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## **Lighting the Fire: Gathering Fuel to Build an Undergraduate Research Program**

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# **LIGHTING THE FIRE: GATHERING FUEL TO BUILD AN UNDERGRADUATE RESEARCH PROGRAM**

**HAILLEY FARGO**

## **OVERVIEW**

Libraries continue to explore ways to be collaborators with undergraduate research experiences. For students to emerge as scholars, they must exhibit information literacy skills and learn how to enter their disciplinary conversations. However, based on the setup of undergraduate research programs, traditionally, libraries might only be used for its space and auxiliary resources. This paper will showcase how an information literacy award, given to emerging student-scholars, helped to build a robust undergraduate research program across multi-campus library system that includes both large and small campus communities. In giving out this award, the library identified opportunities for intervention and became a key stakeholder in supporting undergraduate research across the Commonwealth.

## **UNDERGRADUATE RESEARCH & LIBRARIES**

Within higher education, undergraduate research has been embraced as a meaningful student engagement. This embrace started with the 1998 Boyer Commission report, which outlined a new university ecosystem where students and faculty would collaborate and be both learners and researchers. Even before the Boyer Commission report, Ernest Boyer wrote about his vision for “a more inclusive view of what it means to be a scholar” (1990, p. 24). Since then, institutions have continued to consider the role of the undergraduate student as an emerging scholar, who is learning about disciplinary conventions through the process of conducting meaningful research.

As with many student engagement opportunities, various definitions exist for undergraduate research. For the purpose of this contributed paper, undergraduate research will be defined using the definition provided by the Council on Undergraduate Research (CUR), a major organization focused on exploring undergraduate research within higher education. CUR defines undergraduate research (UGR) as “An inquiry or investigation conducted by an undergraduate student that makes an original intellectual or creative contribution to the discipline” (n.d.). A UGR experience provides students the ability to learn about their discipline, work closely with a faculty mentor, develop “skills in demand” that can be applied to future jobs (Altman et. al., 2019), and refine career plans, including the decision to pursue graduate school. Empirical studies, many within the sciences, have confirmed positive students gains (Ausubel, 2000; Handelsman et. al., 2004; Seymour, Hunter, Laursen, & Deatoni, 2004; Lopatto, 2007; Osborn & Karukstis, 2009; Laursen, Hunter, Seymour, Thiry, & Melton, 2010; Lopatto, 2010).

Academic libraries are a natural fit in supporting undergraduate research and librarians have sought out ways to be involved with these initiatives. As Hensley and Davis-Kahl mention in their introduction to a collection of case studies involving undergraduate research and libraries, “UGR has high expectations of students; hence, there is a clear role for librarians to engage with faculty and students as the library is positioned to teach and mention information skills and issues, central tenets of the research process” (2017, p. xxiii). Current library support for undergraduate research varies; Hensley, Shreeves, and Davis-Kahl (2014) found that libraries provide a spectrum of support for undergraduate research that includes physical space, digital resources, instruction, personalized workshops, and publishing support. This spectrum of support varies depending on the institution, how undergraduate research opportunities are organized and conducted, and the relationship the library has with stakeholders on campus.

## UNDERGRADUATE RESEARCH AT PENN STATE

Penn State University is a multi-campus institution, with 24 campuses across the Commonwealth and a robust online education program. In total, Penn State's 2018 enrollment was 97,136 students; 82,098 of those students are undergraduates (Penn State, n.d.). Each campus has a unique set of students, some who stay until graduation, and others who transfer to another campus. Campus size varies as well; while the University Park campus has 46,000 students, there are campuses with under 1,000 students. Penn State is a decentralized system, making it difficult to track opportunities such as undergraduate research. Based on an internal task force report from 2013, around 50% of Penn State students take part in undergraduate research opportunities (Senate Task Force on Undergraduate Research). This informational report also identified barriers for undergraduate research at Penn State: lack of a centralized office, deciding what counts as a UGR experience, uncertainty regarding how students are trained to do this work, a need for increased professional development and support for faculty who mentor undergraduate students, and a need for increased availability and publicity of opportunities. Many of these barriers still exist today, but as the Libraries continue to focus energy and resources on UGR, our structure allows for support that could help combat some of these issues.

Within the Libraries, we are "one library, geographically dispersed." Logistically, we have one Dean of Libraries and everyone in the Libraries, throughout the Commonwealth, reports up. We share materials, ideas, and with the recent additions of strategic librarian positions, we have begun to align our approaches. Within an aligned approach, we value the campus community, the experts (library staff) who know the ins and outs of their campus and student body and strive to do work that fits our individual campus community, while sharing the same values and strategies for making this work meaningful. This built-in collaboration and aligned approach has set the Libraries up to be leaders in within Penn State for effectively and efficiently working across the Commonwealth.

Each spring, Penn State campuses host undergraduate research exhibitions to celebrate student scholarship. In 2014, the University Park library created "The Information Literacy Award." This award focuses more on the meta of the student research; students receive this award when their research showcases excellence in information literacy skills and use of library resources through the following areas: research process and strategies, source selection, source integration, citations, and social, ethical, or economic considerations in accessing information. During the research exhibition, judges from the library would review student posters and ask questions to assess the students' information literacy skills.

In 2016, a donor stepped forward to endow an Information Literacy Award Grand Prize given at the University Park exhibition. The grand prize is \$500 and became the biggest award given out at the exhibition. In 2017, the Libraries used additional endowment money to enable other campuses to give out this award. In the first year of offering monetary support, nine campuses gave The Information Literacy Award. However, each campus operated independently and used different rubrics to evaluate student work. While it was great to see this award offered at multiple campuses, the Libraries knew that an aligned approach would be needed in order to ensure that every student who received an Information Literacy Award was evaluated in similar ways. When the author of this paper stepped into the Student Engagement Librarian position, one of the biggest projects was to create an aligned approach to The Information Literacy Award and at the same time, begin to build a strategic program to support undergraduate research.

## CREATING AN ALIGNED APPROACH TO SUPPORT UNDERGRADUATE RESEARCH

In Spring 2018, 17 campuses indicated interest in The Information Literacy Award. Representatives from each campus library met to discuss our new approach. Subcommittees were formed to help distribute the work and the larger group of representatives met three times before the exhibitions in April. The biggest priorities for the author's first year of leading the aligned approach included:

- Shared rubric to evaluate student work;
- Graphic to help begin to brand the award across the Commonwealth;
- Workshops to support students before their exhibitions
- Community of support within the Libraries for giving out this award.

Creating a common rubric was the highest priority for the Libraries. A subcommittee met to discuss the criteria and review rubrics used by various campuses in 2017. They decided to evaluate students based on their depth of knowledge around each criterion: from developing to exemplar. Our criteria stayed the same from previous iterations of the award; we evaluated students on their research process and strategies, source selection, source integration, citations, and social, ethical, or economic considerations in accessing information. The full rubric we created can be found in Appendix A. In creating this rubric, we knew the process would be iterative; this rubric would not be perfect, and we knew we would make revisions in the following year. Once the subcommittee approved the rubric, we shared it widely with the large group and encouraged our colleagues to note challenges and successes with the rubric, which would inform revisions in the second year.

Another group of colleagues met to create our first workshop-in-a-box. The goal of this model was to empower anyone, at any campus, to host a workshop that would support students in undergraduate research experiences. Each workshop would have clearly defined learning outcomes, a prepared slide deck, and shared assessment. Colleagues that would want to host a workshop simply had to download the materials, edit the slides slightly to reflect individual campus information, and they would be ready. In our first spring, we created one workshop: Designing and Creating Effective Research Posters. The Box folder with all the necessary materials was shared with the large group and once again, we encouraged our colleagues to make notes on what worked well and what could be fixed with this workshop. During the first spring, five campuses held this workshop on their campus.

## **Year One Results**

Seventy-four students across 17 campuses were recognized with The Information Literacy Award in Spring 2018. While each campus had to use the same promotional graphics and rubric to evaluate student work, campuses got to make decisions around how they would give out this award. Some campuses asked students to opt-in to the award, providing a smaller pool to posters to evaluate in short period of time. Other campuses had the opportunity to review posters before their exhibition, and only evaluated information literacy skills found in the poster and any additional information the student provided. Campuses like University Park evaluated both the visual poster and then asked questions to the student to understand their research process. Through each exhibition, we learned more about how our students participate in undergraduate research and opportunities for future library support.

## **YEAR TWO: AN ITERATIVE PROCESS**

After the Spring 2018 exhibitions, feedback was formally and informally gathered. Four topics emerged as priorities for the next year: developing best practices and promotion of the award, revising the rubric, creating more workshops, and designing a new rubric to evaluate creative accomplishments (beyond the poster format). The author of this paper created charges for each of these subcommittees and sought volunteers from the group she had worked with in the spring. The subcommittee work began Summer 2018 and continued through the fall semester. The only subcommittee that was disbanded was the creative accomplishments rubric, due to time constraints. A brief overview of each subcommittee's work is found below along with the results from our second year.

### **Best Practices & Promotion**

This subcommittee focused on two major projects: renaming The Information Literacy Award and beginning to understand the various groups on each campus that organized the undergraduate research exhibition and the barriers for the Libraries in being full participants in these campus discussions.

In conversations with students and disciplinary faculty, it was clear that The Information Literacy Award did not resonate with this audience. If the Libraries wanted to grow this award (and support leading up to our exhibitions), a new name might help. The subcommittee came up with a variety of names, mainly focused around the idea of our students becoming researchers through this process and tried to avoid an award name with primarily library jargon. With a handful of names, the subcommittee created a survey and sent it out to all library employees who had been involved in Spring 2018 with this award. These library stakeholders had one week to rank the name choices. Twenty-three responses were collected the award name changed to: The University Libraries' Undergraduate Research Award: Excellence in Information Literacy. Our graphic was updated accordingly to reflect our name change (see Figure 1).

### **Figure 1: Graphic for the University Libraries' Undergraduate Research Award: Excellence in Information Literacy**

<Placeholder; Editors will place Figure here in final doc>

A landscape survey was the second project this subcommittee worked on in order to better understand how undergraduate research was valued and discussed at our campuses. Sixteen campuses responded to the survey, providing information on when their exhibitions are held, who are the major stakeholders in hosting these exhibitions, how the campus library is involved with undergraduate research, and barriers for the library's participation. This survey provided a starting spot and benchmark for the Libraries. As we continue to build out our program of support, we have insight on the structure and challenges our campuses face, which will allow us to build a flexible and dynamic program to meet the many needs of our students. The landscape survey will be more heavily utilized in the coming year to help inform priorities and potential work of subcommittees.

### **Rubric revision**

No rubric is perfect and our Spring 2018 exhibitions allowed us to see where the rubric could be tweaked. The rubric revision subcommittee had a lot of feedback to help guide our conversations. The first step this subcommittee took was establishing learning outcomes for each criterion. This allowed us to frame and explicitly state what we were looking for in a student poster and

helped to establish the skills levels. Our revised (and current) rubric, paired with our learning outcomes can be found in Appendix B. We also created a more robust set of questions (Appendix C) that could be used in the judging process. Not every question needed to be posed to students, but the subcommittee felt that if judges had a variety of questions, this would provide them with options. The subcommittee presented the new rubric to the group in early Fall 2018 and we have asked for feedback as we prepare to iterate on the rubric in Summer 2019. However, the one challenge we still face with our rubric is the abundance of library jargon; the full rubric best fits on a legal-size sheet of paper. We have learned that some campuses ask faculty to help judge the Libraries' award and are not always ready for our rubric. This will be a consideration as we begin to look ahead to another version of this rubric.

### **Workshops in a Box**

Our final subcommittee focused on growing our collection of available workshops. Using feedback and insight gathered from Spring 2018, this group decided to create two new workshops: a general getting started with research workshop, aimed at students who were either interested in knowing more about undergraduate research, or were in the beginning stages of their research project and a workshop focused on preparing students to speak at the exhibition about their research and research process. These two workshops were created and the previous year's designing and creating an effective research poster workshop was revised. The subcommittee envisioned that these workshops could be done as a stand-alone workshop, but also would fit nicely as a suite. In addition to building up our workshops, the subcommittee also reviewed the workshop content with our rubric, in order to ensure that we were teaching the things we would evaluate students on during their exhibitions. Four campuses utilized the workshops in Spring 2019 and only the University Park campus used the workshops as a suite. More work will occur in Summer and Fall 2019 to create any additional workshops and investigate why campuses may or may not be using these workshops.

### **Year Two Results**

Nineteen campuses participated in giving out The University Libraries' Undergraduate Research Award and we were able to recognize 105 students. The growth of both the number of campuses giving out the award, and the students who received it is incredible and exciting. Once again, we have learned about our students and undergraduate research experiences and are in the process of gathering feedback from all who were involved.

### **NEXT STEPS & CONCLUSION**

The Libraries continue to make large strides in supporting undergraduate research at Penn State. With two years of exhibitions under our belt, we are excited for making changes and continuing to grow our program of support. In the upcoming months, working subcommittees will form once again, to tackle the next set of projects. We look forward to integrating the work of Willison and O'Regan (2007), who have created a framework for research skill development. Their work could guide our workshop in a box series and be a conversation starter with faculty who mentor undergraduate research experiences.

During the two years of coordinating this award, the author of this paper believes that an aligned approach allows the Libraries to be in a position to support our students in undergraduate research. Being involved in exhibitions across the Commonwealth allows us to see what these experiences look like and where our students need information literacy skills to do their work even better. From an institutional standpoint, giving this award out across the Commonwealth demonstrates our "one library, geographically dispersed," and has been a way for us to provide feedback to the university on how to work across the Commonwealth more effectively.

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## APPENDIX A

### 2018 Information Literacy Award Rubric

<b>Criteria</b>	<b>Beginning skill set</b>	<b>Developing skill set</b>	<b>Accomplished skill set</b>	<b>Exemplary skill set</b>
<b>Research process and strategies</b>	Student's research process is not mentioned in the project/entry.	Inclusion of basic research process is attempted; is incomplete or vague. Student has a hard time articulating their search strategy.	Most of the research process is shown, but there are still some places where it's unclear how the student arrived at that source/information	Research process is clearly shown through keyword searches, subject headings, a description of their search strategy, etc.
<b>Source selection</b>	Sources are irrelevant and/or inappropriate, and do not contribute to the goals of the project or fit the information need. Sources might only be from an advisor or PI.	Sources demonstrate a weak understanding of how to select relevant and appropriate sources and match them to the goals of the project and fit the information need.	Generally, selects relevant and/or appropriate sources that match the goals of the project and information need.	Sources are relevant and/or appropriate, come from a variety of places, and match the goals of the project. It's clear the student understands discipline standards.
<b>Source integration</b>	No evidence is used to support or contextualize arguments; research project appears to have been done in isolation	Frequently fails to integrate evidence to support or contextualize arguments, which interfere with the ability to interpret claims.	Generally, sources are integrated to support or contextualize arguments, but there are some obvious omissions.	Evidence is well integrated throughout with all arguments supported & contextualized. Student has articulated how their research ties into the scholarly conversation
<b>Citations</b>	There are no citations on the poster and visual elements are lacking proper credit/citations, making it impossible to locate original sources.	Sources and visual elements are cited in the incorrect disciplinary format and some citations have been omitted entirely.	Sources and visual elements are documented in an appropriate disciplinary format, but with a few errors and inconsistencies.	Sources and visual elements are cited in an appropriate disciplinary format consistently and completely throughout.
<b>Social, ethical, or economic considerations in accessing information</b>	Project does not showcase the student grappling with ideas around the access or creation of information used for their research/project	Student has begun to engage with ideas around access to information but hasn't fully reached the understanding of considerations around production of information	Student recognizes their role as a producer of information and how they participate in the scholarly community, and role of source types (commercial, subscriptions, open access, etc.)	Student not only recognizes their role as a producer of information, and also recognizes their information privilege and access to information

## APPENDIX B

### 2019 Undergraduate Research Award Rubric

	<b>Learning objective</b>	<b>Beginning – 1</b>	<b>Developing – 2</b>	<b>Accomplished – 3</b>	<b>Exemplary – 4</b>
<b>Research Process and Strategies</b>	The student is able to identify relevant keywords and appropriate databases in order to develop and efficient and effective search strategy.	The student cannot explain or show evidence of having used keywords or selected databases / resources appropriate to their project.	The student can articulate or provide evidence of a search strategy, but keywords may be limited to obvious ones for the topic, and database / resource selection may be general such as Google or the Libraries' discovery layer.	The student can articulate or provide evidence of a search strategy and an evolution of keyword development through the search process. Database / resource selection is discipline-specific in addition to general.	In addition to all the criteria in "Accomplished" the student also uses advanced search strategies such as using the bibliography of relevant works to find sources, using Web of Science citations, browsing through key journals in their field, or using advanced database features such as controlled vocabulary.
<b>Source selection</b>	The student is able to select the most relevant information in order to support their research question and form a cohesive understanding of the scholarly conversations happening around the topic.	Sources are irrelevant and/or inappropriate and do not contribute to the goals of the project or fit the information need. Sources might be from an advisor or PI.	Only some of the sources are relevant / appropriate and match the goals of the project or fit the information need.	All sources are relevant and appropriate and match the goals of the project or information need.	In addition to all the criteria in "Accomplished" sources are diverse and demonstrate in-depth knowledge of the breadth of scholarly conversation in the discipline.
<b>Source integration</b>	The student is able to integrate sources into their own work in order to contextualize how this project fits into the larger scholarly conversation as well as recognize how their prior knowledge might contribute to how they integrate sources and enter the scholarly conversation.	No evidence is used to support or contextualize arguments; research appears to have been done in isolation.  Student's prior knowledge is limited to interjecting opinion into the project.	Evidence from other sources does not support or contextualize the arguments, which interferes with the ability to interpret claims.  Student's prior knowledge is opinion based and may interfere with the ability to balance their opinion with the ideas of their selected sources.	Sources are integrated to support or contextualize arguments.  Student's prior knowledge allows them to balance their own opinions with the knowledge of their sources.	Sources are well integrated to support or contextualize arguments, and the student can articulate how their research adds to the scholarly conversation around this topic, whether filling a gap or furthering a conversation.  Student's prior knowledge allows them to acknowledge their own biases and that is accounted for in the project. This prior knowledge might also allow them to use the sources in a more sophisticated way.
<b>Citations</b>	The student is able to cite their sources appropriately in order	There are no citations on the poster and visual	Sources and visual elements are cited but may be using	All sources and visual elements are documented in an	All sources and visual elements are cited in an

	to give appropriate credit for the ideas of others.	elements are lacking proper credit / citations making it impossible to locate original sources.	the incorrect disciplinary format, no traditional format, or some citations may be missing entirely.	appropriate disciplinary format but with a few errors and inconsistencies.	appropriate disciplinary format consistently and completely throughout.
<b>Social, Ethical, or Economic Considerations in Accessing Information</b>	The student is able to articulate the cost of accessing subscription-based research resources in order to grapple with ideas of access and privilege in the information economy.	The student does not acknowledge that information has a cost or that access is limited based on institutional affiliation (or lack thereof).	The student acknowledges that some information is found freely on the web and that some is found through Library databases but can only vaguely describe that that means about cost and access.	The student acknowledges that some information is found freely on the web and that some is found through Library databases and can describe the impact that might have on their own research and that of others.	In addition to all the criteria in "Accomplished" the student also acknowledges that as an information producer they need to think about how they share their own research with a broader community.

## APPENDIX C

	Questions
<b>Research Process and Strategies</b>	<ol style="list-style-type: none"> <li>1. How did you determine your keywords and what databases to use? Did you seek out any help in this process?</li> <li>2. Why did you pick [x database]? How did you know [x database] could help answer your research question?</li> <li>3. Did you talk to your faculty mentor/PI/professor to learn what are core journals or conferences for your discipline?</li> <li>4. How did you use your search results to find additional sources?</li> </ol>
<b>Source selection</b>	<ol style="list-style-type: none"> <li>1. What was your research question?</li> <li>2. What was the information need of your project?</li> <li>3. Are the sources selected appropriate for the discipline?</li> <li>4. What criteria did you use to evaluate which sources were most appropriate for your project?</li> </ol>
<b>Source integration</b>	<ol style="list-style-type: none"> <li>1. Why did you pick this research topic? Did you have any prior knowledge on this research topic before you got started with this project/lab?</li> <li>2. Who are other scholars doing this research? Whose work are you building off of for your research?</li> <li>3. Who are others in your field doing this type of research? How does your work/project complement, complicate, or add to the conversation around this topic?</li> </ol>
<b>Citations</b>	<ol style="list-style-type: none"> <li>1. What citation style did you use and why did you use this style? Did you have any challenges using this style?</li> <li>2. Are any of your visuals on your poster created by someone else? If so, how did you go about giving them credit for their work?</li> <li>3. If you did not create the visuals yourself, where did you find the images you used for your project, and how did you determine the creator's permission for use?</li> </ol>
<b>Social, Ethical, or Economic Considerations in Accessing Information</b>	<ol style="list-style-type: none"> <li>1. How do you think the results of your research poster/project would have changed if you did not have access to a certain database/journal? What's the impact?</li> <li>2. With your results, who have you shared your project with? Do you have any plans to share this more broadly, in your discipline or in the general community? Why does your project matter? To your discipline? To society?</li> <li>3. How did you pay for the information that you accessed?</li> <li>4. Which of the resources that you used will you still have access to once you graduate?</li> <li>5. How would you have found this information if you were an independent scholar?</li> </ol>

**Images for Tables and Figures (Editor will put in body of the text later)**

**Figure 1**



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