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The Apprentice Researcher: Using Undergraduate Researchers' Personal Essays to Shape Instruction and Services

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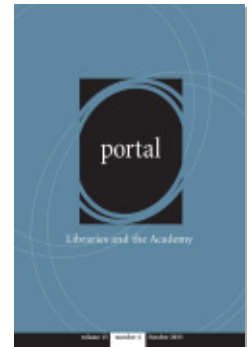
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abstract: Little is known about the intellectual journey of advanced undergraduates engaged in the research process. Moreover, few studies of this population of library users include students' personal essays as a point of analysis in their scholarly pursuits. To gain insights into the research trajectory of apprentice researchers at the University of Michigan, the Library examined the personal essays that students submitted for its inaugural undergraduate research award. These essays chronicled students' intellectual growth and development throughout the research process. Drawing on observations about the unique needs of these students, the authors analyze the implications for library instruction and services.

Introduction

In a study of undergraduate honors theses, Reba Leiding observed that "in larger institutions the evolving needs of advanced undergraduate research are not readily observable."¹ Whereas researchers have engaged in studies of specific facets of the information seeking habits of advanced undergraduate students (such as bibliography analysis, or the examination of search styles), few have focused on their research processes writ large. Moreover, very little analysis of this population of library users has involved students' personal essays describing their research processes. Such observations can raise awareness of the unique needs of these researchers, particularly given

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the changing nature of research methods and resources, and can provide direction for library instruction and services.

The opportunity to explore the research practices of advanced undergraduates emerged at the University of Michigan (UM) Library with the initiation of an undergraduate research award. In order to recognize the exceptional work of our undergraduate students, and gain insight into the nature of their research processes, the UM Library began sponsoring an award for undergraduate research during the 2010–2011 academic year. First introduced in 2002 by the University of California, Berkeley, Library, research prizes for outstanding undergraduate projects are growing in number at academic libraries across the country. As Lynn Jones points out, “the prize emphasizes the quality of research and the student’s internalization of information literacy skills.”²

This prize offered an opportunity to see the outcome of the library research our undergraduates undertake and to analyze the ways in which they utilize library resources. Thus, we not only asked students to submit their research projects for review, but also solicited personal essays that highlighted their research trajectories. Writing about the

The personal essays in our student sample not only provided insights into the nuts and bolts of students’ research processes, but also illuminated their thoughts about the nature of engaging with and creating scholarship.

usefulness of such essays for librarians, Jones states that, “[l]ike a focus group, essays provide a window into the student research experience: the thrill of self-directed learning, the discovery of much larger worlds of information than they had known before.”³ The personal essays in our student sample not only provided insights into the nuts and bolts of students’ research processes, but also

illuminated their thoughts about the nature of engaging with and creating scholarship. In this article, we analyze the essays from our undergraduate award pool in order to fill a gap in the scholarship on research methods: that of the advanced, or, as we term it, apprentice undergraduate researcher. By analyzing these students’ stories, we are better able to open up the research process to an examination of both behaviors and meanings ascribed to those behaviors by the students themselves.

Literature Review: Theoretical Background

Our inaugural research award offered an opportunity to gain clearer insight into the undergraduate research process, especially through the essays that students submitted with their research projects. As Alison Head of Project Information Literacy (PIL) notes, “few articles in the library literature have investigated the undergraduate research process from the student’s viewpoint.”⁴ In addition, Robert Detmering and Anna Marie Johnson recently remarked on the dearth of student voices in research on information literacy; yet, as they further illustrate, students’ literacy narratives can illuminate where students struggle and how they make sense of the research process.⁵ Examining students’ stories about the research process opens up the possibility of understanding not only where students encounter challenges, but also what steps they take to navigate the increasingly

complex system of available electronic and print resources. Detmering and Johnson's work on information literacy narratives illustrates the power dynamics inherent in the research process, especially the frustration that students can feel at being "forced" to undertake a research assignment whose end-goal, in their eyes, is satisfying what can seem like arbitrary and mysterious expectations.

In addition to Detmering and Johnson's work on student narratives, PIL has provided an influential framework for analyzing undergraduate research behavior.⁶ Focusing on the initial stages of research, Alison Head and Mike Eisenberg identify the means by which undergraduates in their study establish research contexts. They identify four activities: 1) establishing a big picture, or background information and selection of a topic; 2) identifying and learning the relevant language, words, and terms associated with a topic; 3) establishing the situational context, which entails identifying the requirements and expectations of the professor; and 4) information-gathering, finding, and accessing relevant resources.⁷ Our own research at the UM Library capitalizes in part on this model, particularly where we see undergraduates establishing the "lay of the land" for their topic. As the PIL studies predict, our sample of researchers would often turn to Google and Wikipedia as an initial source for establishing the big picture and relevant language. However, our findings also suggest that our picture of undergraduate research must take in the interactions students have with campus faculty and librarians, with librarians at other institutions, and with members of the public, both experts and those who can provide primary material for a given research project. In other words, our research suggests that the notion of situational context and information-gathering activities as described by the PIL reports needs to be broadened to take in the activities of the apprentice researcher, a researcher who is motivated by something more complex than the exigencies of a harried effort to secure a grade.

Carol Kuhlthau's groundbreaking study also analyzed the information search process (ISP) in the context of "an imposed rather than a personally initiated information need."⁸ Unlike previous studies that focused on researchers' activities, she studied researchers' affective and intellectual point of view. Utilizing a series of small-scale and longitudinal studies of researchers in high school and college, as well as public library users, Kuhlthau identified a six-stage ISP, beginning with anxiety in the early or "initiation" phases, moving through feelings of confusion as researchers try to fit new information into what they already know, to a sense of confidence and, ultimately, relief as the process concludes. The uncertainty felt at the outset of the ISP is often connected, Kuhlthau found, to researchers' inability to identify what types of information they need. Kuhlthau's focus on "academically capable" researchers corresponds with our study's emphasis on apprentice researchers.⁹

While the PIL and Kuhlthau studies are important, they tend to assume, whether as an unarticulated premise or as a result of the demographic nature of the respondents, a particular kind of research assignment: something like the semester-end term paper, a research project that is contained within the temporal limits of a semester-long course and motivated by a class requirement. Likewise, Detmering and Johnson primarily emphasize the voices of students who are resistant to, or mostly frustrated by, the research process, or those who see it as a pointless requirement from which they gain little satisfaction. Similarly, PIL assumes that undergraduate research tends to happen in the context of



assignments in which undergraduates do not feel personally invested, as well as in the physical and virtual boundaries of the library and its collections. Their research further implies a dichotomy between beginning and advanced researchers seen elsewhere in the information literacy scholarship.¹⁰ In other words, when studying undergraduate researchers, it is common to emphasize the novice researcher as an outsider to disciplinary expectations and to ignore the advanced undergraduate researcher in favor of faculty or graduate students already embedded in their field of study. On the whole, research that emphasizes this dichotomy between undergraduates and graduate students and faculty often recommends library interventions that focus on point-of-need service, rather than a more nuanced approach to research strategies that include the wide range of student ambition, motivation, and engagement with material.

Gloria Leckie provides an explanation about why novice researchers follow different research paths than expert researchers. According to Leckie, faculty and other expert researchers “are very familiar with who is writing on particular topics, so following a citation trail (rather than doing a literature search) may be the preferred method of

developing a research idea.”¹¹ She contrasts this approach with the beginning researcher who would need to conduct a literature search, read review articles, and spend time sifting through a great deal of literature to determine who the key researchers are. Likewise, Claire Warwick et al.¹² and Melissa Karas and Ravonne Green¹³ emphasize students’ desires to find information quickly and easily, preferring convenience over

The aggregate picture that emerges is of an undergraduate researcher somewhat alienated from his or her own research, under the duress of needing a good grade, and in a hurry to procure that grade.

anything else. The aggregate picture that emerges is of an undergraduate researcher somewhat alienated from his or her own research, under the duress of needing a good grade, and in a hurry to procure that grade. As Head and Eisenberg note,

Unsurprisingly, what mattered most to students while they were working on course-related research assignments was passing the course (99 percent), finishing the assignment (97 percent), and getting a good grade (97 percent). Yet, three-quarters of the sample also reported that they considered carrying out comprehensive research of a topic (78 percent) and learning something new (78 percent) of importance to them, too.¹⁴

In light of the first set of statistics, which are witnessed anecdotally by faculty and librarians every day, it is easy to forget the second set of statistics. As Andrew Abbott concludes in a study conducted for the University of Chicago’s Regenstein Library, and as backed up by our findings, such a snapshot of undergraduates-at-large does not necessarily reflect the core life of research, either in a library or at a university, where there exists a small, but passionate, group of researchers who are also the heaviest users of library resources and services. Abbott suggests that librarians might do better to think of their constituencies as falling into the categories of heavy users and light, or non-users, each category being drawn from across the populations of the university and determined largely by disciplinary needs and conventions rather than levels of scholarly engagement

or disengagement. According to this analysis, heavy users from all three populations—undergraduates, graduate students, and faculty—have more in common with each other than they do with light or non-users. In fact, Abbott found that the heaviest users do not privilege any one kind of library resource over another (say, print over electronic, or vice-versa), but rather use all of the available research resources and do so at much higher rates than the remainder of the university population.¹⁵ Likewise, our research suggests that, for a full picture of undergraduate research, we must take into account those researchers who are deeply engaged by their work and who take advantage of a whole range of resources, not all of which will be found in the library building or among the library's electronic or physical resources.

On the whole, few have analyzed the research practices of advanced undergraduates who have a more sophisticated disciplinary background than the novice researcher, but are still in the early apprenticeship phase of their studies. As we will demonstrate, our findings were very different from those of Detmering and Johnson, PIL, and others, all of whom tended to point to students' immense frustration about the research process, a sense of research as an "ordeal" that often takes place "within a context of isolation."¹⁶ While the students in our sample described the challenges of research, especially when they encountered dead ends, the overwhelming number ultimately described their experience as a positive one whereby they sought to join their voices to that of a scholarly conversation by making an original contribution.

Of particular interest to the present study is that this sample of students represents a self-selected group, advanced in their engagement with research. Similar to investigations of honors students often described as deeply committed to their research and closely mentored by faculty,¹⁷ or advanced-level students who express the positive outcomes of hitting and overcoming walls in their research,¹⁸ this group of students took initiative for their learning, often worked closely with faculty, and described the advantages of the nonlinear nature of the research process. However, this particular student sample also represents a broader, more diverse constituency than honors students or seniors alone (as described below). These students' personal essays provide an important snapshot of this constituency, the library's core constituency for its research mission, at work at a particular moment in their intellectual development.

The material we analyze presents, in students' own words, the processes and intellectual journeys represented by their research. Our purpose here is to open up some questions: what might be the implications for library instruction from what these apprentice researchers, a collection's core set of users, have to tell us? To the extent that they represent an incipient mastery of the very thing that library instruction exists to cultivate, library research, what might their accounts of research tell us about what and how we should teach students who might, for example, receive a one-off library instruction session in a gateway course? Recognizing that these students are in our classes, even in our instruction sessions for beginning students, means that we must consider ways to pitch our instruction at multiple levels so as to engage both the student who simply wants to fulfill the minimum requirements for an assignment *and* the ambitious student who sees the research paper as an entry point to a discipline. Beyond library instruction sessions, these results have implications for a wide range of services, including consultations, outreach, and programs.



Case Study Design

The present study takes advantage of documents submitted by students and their faculty advisors as part of the UM Library's Undergraduate Research Award. Those documents in turn generated the 34 cases that we analyze in this paper. This section gives an overview of the award process and of the nature of the supporting documents that constituted the cases that we examined.

The UM Library's award structure was based in part on the programs at the University of Washington's Odegaard Undergraduate Library and the College Library at University of Wisconsin, Madison, with prizes given to six students for outstanding library research in the form of exceptional papers or projects at the end of the academic year. The award committee, comprising four undergraduate librarians and two subject specialists, received 34 applications from a broad range of departments and disciplines, including work from the sciences and from students in their first or second year. Undergraduate honors theses represented 32 percent of the applications, and four projects were submitted from the Undergraduate Research Opportunity Program, a program wherein undergraduates assist faculty with their research projects. Most submissions came from the humanities or social sciences (34.4 percent and 59.3 percent respectively) and were produced by students in their third or fourth years, predominantly seniors. However, one of the top awards went to a poster researched and prepared by a sophomore Engineering student. On the whole, students in this group represent a cross-section of budding researchers on the university campus.

In order to be considered for the award, students were asked to submit a copy of the student's research paper or project; a personal essay; a bibliography; and a faculty letter of support. The award committee created a rubric that provided guidance for analyzing the personal essays, bibliography, and final research projects.¹⁹ For the personal essays, the award committee looked at the sophistication of the search strategies used, students' comprehension of the material, and the use of appropriate resources. Regarding the bibli-

ography, the committee evaluated the depth and breadth of sources listed, including those sources that bespoke an eye for the unexpected connection across fields or bodies of resources, as well as the consistent and correct use of citations. The committee scored the final projects by considering the degree to which each project opened up original perspectives on its source materials and topic, the quality of its writing and presentation, the depth of the student's understand-

The committee scored the final projects by considering the degree to which each project opened up original perspectives on its source materials and topic, the quality of its writing and presentation, the depth of the student's understanding of the topic, and the quality of citation and documentation of sources.

ing of the topic, and the quality of citation and documentation of sources. Over the course of several weeks in April 2011, the committee reviewed each project and narrowed the pool of possible award winners. Based on the extensive and creative ways that students

made use of libraries, consulted with librarians, and used library tools to support their research, the committee was able to identify the top six winners.

The students' personal essays regarding their engagement with research and the supporting letters submitted by sponsoring faculty, supply the sample for the present analysis. The prompt for the students' personal essay was written with the intention of eliciting something more than a list of resources used (although that was also important information to us); we hoped to gather a fuller sense of students' intellectual development of their projects, and the ways in which the materials turned up by the search shaped their lines of inquiry. The prompt read in part,

In the personal essay, communicate the specifics of the process you went through in researching your project and give the Award panel a sense of how your ideas and methods *changed and responded* to your research. Accomplished research reflects not only comprehensive searches and methods, but also allows the results of those searches and methods to shape the final product. Thus, the panel is interested in the growth both of your project and of your skills as a researcher.²⁰

In other words, students were prompted to describe the ways in which sources and research shaped each other. These student essays serve as our primary subject of analysis in this paper; however, we will also examine the faculty recommendation letters to discern any patterns that might exist with regard to their expectations of student research habits.

Methodological Approach

For this case study, we applied techniques of narrative analysis to the 34 personal essays and faculty letters. Although narrative analysis can be used in conjunction with statistical methods, it is not necessarily a statistical methodology, but rather looks to identify patterns and structures in the narratives people construct about their behavior and their culture, and seeks to identify evaluative statements that convey the meaning attached to structures and events in the narrative. Narrative tends to draw out perceived lines of causality, and, by analyzing personal narratives for both structure and meaning, the investigator can gain a deeper understanding of how subjects interpret their own behavior and experience.²¹ By identifying these structures and evaluative statements, narrative analysis can help investigators to develop a taxonomy of terms used by the subjects themselves to describe both behaviors and meanings ascribed to those behaviors. Such a taxonomy helps to open a window into a particular culture (here, the culture of the apprentice researcher) through accounts of that culture and its values given by that culture's constituents themselves.

In the present study, the personal essays solicited by the competition give a detailed account both of the research behaviors that went into the undergraduate research projects and of the subjects' own best sense of the meaning of those behaviors. Two coders evaluated the 34 statements to identify patterns of recurring research behaviors, the most prominent of which are discussed below (for example, gathering initial knowledge, establishing a sense of authority, building a network). These essays were also coded for evaluative statements; that is, those statements that identify the subjects' own sense of the meaning and significance of their behavior. As our analysis bears out, these evaluative statements tended to highlight and interpret subjects' experience of the "meandering"



nature of library and archival research. In addition, three coders evaluated the faculty support letters both to analyze what faculty value in student research and to gain greater insight into the ways in which research methodology is being taught.

Overview of UM Library Findings

Scoping out the field at the beginning of the research process

Students in our sample used a variety of means to scope out the issues relevant to their research topic(s). Their process of grounding their knowledge in their topics, as well as gathering literature for the first phase of their research, was deep and broad, involving conventional approaches to research (seeking out print books and journal articles, searching for materials in online subscription databases), as well as evolving methods for gaining insights into their topics (extensive use of the free Web and social media). Throughout the course of this initial research process, students honed their search strategies, and even adjusted or refined their research question(s) in response to material they were uncovering. This section presents examples of what we learned about the trajectory of these students' initial research process.

Perhaps unsurprisingly, students tended to draw on their personal backgrounds or life experiences as catalysts for their research topics. Whether they wanted to better understand their own family histories or social identities, or address lingering questions after completing a volunteer project or internship, over a third of the students specifically mentioned personal experience as an impetus for their work. For example, one student reported that after volunteering at a substance abuse treatment facility, she was inspired to find methods that might support earlier recognition of substance use disorders. Another student shared that he "sought to learn more about my ethnic heritage and familial legacy through this project." Given the personal nature of many of these projects, as well as the high caliber of their final products, this insight may present opportunities for library support or intervention when students are first making decisions about how to proceed with a research project or topic.

Once students began looking for material on their topics, establishing a sense of authority among their sources was an essential step in their initial research process. Approximately a quarter of the students remarked that they attempted to validate authorial credibility by assessing the quality of the primary and secondary sources used by a particular scholar, or by attempting to discern the integrity of publishers, professors, and universities in the works they consulted. Additionally, some students sought to understand the author's perspective or bias, as well as the peer review process and its implications for the material they were reading. As one student noted, "I had to understand their beliefs and at the same time acknowledge potential biases in their experience." These steps demonstrate the level of complexity students incorporated into their research processes. In fact, students often referred to authorial credibility as key to shaping how they proceeded with their projects. As one student remarked about her group project, "Finding information on [professors and universities who were the leaders in their fields] and reading their papers helped us understand how to fine-tune our topic." Students in our sample showed an awareness of the importance of sifting through sources and identifying what one student described as "the most prominent literature in the field."

This quest to discern scholars' credibility reflects a key component of students' research processes, as documented by PIL. PIL reported that forty percent of respondents considered an author's credentials either "often" or "almost always" when working with library materials on a research project.²² We observed from students' personal essays that they were incredibly resourceful in figuring out ways to gauge authority and that they used a broad range of strategies and tools to achieve this goal. In addition to the aforementioned strategies, several of these approaches included talking to professors, tracking down citations, and referring to citation indexes.

Another key thread that emerged throughout students' essays was figuring out how to navigate an immense scholarly universe and glean the important material to include in their projects. Half of the students referred to the use of sources to get to other sources, in order to dig deeper into a topic, argument, or conversation. Students tended

to chase footnotes, pursue the works of authors who piqued their interest, and mine scholarly bibliographies, all to expand their knowledge on a subject. One student commented, "Although it seems simple now, this was a strategy that I had never fully utilized in the past....Through researching and writing my senior thesis, I learned that finding one or two solid sources through initial searches will help push the research process forward." Another student observed, "Once I found an article I could understand, I was able to use additional key words from that article" to retrieve supplementary sources. In evaluative statements, the majority of students mentioned the importance of this element of research retrieval, which often led them to understand the evolution of a concept or topic, and to identify gaps in that history that might be compelling to address. For example, one student discussed how he teased out the history of the conversation on his topic, noting that he built his line of inquiry on gaps in one of his research paper's conclusions. These accounts suggest the degree to which the activities of finding reliable sources and formulating an original contribution were complementary activities.

As one might expect, nearly a third of our student sample mentioned that they sought initial background information on their research topics from the free Web, through sites such as Wikipedia, Google News, YouTube, and traditional Google and Bing search engines. However, material from these sites was not a stopping point; rather, students often expressed that this was a necessary beginning, either as a first step in surveying current issues in their fields of interest, or as a conduit for serendipitous learning. In fact, this method of initial inquiry often led to a much larger, more complex research process that included consulting scholars in their fields, visiting archives, and making use of professors, student colleagues, graduate student instructors, and a range of libraries and librarians. What we might consider nontraditional sources of information, such as YouTube, Google, and Facebook, in many cases led to the discovery of unique materials students had not found elsewhere, such as recorded interviews, public broadcasts, and symposia proceedings. For example, a student who studied the incorporation of community outreach initiatives in *telenovelas* mentioned that she used Facebook to find

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a *telenovela*'s page, wherein "I discovered links to blogs about the series and other primary source postings about the show." A similar trajectory facilitated connections with researchers in students' areas of interest (for example, one student used Google to find a network of former Black Panther Party members and allies) and to citation support for new forms of media (for example, one student needed to learn how to cite Facebook). For another student, a simple Google search returned background material on an issue that eventually led to her thesis topic.

Students not only used the free Web in creative ways to support their research, but their evaluative statements indicated that they displayed critical thinking skills in these endeavors.

Students not only used the free Web in creative ways to support their research, but their evaluative statements indicated that they displayed critical thinking skills in these endeavors. For example, one student expressed that while she was able to gain momentum in her project by using the free Web, she eventually recognized a need to consult library resources and abandon her "dependency on Google." Another student reported, "I realized that my reliance on Google Scholar was introducing systematic biases into my research." Such insights may help librarians

consider ways to discuss with students best practices for using the free Web, as well as how the library's subscription resources complement the research process.

Creating a Research Network

As we have noted, students' essays demonstrate not only how important it is for apprentice researchers to scope out the field in order to understand their topics, but also to figure out who has authority in their areas of research and where the opportunities for an original contribution lie. Additionally, we had a chance to learn more about their process for accomplishing these goals. As discussed in the previous section, the students in our study were highly innovative in the ways in which they scoped out the field, and their ability to do this was aided heavily by their facility and willingness to seek out associates who could help them at different stages of their projects. Rather than working solely with a faculty member or librarian, these researchers sought a wide array of potential collaborators, including faculty, graduate students, librarians, and researchers working on similar topics at other institutions.

As students scoped out the field and developed their topics, they drew heavily on their professors' expertise, as well as that of their graduate student instructors. On the whole, faculty and graduate student expertise was a richly tapped resource that shaped much of our students' research process. According to Leckie, asking for guidance from a professor is a strategy "that many undergraduates are the most reluctant to use, even though it might save them an incredible amount of time."²³ Yet, we found this to be one of the key strategies used by our research award applicants. This approach reflects these students' awareness of scholarly engagement among faculty and graduate students, as well as a move away from novice (and toward more expert) researcher strategies. Approximately one third of the students shared that they had significant contact with

their instructors as they developed their topics. Faculty and graduate students were particularly useful not only in helping to shape the direction of their arguments, but also in identifying what was considered to be the key scholarship in their field.

Perhaps more striking is the extent to which students reported seeking assistance and advice from scholars or relevant contacts outside of their institution. In a recent article on researching women's literary history, June Howard affirms that "participation in a network of researchers is indispensable" to the research process for senior scholars,²⁴ and our case study suggests that it is crucial for undergraduates as well. In fact, nearly a quarter of our applicants showed little hesitation in contacting people with whom they had very little connection, and this strategy yielded positive results. For example, one student contacted a researcher who had given a presentation at a conference that was findable on the Web, but restricted behind a paywall. Not only did the researcher send along the text of the presentation, but she also sent additional unpublished research. Another student contacted the authors of a study relevant to his paper, who in turn shared a database of background information that they had compiled for their research. A third student contacted international security experts to conduct interviews, "some of which [sic] had written the papers that [he] read for the project."

Students were also active in contacting librarians both on campus and at other institutions in order to identify collections that housed relevant materials to their projects. Over half of the student researchers in our applicant pool had significant contact with librarians as they conducted their research, whether it was through course-related instruction sessions or through chat, text, e-mail, or in-person consultations. One student "e-mailed librarians at several institutions to see what relevant material was available." Drawing on the information she received, she submitted a grant proposal and was awarded funding to visit an archive in Massachusetts. For another student, an introductory library instruction session was what made the research process possible: "At first, finding relevant resources using the library system seemed overwhelming. I grew up in a very small town, where the library is literally only one room large. One of the biggest things this semester that helped me dive into the research process was a workshop that the library conducted for [my] Research Methods lab." Librarian-run research sessions not only helped students find materials, but also helped students realize that librarians are available and approachable, an insight that empowered students to engage with librarians at other institutions in person and online.

In most cases, students moved beyond the library instruction session to seek out additional consultation with subject librarians. Students reported connecting with librarians at myriad service points, including at various libraries across campus, at libraries outside of campus, at archives, through chat, and through subject or course-specific online research guides. In at least one case, a student working on an interdisciplinary project sought out multiple librarians from multiple specialties. Students found their interactions with librarians extremely productive. One student reported that the skills she learned in one-on-one sessions with a subject specialist were "crucial to the success of [her] project." In another case, a student worked closely with a special collections librarian who "became a mentor and directed [her] to some of the collection's best materials."

This evidence of advanced researchers drawing on librarians as a key resource is striking in light of recent PII results that indicate that eighty percent of respondents



“reported that they did not use librarians for help with a course-related research assignment.”²⁵ As a participant in the PIL study, the University of Michigan Library received a breakout of statistics culled from its own student users, among whom “over seventy percent of students claim to never/rarely use a librarian as a resource.”²⁶ While these are undoubtedly high numbers, our study suggests some other ways to interpret them. On the one hand, students who are motivated to make use of librarians do not hesitate to do so, and they report that they benefited as a result. Likewise, out of approximately 27,500 undergraduates at the University of Michigan,²⁷ approximately 8,200, by their own report, do contact librarians when they are seeking out more resources. In our opinion, 8,200 motivated users who recognize and take advantage of librarians as a resource in their research is a respectable number. Overall, as these students attest, the advanced undergraduate researchers are extremely proactive about finding resources and seeking help when they need it.

From the point of view of understanding current student research methods, the narratives in our sample contribute to the literature by demonstrating an unexpected level of networking that, if not necessarily new in student work, is greatly facilitated by the increasingly networked world of the Web. These students used both traditional means and the Web to create research networks that helped them to scope out the scholarly

These students used both traditional means and the Web to create research networks that helped them to scope out the scholarly field, find resources, and collaborate with scholars both at their home institutions and at other schools, libraries, and archives.

field, find resources, and collaborate with scholars both at their home institutions and at other schools, libraries, and archives. The facility with which students were able to make contacts outside of their institution is one of the many ways in which research has changed in recent years. Twenty years ago, reaching out to researchers at other institutions would have been much more difficult, as it would have involved making contact either

through the phone, in person, or through the mail. Snail mail interactions would have taken too long for the usual semester-long research paper, and telephone or in-person contact would have been more intimidating. Now, however, it is much easier for students to locate contact information on the Web, and it is relatively easy to send an e-mail to a stranger. In this way, students today are much more easily plugged into a Web-based research network.

*Meandering process of scholarly inquiry*²⁸

Much writing on undergraduates emphasizes students’ struggle to understand the complexities of the research process and their impatience with the painstaking nature of research. While this may be true of many students, the apprentice researchers who submitted projects for this award not only displayed a high degree of sophistication in their research process, but often an enthusiasm for the complexities of scholarly inquiry. The students followed multiple research paths (including scrolling through extensive

microfilm reels), asked probing questions about their topics, and drew on advice from faculty, librarians, and other scholars to direct their energies. As opposed to an arbitrary search, students used a variety of methods to find information and engage in the scholarly conversation. Based on what we saw in the research accounts, it is not always easy to draw a clear distinction between novice and senior researcher; rather, students brought an engaged, nuanced approach to the research process.

A significant factor distinguishing these students' work was their appreciation of the meandering process of scholarly inquiry as described repeatedly in evaluative statements, including the Eureka moments and the unavoidable road blocks. Students showed flexibility in adapting their ideas to extant literature on their topics and addressing gaps in knowledge. As one student put it, "I learned to shift and adapt my hypothesis to integrate already existing research with my original idea." Students also fine-tuned their topics in response to what they found in their sources, and appeared to benefit from moving between writing and researching in order to focus and develop their ideas. In one case, a student reported, "The drafting process continuously prompted me to reconsider how I used [sources]." In another case, a student recognized the need to reformulate her hypothesis "if I wanted my study to be situated in the literature." Approximately one fourth of our student applicants came to realize that there was something productive about hitting a wall in the research process.

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As one student noted, "I learned not to abandon an idea at the first appearance of a potential challenge." As many students realized, struggling with a topic (or with finding sources on a topic) led to a useful shift in emphasis. One student reported, "I was totally thrown off my intended course and for a while felt that my project had no direction. In retrospect, this was undeniably the most significant turning point in my research process...." Recognizing students' willingness to grapple with challenges and the non-linear nature of the research process can inform how librarians think about teaching strategies for finding materials and incorporating the uncertainty of the research process into instruction sessions (as opposed to canned searches in library instruction sessions). Although canned searches are beneficial for demonstrating resource access and retrieval, as well as library services, they do not always model the iterative process by which research is actually conducted; hence, students see neither the real frustrations and pitfalls of research, nor the real rewards.

Part of this iterative process for our student sample involved a movement back and forth between types of resources and disciplinary approaches: free Web, consultations, books and articles, databases, primary sources, and libraries (both on campus and beyond). Students did not solely rely on readily available material, or even material housed at their institution; instead, they culled resources from a broad range of locations and showed considerable creativity in identifying possible sources of information. In one case, a researcher began with a popular source where there was accessible language (such as in *New York Times* articles) and used that source to develop a list of keywords and relevant names with which to search for court cases in *LexisNexis*. In other cases,



students tracked down witnesses to an event or inhabitants of a region of interest and recorded their stories. In this way, these student researchers assembled their own archives, created new knowledge, and made materials available to future researchers. In fact, one student contacted former Black Panther Party activists in order to interview them about the party's health care initiatives, an aspect of their activities that has gotten little attention and thus was not recorded in the available archives. These interviews will be incorporated into the University of Michigan's social protest archive in the Special Collections Library. Overall, our analysis seeks to expand the findings of studies such as PIL, which are indispensable to librarians and teachers, by suggesting that the conceptual categories we apply to undergraduate researchers need to take into account the genuine passion and ability possessed by many of these researchers.

As evidenced by their essays, the students in our sample demonstrated persistence, ingenuity, and enthusiasm for their work. Students expressed that their projects were rewarding and significant in developing their research acumen and their sense of themselves as intellectuals. The personal essays clearly articulated that undertaking a research project is a significant endeavor both intellectually and personally. As one student put it, her project "ultimately resulted in my appreciation of research as the dynamic process through which we make sense of the world." Considering the wide range of research experience represented in the sample (from a freshman seminar paper to honors theses), it is clear that in all library instruction scenarios we want to consider ways not only to introduce students to resources and services, but also to create opportunities for those who are motivated to dig deeper into their research projects.

Faculty Insights

In addition to the student essays, which afforded a deeper awareness of the research trajectories of undergraduates, award applicants provided letters of support from faculty members who taught or mentored them during their research process. These letters were a source of insight into how faculty members view the success of a project or paper, what they consider effective work, and, to some extent, the ways in which faculty are teaching research methodology both inside and out of the classroom. In their recommendation letters, faculty were specifically asked to describe how the student's final project was relevant to the course assignment and learning goals, whether the sources used were appropriate for the scope of the argument and its method, and whether the methods of research and argumentation were consistent with disciplinary standards.

Although our case study was not specifically designed to gauge faculty involvement in teaching research methodology to apprentice researchers, the students' personal narratives and faculty letters of support nevertheless gave us considerable insight into the ways in which research methodology is being taught in the undergraduate classroom. In only three cases did students describe learning research skills from faculty members in a classroom setting, and very few faculty described teaching research methodology to the class as a whole. Although eight faculty members described designing assignments that would teach basic research skills, and three students mentioned having been brought to the library for an instruction session, the majority of research instruction described by both students and faculty happened in one-on-one settings, between either a faculty

member or librarian and a student. In many cases, students described getting feedback on their topics from their professors, either in office hours or through written comments on a proposal. In these discussions, professors pointed students toward specific sources and strategies relevant to the individual project. Students on the whole found these individual mentoring sessions highly productive; as one student wrote:

This research project taught the importance of communicating with my professor and GSI. The meeting... ended up inspiring the choice of topic of the paper, and [my professor] was extremely helpful as well. He introduced me to sources...which I would not otherwise have considered but...added an important dimension to my paper.

While it is not particularly surprising that so much research instruction happens in one-on-one situations, the practice has some significant implications. Judging from our findings, the students who are most consistently benefitting from research instruction are those who approach their professors. Although it has always been the case that students who go above and beyond the basic expectations for a course often get the most benefit, these findings also

suggest that students across the board are not systematically receiving the same level of research instruction. In addition, the one-on-one research instruction characterizing most faculty / student interactions in this case study focused almost entirely on the specifics of a particular topic on which a student was working, and where that particular student was in the research

process. For this reason students and faculty found these interactions particularly effective. This individualized, topic-responsive instruction contrasts dramatically with the one-shot, full-class sessions with librarians that constitute most students' introduction to the research process. While it is likely not possible to scale library instruction so that every student can meet individually with a librarian, our findings suggest the need for designing library instruction to teach generalizable research skills within the context of individual projects.

Additional insights emerging from the analysis of faculty letters were faculty attention to and appreciation of the student research process. In particular, faculty advisors praised students' extensive and diverse use of material when researching their topics, and the perspective-taking that students demonstrated. For example, one impressed faculty member stated that "[My student] made sure she read every article she could on her topic, and tried to figure out any related topics that she could further research." Another professor was struck by his student's comprehensiveness in research methodology as well as the originality of the topic: "The result was a paper that was not only excellent for undergraduate work, but also wholly original in terms of the scholarship." In addition to this faculty member, several professors mentioned the exceptional nature of their student applicants, many of whom went "above and beyond" project parameters to create original and compelling work. In fact, not only did the students learn a great deal

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from their research, but faculty themselves learned a lot from their students' work. As one professor noted, "I think I learned as much or more than my student did." Another remarked, "[My student's] discovery of library resources also helped me a lot to get familiar with the UM library as a new faculty member." Similarly, faculty admired the initiative their students demonstrated in pursuing their topics. "I offered [my student] guidance along the way, but she worked very much on her own and in doing so has proved herself to be an original and critical thinker who can efficiently conduct advanced research and can develop and explore original approaches to her research subject."

Several faculty members also noted that their students were continuing work on their research projects beyond the confines of the assignment, in order to prepare for publication or presentation. This highlights the unique nature of undergraduate research apprenticeship, and reinforces the idea that faculty mentors introduce these students to a particular field of study in a meaningful way. As a result, students often commit to contributing to that field and are inspired by their work. The library also has a role in this process. At this particular institution, the university press, the scholarly publishing office, and the institutional repository for scholarly work are all housed in the library. Subject specialists, and librarians who work in departments dedicated to scholarly communication, not only have the opportunity to cultivate budding authors, but also to guide them through the publication process.

These windows into faculty members' impressions and experiences also offer opportunities for librarians to strengthen, as well as further market, their roles in the undergraduate research process. Librarians are consistently working to demystify the research process for undergraduates, in order to help students feel enabled and empowered to see themselves as capable researchers. While we are not always perceived as collaborators in the research journey, librarians are uniquely positioned to help students go beyond the minimum requirements posed by an assignment and consider a range of sources, dig deeply into a topic of interest, recognize multiple perspectives, and become impassioned about research. Marketing the value of librarians' pedagogical and information literacy skills allows us to complement traditional classroom education and extend students' learning.

Implications for Teaching

What can we learn from these findings to improve teaching and learning in the library? The sample represents a small and self-selecting group motivated by strong personal interest in their projects, a picture of the undergraduate researcher seemingly at odds with the vast majority of undergraduates who receive instruction from librarians. However, it is important to remember that this group of undergraduates represents the library's most committed constituency and its heaviest users of collections and services. As a point of reference, it may be useful to note that Abbott estimates a core research constituency that totals only about two percent of all possible users; nevertheless, his report advises that the University of Chicago library orient its collections and services around that constituency.²⁹ Indeed, Chicago's recent additions and renovations to the Regenstein library developed out of the recommendations of that report.³⁰ Furthermore, orienting instruction and services to a library's heaviest users can have positive side

effects for the rest of the undergraduate population. As George M. Dennison notes in discussing the ways in which Honors programs can enrich the educational environment for non-honors students,

The pattern and impact of participation [in Honors programs] provide good and relevant evidence for the thesis that, if offered opportunities for access to enriched, demanding, and intellectually rewarding academic experiences, students and faculty over time will take advantage of them, and by their example and leadership, inspire their peers to insist on more active engagement and higher quality in all aspects of undergraduate education.³¹

In light of these arguments, librarians should consider ways to address the needs and interests of the apprentice researcher.

One hint for instruction lies in the stories students told through their personal narratives, from an interest in a topic that was “close to home,” to the initial canvassing of sources via the free Web, to the frustrations of not finding what they had hoped was there (or of finding that too many people had already trod that particular research path), to the opening up of avenues of research and entire archives through personal contacts and relationships. Above all, this picture of undergraduate researchers is one that holds out the possibility that students are savvy and engaged, rather than passive and resigned, and are active participants in their educations, ready to be persuaded to the challenges and rewards of research. The apprentice researchers who took part in this award offer a story that can be used as a model for moments of intervention in the library classroom. There is no formula for instruction; indeed, the best instruction will involve collaboration between the librarian and instructor and will be deeply woven into the syllabus and assignment sequence of a given course. Nevertheless, the personal narratives from this award suggest the following ways of intervening in library and research instruction.

Help students to see the ways in which library research is often deeply personal, and capitalize on this fact. This recommendation does not suggest sacrificing intellectual depth for personal narratives, but rather helping students tap into their interests and passions when developing research topics. In fact, faculty advisors often mentioned in their recommendation letters that they were struck by students’ enthusiasm for their projects. One professor noted, “I have been impressed by [my student’s] passionate and persistent engagement with this ambitious topic” and another stated, “[My student] is so involved and passionate about her project that, even though she is finishing her Bachelor’s degree in May, she will continue working on her paper... to submit it to an academic journal.” How can librarians model the move from personal interest to a viable research topic? Can librarians open up space in the instruction classroom for allowing students to make connections between the course material and their own interests? One of the most challenging moments for librarians comes when they are asked to design a session for a class whose research assignment is too far off in the future to feel urgent to the students (or, in some cases, when there is no research project on the horizon at all). Such sessions—often premature or hypothetical—often feel like heavy lifting for librarians as they struggle to maintain students’ attention. However, such sessions can also provide an opportunity for librarians to engage students in a conversation about possible research topics related to the course material. Why did the students take the course in the first place? What have they been talking about in class? What has sparked the most heated discussions? Giving



students opportunities to reflect on what their own relationship is to a class—and then using these connections in the session to suggest research paths—can allow students to feel connected with the research process.

Help students to see the ways in which research is neither linear nor without stumbling blocks, and that both of these qualities can elicit research's most profound rewards. Librarians often present research as a highly organized and systematic process when, in fact, as evidenced in the personal essays, students engage in an iterative and nonlinear process. Apprentice researchers use varying and imaginative strategies to ascertain the authority of sources, familiarize themselves with their research field, and formulate an original approach to their sources. As the personal essays demonstrate, students are open to changing the direction of their projects based on the information they gather or the obstacles they encounter; indeed, such changes of direction are fundamental to the process. The unsystematic and serendipitous nature of the research process suggests a need to offer students an array of strategies for researching a topic.

What would our sessions look like if we allowed more room for those roadblocks that students in our award pool ultimately found most productive? Possibilities might range from on-the-spot searching for topics that the students generate (and that might turn out to be too broad, too narrow, or otherwise tricky), to posing a question with no “right” answer, but that requires students to reformulate or re-conceive a problem. Librarians might draw on students’ personal interests to propose research scenarios that address a student’s query: What sorts of sources might we use to answer that question? Where might we start looking for materials? What knowledge can we glean from particular resources (or not)? Allowing students a chance to propose and experiment with multiple strategies can help them to understand that there is no one approach to any possible topic—and that topics will get re-shaped in response to what they find (or don’t find).

Emphasize the degree to which research is about relationships with other people. Most obviously, this means the relationships students already have with their professors or graduate instructors, with librarians, and with each other. Beyond that, library instruction can be an opportunity to demonstrate the ways in which research, and scholarship itself, is an entry into a conversation. Modeling scholarship as conversation can mean pointing out the kinds of networks that many of the students in our award pool were able to identify and draw upon. Such modeling might involve using a single text as a source of information, not just about a topic but about the scholarly network: Who is it citing? What books sit next to it on the shelf? What subject headings are associated with it? What other scholars does the author refer to in setting up his or her argument? How do you use those leads to establish a network associated with a topic?

Talking about research in terms of a scholarly network can help students understand the characteristics of scholarly literature: author credentials, bibliographies, and the contours of scholarly conversations. Librarians struggle to help students understand the context of scholarly discourse: Why is there such a thing as scholarly literature, and why is it important that students use it in their research? Students are often aware of terms like peer review, but when we ask them what it means, why scholarly communication matters in the academy, and why it is important to cite sources, the gaps become apparent. The idea of a scholarly community, and the fact that students are a part of that community, are not always clear to our students; mapping a scholarly network with students can help make that idea more concrete.

Furthermore, as our findings suggest, the process of doing an advanced research project helps our students to understand their contribution to the scholarly conversation. As a result, we need to think more creatively about the way we teach scholarly authority. The students in our sample represent a group that is ready to move beyond a discussion of the differences between scholarly and popular sources, and we can engage other students like them in a more complex conversation about the nature of scholarly research by talking about scholarly communication at a conceptual level, as well as how it drives resource searching on a practical level.

Design instruction sessions so that we engage students at multiple levels, including that of the apprentice researcher. One of the challenges of developing new strategies for teaching research methods is that students come to our classrooms with varying levels of experience and motivation. Given that many of the undergraduate students in our sample are engaging in a level of research more akin to graduate-level work, how can we engage apprentice researchers in the library classroom? Some answers have already been given above: drawing on students' personal interests; affording students an opportunity to try out a variety of research strategies; modeling the challenges inherent in the research process; and helping students see themselves as connected to a research network. Additionally, as we found in students' personal essays, it is useful to think of the instruction session as only the first in a series of conversations with students about their research; encouraging students to follow up with library instructors, or with subject specialists in their fields of inquiry, can extend the possibilities for learning beyond the one-shot session.

Based on the insights we gained about one-on-one instruction, another possibility is to work with faculty on a workshop model of instruction; for example, two UM librarians recently attended an undergraduate seminar on the day that the students were workshoping their research paper proposals. Rather than leading an instruction session for the entire class, students were divided into small groups, each led by one of the librarians or the faculty member. In this scenario, librarians incorporated personalized research instruction into discussions of each student's proposed paper topic. Judging from our findings, seeking similar pedagogical opportunities would be an effective educational strategy because it allows librarians to teach research in the context of students' needs and interests.

Implications for Services

At the UM Undergraduate Library, a conversation has been ongoing about the best ways to serve undergraduates: is it by providing the convenience of chat and text reference so that we can meet them at their point of need, or is it by providing in-depth one-on-one consultations? Our sample makes clear that undergraduates have varying levels of research needs, including point-of-need assistance and long-term mentoring. A common stereotype of undergraduates often assumes that students are working at the last minute, looking for the quickest solution to the need for outside sources in their papers. While this stereotyped student is often a key constituency in our libraries, our award pool demonstrates that an awareness of the needs and motivations of advanced undergraduate researchers should also be a component of any reference training and should be taken into consideration during reference interactions. Training reference and



instruction staff to recognize the needs and abilities of the apprentice researcher working on in-depth projects will help us hone our approaches to the diverse user communities that we serve.

As the students' personal essays demonstrated, interactions with both generalist and specialist librarians were key to the academic success of our award winners. Students made extensive use of subject specialists, and these relationships complemented students' previous experiences with introductory library instruction and reference assistance, particularly for in-depth research needs. Many of the award submissions were from upper-level students who worked with subject specialists, likely due to library connections made in their departments. However, there were also submissions, and at least one award winner, from the sophomore rank who were not necessarily connected to the library's subject specialists. As our findings reveal, undergraduate librarians in the classroom have the opportunity both to develop mentoring relationships with students and to leverage the expertise of subject specialists by making sure that all students know how to identify and contact them.

Conclusion

The introduction of an undergraduate research award at the University of Michigan has far surpassed expectations. Not only did we succeed in engaging students in a library initiative, but these students challenged some basic assumptions about undergraduate student research behavior. Overall, the students in our sample were a self-selected group who considered themselves serious researchers. Their personal essays gave us a unique opportunity to evaluate how advanced undergraduates are conducting research and

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how librarians might more effectively help them. Unlike previous library literature that has presented polarized modes of research between “expert” and “novice” researchers, the students in our undergraduate research award pool demonstrated sophisticated, persistent, and hybridized methods of inquiry. We examined narratives from undergraduate students who went to great lengths to conduct in-depth research, expressed enthusiasm for the process, and even chose to submit their projects for consideration for a research award. Instrumental to

their research processes was the ability to use obstacles productively—students would hit a wall in their research, and, after a period of frustration and often despair, would find a new resource that sent them down a totally different path, opened their minds to a new way of thinking, and led them to a very different topic or research question than they initially thought they would pursue. It provided them a major “ah-ha” moment that signified a palpable growth in the sophistication of their research strategies.

The insights that we gained from the student essays—as well as the projects themselves—invite innovation in instruction and specialized services for the apprentice researcher. At this point, it is too early to judge how wide an impact this award process has had on faculty and student perceptions of undergraduate research; however, the impact on library instruction and services has already begun.

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