program element, we asked students how helpful that element was for applicable program outcomes. Responses were scored one point for "very helpful," two points for "somewhat helpful," and three points for "not helpful." Students could also select "not applicable," which did not affect a question's score.

Seven of eight students completed the survey. Responses were not required for every question, but on the student survey, all seven respondents answered all of the questions, except for two questions, which had six responses. The results of the student exit survey are reported in Tables 1-3. All eight of the participating mentors completed the survey, and selected comments appear in the discussion that follows.

Results and Discussion

Our discussion focuses on achievement of program outcomes for students, but where relevant, we include comments from mentors as well. Overall, the mentorship program was most successful in achieving professional acculturation outcomes, with all program elements scoring "somewhat helpful" or better (Table 1).

Feedback on the program's success with respect to "opportunity" outcomes (those related to projects, internships, and volunteer opportunities; Table 2) was decidedly mixed, with some students rating the program ele-

Table 2: Project, internship, volunteer, and other opportunity outcomes. Outcomes are listed in the left column; mentoring program elements are listed across the top. The score for each outcome (and number of responses, excluding "not applicable" responses) is reported for each program element. Scoring scale: 1=very helpful, 2=somewhat helpful, 3=not helpful. "---" indicates there was no survey question for that program outcome and program element combination. Shaded cells highlight scores with an average greater than 2, or less than "somewhat helpful."

Program outcomes:	One-on-one mentoring	Mentorship network	Group activities	Cornell events	"Greetings from Cornell" messages	"Day in the Life" blog	Career devt instruments
Develop a project idea/ plan (e.g. for a course assignment)	1.8 (5)	2.2 (5)	2.5 (4)	2.5 (4)	2.5 (4)	---	---
Execute a project idea/ plan (e.g. for a course assignment)	2.0 (4)	2.25 (4)	---	---	---	---	---
Obtain feedback on a project, presentation, or publication	1.67 (6)	2.0 (5)	---	---	---	---	---
Present or publish the results of a project	2.25 (4)	2.25 (4)	---	---	2.4 (5)	---	---
Obtain an internship opportunity	2.0 (4)	2.0 (4)	2.5 (4)	2.75 (4)	2.5 (4)	---	---
Obtain a volunteer opportunity	2.25 (4)	2.25 (4)	2.5 (4)	2.75 (4)	2.5 (4)	---	---

ments "not applicable" or "not helpful." One-on-one mentoring was generally helpful for outcomes related to projects (developing, executing, or obtaining feedback on a project), with the exception of the outcome "present or publish the results of a project." This variability is probably to be expected, as not all students sought the assistance of their mentors in obtaining these opportunities, nor were such partnerships required of students and mentors. In addition, not all mentors were necessarily in a position to provide such opportunities for their mentees. In spite of this, one clear success in this area (not reflected in the survey) was a project completed by students Trisha Adamus and Alison Miner, working with mentor-librarians Dianne Dietrich and Gail Steinhart. This work resulted in a poster presentation at the 2011 LITA National Forum (Adamus and Miner 2011), and a peer-reviewed paper published in the online journal *Issues in Science and Technology Librarianship* (Dietrich *et al.* 2012).

The program was generally successful in terms of selected professional development outcomes (identify personal career strengths and priorities, develop professional contacts) although it was not as helpful for most students in terms of securing a volunteer opportunity or employment (Table 3). This isn't necessarily surprising, as at the time the survey was administered (April of their final semester), most were in the process of applying for jobs. We should note, however, that outcomes related to the job search process (obtaining feedback on application materials,

Table 3: Professional development and employment outcomes. Outcomes are listed in the left column; mentoring program elements are listed across the top. The score for each outcome (and number of responses, excluding "not applicable" responses) is reported for each program element. Scoring scale: 1=very helpful, 2=somewhat helpful, 3=not helpful. "---" indicates there was no survey question for that program outcome and program element combination. Shaded cells highlight scores with an average greater than 2, or less than "somewhat helpful."

Program outcomes:	One-on-one mentoring	Mentorship network	Group activities	Cornell events	"Greetings from Cornell" messages	"Day in the Life" blog	Career devt instruments
Identify personal career strengths and priorities	1.67 (6)	1.67 (6)	---	---	---	1.83 (5)	1.75 (4)
Develop professional contacts	1.4 (5)	1.33 (6)	1.6 (5)	1.8 (5)	---	---	---
Obtain career advice	1.6 (5)	1.83 (6)	---	---	---	---	---
Obtain feedback on employment application materials	1.83 (7)	2.0 (4)	---	---	---	---	---
Obtain a professional reference	1.6 (5)	1.6 (5)	---	---	---	---	---
Obtain an employment opportunity	2.5 (4)	2.5 (4)	2.67 (3)	2.67 (3)	2.5 (4)	---	---

obtaining career advice, and obtaining a professional reference) were favorably scored.

One-on-one mentoring and the mentorship network

We expected these two aspects of the program to be applicable to most or all of the program outcomes. Students reported that both one-on-one mentoring and the mentorship network were beneficial in terms of acculturation outcomes (Table 1). The majority of students reported that they appreciated opportunities to engage with a variety of staff, to learn about the broad range of projects in progress at CUL, and to understand what it is that librarians and library staff actually do:

"The mentoring program created an environment which encouraged the students to seek out advice from the best possible source (mentor or other staff). (…) I felt comfortable contacting any of the mentors with a question, and I was always blown away by the amount of information each mentor gave."

The mentorship network also helped foster a sense of community for students within the program and beyond:

"I loved seeing the mentors out and about in the 'real world' - seeing others at conferences or hearing about their conferences or following them on Twitter - just seeing their ideas out there in the real world, and seeing that they're tackling some of the same issues that we're going to struggle with is encouraging. I feel like when I do get a job, I'll have lots of excellent contacts at Cornell, who I hope will want to continue collaborating with me as much as I do with them!"

One-on-one mentoring was also helpful for three of the four project-related outcomes, but neither one-on-one mentoring nor the

mentorship network were particularly applicable or helpful for those outcomes having to do with employment, internships, or presenting/publishing the results of a project (Tables 2-3). Students were especially appreciative of the opportunities to become acquainted with the work librarians do, and for insights into the hiring process: "I feel that sharing the real world experience of working as a librarian and describing the criteria they look for when hiring librarians helped me focus my studies and projects at SU."

Students varied in how fully they engaged with this portion of the mentorship program. Some took full advantage of it and were paired with mentors who were able to facilitate contacts with other library professionals, or could offer advice on coursework and an insider's view of the profession. Others commented that they did not feel a need to interact with their mentors much or that they did not take full advantage of the opportunity. Comments also included a desire to have at least one more face-to-face event, and suggestions that projects and coursework be arranged to facilitate interaction between students and mentors. One student commented that not all mentors were practicing eScience librarians, and while we made an effort to set realistic expectations in this regard at the start of the program, emphasizing the other and more general benefits to students, it is a valid concern. If eScience expertise had been considered an essential requirement for a mentor, then it would have been necessary to partner with multiple institutions to offer the program. This would have negated the benefit of physical proximity of the two campuses, and would have made the program considerably more complex to manage.

Mentors, for their part, appreciated the freedom to agree to the terms of the mentoring relationship with their mentee, rather than having to adhere to strict guidelines: "We could develop a relationship that worked well for us. The process wasn't very complicated, and allowed for different personalities." They also noted that students and mentors alike were busy and perhaps not able to engage as fully as they might have liked, but appreciated the elements of the program (virtual communication) that periodically reminded them to "check in" and participate. Like students, mentors also voiced an interest in more "face time" and opportunities for collaboration (those that did work on a project with a student reported that it was a positive experience).

Group activities and site visits

Students reported that group activities helped them with several of the associated program outcomes, particularly those having to do with professional acculturation (Table 1). Students valued the broader view that group interaction and discussion gave them, including feedback on presentations, networking opportunities, and learning more about the profession in general. Students and mentors alike indicated they would like more of these activities. One student commented: "I like the opportunity to connect with the mentors in a more formal setting because I feel that we learn a lot about what they are currently doing." According to a mentor, "This was the best part - people had fun, the time was dedicated to interaction, and the activities were good/fun/relevant." Both students and mentors commented that they wished they had more structured activities to encourage interaction throughout the entire group as well as more unstructured time for informal networking.

Students reported that group activities were less helpful in terms of placing students in internship, volunteer, or employment opportunities (Tables 2-3), although it is possible that contacts made at these events were later helpful in this regard.

Cornell events

As with group activities and site visits, students reported that opportunities to attend Cornell events helped them in areas having

to do with professional acculturation, but were less helpful in terms of developing a project idea/plan, or internship, employment, or volunteer opportunities. Students appreciated the window into the workings of an academic library that the Cornell events provided, and voiced a desire for more such opportunities, "The ability to sit in on meetings of the metadata working group provided a unique look into some of the day-to-day responsibilities of different types of librarians, not just science and eScience librarians." Students were also invited to participate in meetings of the Data Discussion Group and individual lectures of interest. Students again noted that the distance between campuses presented a challenge (to the point where some students were not able to attend any events). Timing of events was not necessarily convenient for students, and with the additional time required for travel, they suggested that there be more opportunities for virtual interaction.

Virtual communication: "Greetings from Cornell" messages and the "Day in the Life" blog

"Greetings from Cornell" messages were most helpful for professional acculturation outcomes (Table 1), giving students a sense of the profession but also providing them with current information on eScience topics: "I value seeing what others are reading about escience. The links are usually really interesting." Students and mentors valued the messages for sustaining some degree of connection between mentors and students. Reported one mentor, "It was a reminder about the program, one time it triggered an 'oh, I should get in touch with XXX' and see how she's doing." Mentors also valued the messages for their content: "The Greetings from Cornell messages helped keep me in the loop with the program and developing areas of e-science - I learned good ideas from my colleagues and became more aware of issues that I may not have run across."

The messages were less helpful for connecting students with opportunities, although we often sent news of opportunities (such as job announcements and conferences of interest) as separate messages, which may not have been perceived as "Greetings from Cornell" messages. Some students noted that they didn't feel they had time to read the messages; others requested more tips on useful/ current readings in eScience and data curation, as well as more active discussion of the topics raised in the messages.

Students reported that the "Day in the Life" blog helped them in all the outcome areas that were assessed (professional acculturation outcomes, Table 1). No students reported that "Day in the Life" blog wasn't particularly helpful, although some students commented that they did not have time to read the entries. Those that did read it appreciated it as another vehicle for understanding the work of academic librarians: "Interesting and relevant - helped expand my ideas about librarianship." Even the mentors appreciated the "chance to 'look in on' other librarians and their work." As with the "Greetings" messages, students commented that more active discussion would have been useful. As a practical matter, it might have made sense to streamline the virtual communications, using just email. Most blog authors chose to password-protect their entries, whether or not the piece included anything that could be construed as sensitive or controversial. We suspect authors simply followed the convention established by earlier authors. In any case, remembering or retrieving and then entering a password was cumbersome for readers. Because entries were generally not publicly accessible, there was no particular advantage to the blog as a format for communication.

Career development instruments

Two students took advantage of the opportunity to try these instruments in the first year, and two more did so in the second. One student took advantage of the follow-up opportunity with library human resources.

Those students who did make use of the instruments found them useful for the associated program outcome ("identify personal career strengths and priorities, Table 3). Several students reported they were too busy to try the instruments, and no mentors report using the instruments as a basis for discussion with their mentees.

Benefits to mentors

We didn't explicitly assess the benefits to mentors, although we might expect mentoring to be a professional development opportunity. Ghouse and Church-Duran (2008) cite several potential benefits to mentors, including the development of leadership and people skills, as well as reinforcing personal concepts of ethics and integrity. Cornell mentors reported learning something about the subject matter at hand as well, and appreciated observing the students' development over the course of their program:

"As a mentor, the program really was a professional development opportunity for me also. To be part of a state-of-the-art e-science librarianship program even from the outside gave me a better understanding of developments in this field. I also thoroughly enjoyed getting to know my student and seeing her develop as a newly minted e-science librarian. The change in the whole group from start to finish was pretty impressive and fun to watch."

Conclusions and Recommendations

Overall, students and mentors alike responded quite favorably to the mentorship program. Because we were most successful in achieving professional acculturation and professional development outcomes, it would make sense to either focus future efforts on these two areas, or to modify the program to be more successful in achieving the outcomes related to projects, internships, and other opportunities. Based on the assessment of the opportunity-related outcomes as well as general comments about the program, we think there are four sets of issues where those planning mentorship programs can learn from our experience: time (participants are busy), geography (desire for face-to-face interaction), access to opportunities, and the importance of focusing on mentoring for eScience specifically as opposed to professional development more generally.

Time and Timing

As noted earlier, students and mentors reported being busy and were unable to take full advantage of the program. Designing a program that is better integrated with the students' academic experience might be one way to improve this situation; mentorship program activities that are optional and in addition to academic requirements are likely to be among the first thing a busy student will have to give up when faced with competing demands for their time. Students and mentors reported the desire to build in collaboration or interaction on coursework. Project-based work would be one way to address the challenge of time, but would require more of mentors and might be impossible for mentors lacking relevant expertise.

A very positive aspect of the program related to time and timing is the correspondence between the mentoring program and the chronological stages of students in their degree program. We speculate that early interactions in the program helped to maximize the potential benefits as the students transitioned from science to librarianship at a time when they were absorbing information about eScience, librarianship, and information technologies all at once. Having the support of the mentorship program likely helped make this initial transition stage less overwhelming, and probably contributed to the success of the program in achieving professional acculturation outcomes.

Geography

It is noteworthy to mention that all participants considered even the relatively small distance between the two campuses to be a

challenge. We thought proximity would work to our advantage, and to some degree it did, but nonetheless participants found the distance to be a barrier. Not surprisingly, lack of "face time" is a common complaint for other mentorship programs that cross institutional boundaries. Even in a program that was set up explicitly for mentoring "at a distance" (Earl *et al.* 2004), this was an issue, and participants identified site visits as one of the most valuable aspects of that program. Similarly, feedback on the ALCTS mentoring program indicated that geographic proximity should have counted more heavily in matching mentors and mentees (DeZelar-Tiedman *et al.* 2006). Our program would probably have benefited from at least one or two more in-person events for students and mentors. In terms of inviting students to participate virtually in Cornell events, in spite of the increasingly widespread availability of videoconferencing facilities and lower-cost technologies such as Skype, students were not able to participate as much as they would have liked. Cornell events were not scheduled with student attendance in mind, but some did occur on a predictable and recurring schedule. With advance planning, it may have been possible to factor the timing of predictable events into course scheduling, or even to require participation (virtual or in-person) in some modest number of events as a course assignment. Such a requirement could have raised the bar for Cornell in terms of ensuring access to technology to support virtual attendance, and for a limited number of events, this might have been a practical possibility. As it was, we shared information on a broad range of events but were not always in a position to influence the selection of a venue (i.e. one with video conferencing capacity) or to otherwise arrange for technological support. More careful selection of events of interest and better support (including, possibly, making arrangements for transportation) for fewer events might have addressed this issue.

Access to opportunities

While some students in the program did find it useful for gaining access to opportunities, there are at least three ways mentorship programs could be more successful with respect to helping students find opportunities for internships, projects, and volunteer work:

- Plan to involve mentors in at least one student project. This would require more time and effort for both students and mentors, and some thought as to how to ensure fair grading when a student's performance might be impacted by a mentor's contribution.
- Plan for publication of at least one student project, as a paper, or conference presentation, or poster, with input from or collaboration with a mentor. While the eSLib program did encourage and financially support conference attendance by students and we noted one such collaboration that was very successful, we made no particular effort to encourage all mentors and students to view this as an opportunity to work together. We should also note that an early start on such efforts is crucial, given the long lead or turn-around times required to get a paper published or a conference proposal accepted.
- If support for internships is to be an important component of a mentorship program and an expectation of the academic library partner, it may make sense to have multiple academic library partners. Few institutions can absorb a large number of interns with specialized interests, particularly if the students are seeking internships in the same short time frame (the summer following their first year, in our case). Otherwise, general expectations on mentors' roles in helping students obtain internships and other opportunities should be made clear at the outset: are mentors to advise, connect and refer students on the basis of their own expertise and contacts? If that is the case, not all mentors will be in a good

position to assist students. Other options include trying to equip mentors with tools and information to assist students and encouraging mentors to work together to assist students, appoint one or a few more knowledgeable and better-connected mentors to serve as internship advisors, or to make clear that students should have no specific expectations of their mentors in this regard.

Mentoring with an eScience focus

Finally, we'd like to note the challenge of balancing the need for mentors with relevant expertise with the opportunity to create a real mentorship community. We noted the challenges posed by geographic separation of two institutions that are relatively close, yet if planners of similar mentorship programs wish to recruit mentors with specific professional expertise, they would almost certainly have to recruit from multiple and geographically dispersed institutions. This would make the cultivation of community that we achieved with in-person events much more challenging, and suggests that planners should consider the implications of making that trade-off.

Overall, we're pleased with the results and feedback of the program, and have shared some ideas that could be implemented to offer an even stronger mentorship program in the future.

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