

Undergraduate Research Survey: Students Satisfied but Desire More Mentor Guidance in Managing Projects and Accessing Secondary Sources

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ABSTRACT

This research examines students' undergraduate research experiences at a medium-sized institution in the Mid-Atlantic region and aims to analyze students' perceptions by identifying shared characteristics in executing research. Based upon survey analysis (n=68), the results imply that 23 participants (34%) struggled with time-management while completing their research projects. A total of 12 participants (18%) believed that accessing and using library databases was not applicable to their projects, six participants (9%) did not successfully access and use library databases, and nine participants (13%) had trouble accessing information related to their research topics. This study recommends ways in which researchers and mentors can improve their practices to enhance the undergraduate research experience.

Keywords: facilitate, time, faculty, library, resource

INTRODUCTION

Many scholars have recognized undergraduate research as an impactful educational practice (Chmielewski and Stapleton 2009; Kinkead 2003; Pita, Ramirez, Joacin, Prentice & Clarke 2013; Rowlett, Blockus & Larson 2012; WUSTL 2013). However, the process of conducting undergraduate research is not the same in all instances (Chmielewski and Stapleton 2009; Kinkead 2003). The wide range of disciplines on any college or university campus, ranging from science and engineering to arts and humanities, leads to vastly different experiences and expectations for each student researcher and faculty mentor (Chmielewski and Stapleton 2009; Kinkead 2003). Though the undergraduate research experience differs from person to person, outcomes of excellent undergraduate research seem to be universal. Scholars have found that excellent undergraduate research depends on mentor engagement in the research process (Chmielewski and Stapleton 2009; WUSTL 2013), disseminating and showcasing students' work (Pita et al. 2013), and institutional commitment in supporting student research (Kinkead 2003; Rowlett et al. 2012). Unfortunately, hurdles may arise that hinder

these best practices, and researchers must prepare to overcome them.

LITERATURE REVIEW

Kinkead (2003) claims that a "hallmark" of undergraduate research is a faculty mentor who engages with and guides a researcher (6). Mentors are essential to the planning, development, and implementation of undergraduate research projects (Kinkead 2003; WUSTL 2013). If a student or faculty member is not entirely committed to the research project, that project's value greatly diminishes (Chmielewski and Stapleton 2009). To maximize mentor engagement, WUSTL (2013) created its own best practices that outline faculty mentor intervention in each stage of undergraduate research. WUSTL (2013) claims that before starting the research process, the faculty mentor should work with the researcher to design a manageable project with a reasonable budget. Throughout the research process, the mentor should develop a meeting schedule to set deadlines, discuss appropriate time management skills, and provide feedback (WUSTL 2013). When research is complete, the mentor can review materials that the researcher produced, such as

posters and manuscripts (WUSTL 2013). Pita et al. (2013) further advise mentors to encourage participation in the broader research community, which leads to dissemination—another characteristic of successful undergraduate research.

Kinthead (2003) and Rowlett et al. (2012) state that disseminating and showcasing undergraduate research rewards hard work and enhances the research experience. By disseminating and showcasing projects, both students and faculty mentors gain concrete recognition and contribute new knowledge to their discipline (Rowlett et al. 2012). Dissemination can take many forms, such as published articles in peer-reviewed journals or student-centered conference presentations (Rowlett et al. 2012). Rowlett et al. (2012) assert that conferences are especially rewarding in that students can gain experience presenting, receive feedback on their projects, and generate new ideas by engaging with others. In general, recognition depends on an institution's willingness and capability to support student and faculty efforts, which is why institutional commitment is also integral to a successful undergraduate research experience (Rowlett et al. 2012).

Institutional commitment means that college or university personnel provide appropriate resources for researchers and recognize students and faculty who engage in undergraduate research (Rowlett et al. 2012.) Kinthead (2003) claims the lack of institutional recognition is a “stumbling block” of undergraduate research (13); however, institutional recognition is an important step in the post-research phase in that it increases the sustainability of undergraduate research initiatives (Rowlett et al. 2012). Institutions can offer support by funding opportunities for recognition at venues beyond the institution, such as research conferences, to make travel expenses more affordable for researchers and faculty mentors (Rowlett et al. 2012).

Another way institutions can contribute to undergraduate research is by providing sufficient library resources, which allow students and faculty to search for information, prepare proposals, and investigate new ideas (Rowlett et al. 2012). Library resources include access to literature, timely interlibrary loans, information literacy and development of

research skills (Rowlett et al. 2012). In terms of research literacy, Gilbert, Knutson & Gilbert (2012) suggest institutions integrate a library component into undergraduate research methods courses. They find that professors are often disappointed by the quality of references in research papers, which often contain non-scholarly sources from the Internet (Gilbert et al. 2012). It is imperative undergraduate researchers not only have access to library resources but also have the capability to access them (Pautz and Gauder; Gilbert et al. 2012).

Student researchers enjoy positive and rewarding experiences when they work with engaged faculty mentors, showcase their scholarly work, and receive support from a committed institution. But what are the barriers inhibiting and facilitating impactful research practices, and how can faculty mentors and student researchers overcome obstacles and drive success? The purpose of this study is to investigate the opinions and behaviors of college students to better understand what enhances and diminishes the undergraduate research experience across disciplinary boundaries.

METHODS

Participant

A total of 112 undergraduate students from a medium-sized institution in the Mid-Atlantic Region participated in this study. To complete the survey, participants had to (1) start a research project prior to taking the survey and (2) plan to present or publish the results. A total of 68 out of 112 participants completed the entire survey. Participants included Learning Center tutors, Writing Studio tutors, and presenters at the institution's annual research conference. At the end of the survey, students had the opportunity to submit their email address for a chance to win a Starbucks gift card.

Development of Survey Instrument

A 50-item, full-scale survey (Appendix 1) was adapted from a 50-item, pilot survey that the primary researcher developed and tested on 75 students. Pilot survey participants included peers and students across the country who participated in the York College of Pennsylvania Naylor Workshop for

Undergraduate Research in Writing, a three-day event in which students develop research projects by engaging in seminars, collaborating with teams of experienced scholars and peer researchers, and crafting research artifacts. The pilot survey suggested that participants were confused by the definition of undergraduate research. This confusion prompted revision to include the definition of undergraduate research in the full-scale survey. In the pilot survey, participants were asked if they had completed their research for a course grade; this question was meant to weed out participants who were either obligated to complete projects or had only completed smaller-scale practice projects. The question regarding course grade was deleted for the full-scale survey because it eliminated too many participants in the pilot survey. To be sure that the students who participated in the full-scale survey were serious researchers, the full-scale survey asked participants if they planned to disseminate their findings beyond the classroom.

Full-scale survey questions were based on the elements of successful undergraduate research. The survey consisted of close-ended multiple-choice questions; close-ended Likert rating scale questions; and open-ended short-answer questions. Upon completing the questions for one research project, participants were asked if they had an additional project to share. If they selected yes, they were prompted to the next page; if they selected no, they were redirected to the end of the survey. Because of low participation rates for questions regarding additional projects, results examined in this study only include responses that correspond to the first project each participant shared.

Administration of Survey

To gain a representative sample of students from all departments, a request was made to the institution's Director of the Institute for Public Service and Sponsored Programs to administer the survey via email to students who were to participate in the institution's annual conference of student research. Conference presenters provide an excellent sample because they represent all disciplines. With permission from the Learning Center Director, the survey was also

administered to tutors to ensure a larger sample size. Students participated in the survey on their own time. The survey took approximately 15 minutes to complete. The response rate was 24%.

Analysis of Results

After the survey closed, the data were examined using quantitative and qualitative analysis. For the Likert scale questions, a descriptive analysis was conducted to determine students' overall perceptions of their research experiences. A qualitative analysis for the open-ended responses was accomplished by exporting the results to a Microsoft Excel spreadsheet and reading through the responses. The primary researcher then examined each response, creating categories for similar responses. Similar categories were then condensed into a single category to minimize the number of categories. Categories were color-coded to correspond with each type of response. Responses that corresponded to more than one category, were color-coded for all applicable categories. The "other" category contains responses with the lowest percentage of respondents.

RESULTS

This survey was designed so that participants could share their experiences with multiple projects, but many participants only chose to share a single project. A total of 28 participants (41%) of the 68 participants who completed the entire survey responded that they had started two or more projects for presentation and/or publication purposes. However, only 12 participants (18%) decided to share more than one undergraduate research experience. Those who did share more than one research experience shared two at most. Of the 112 participants who started the survey, 44 of whom did not complete the entire survey, 85 participants (76%) conducted undergraduate research and 81 participants (72%) planned to publish or present their research. This means that only four participants who conducted undergraduate research did not plan to publish or present it.

Table 1. Rating scale statements.

	Strongly Agree	Agree	Disagree	Strongly Disagree	N/A
1. You were interested in your research topic.	36 (53%)	29 (43%)	3 (4.4%)	0.0	---
2. You had an adequate amount of time to conduct your research.	23 (34%)	35 (51%)	8 (12%)	2 (2.9%)	---
3. You had fun researching your topic.	28 (41%)	36 (53%)	3 (4.4%)	1 (1.5%)	---
4. Your research was affordable.	43 (63%)	21 (31%)	2 (2.9%)	2 (2.9%)	---
5. You successfully accessed and used library databases.	26 (38%)	23 (35%)	5 (7.6%)	1 (1.5%)	12 (18%)
6. Librarians were available to help you.	10 (15%)	26 (39%)	2 (3.0%)	1 (1.5%)	27 (41%)
7. Librarians met your needs.	9 (14%)	20 (30%)	6 (9.1%)	1 (1.5%)	30 (45%)
8. The library's hours of operation were adequate.	12 (18%)	26 (39%)	5 (7.6%)	2 (3.0%)	21 (32%)
9. You were comfortable with your faculty mentor(s).	49 (72%)	17 (25%)	0.0	0.0	2 (2.9%)
10. You met with your mentor regularly.	37 (54%)	23 (34%)	5 (8.8%)	0.0	2 (2.9%)
11. Your faculty mentor responded in a timely manner.	39 (57%)	24 (35%)	3 (4.4%)	0.0	2 (2.9%)
12. Your mentor was helpful.	41 (60%)	22 (32%)	2 (2.9%)	1 (1.5%)	2 (2.9%)

Note. The first number in each column is the raw number; percentages are indicated in parentheses. Statements 8-11 listed above did not offer a "not applicable" category. Participants who indicated that they did not have a faculty mentor earlier in the survey were removed from the category they selected and placed into the not applicable category.

Almost all participants persisted with their project. Specifically, 65 of the 68 participants who completed the survey (96%) had either completed their project or were in the process of completing it.

Table 2. Difficulties in executing research

Response	Respondents	
	Raw	%
Money constraints	2	2.9
No difficulties	3	4.4
Teamwork	3	4.4
Using statistical analysis	3	4.4
Finding subjects/participants	4	5.9
Finding and accessing info/data related to topic	9	13
Time (constraints, consumption, management)	23	34
Other	22	32

Note. Other responses included lack of interest, lack of guidance, weather conditions, changing topics, performing calculations, getting approval from IRB, slow reimbursement, intensive lab work, communicating the findings concisely, starting the project, miscommunication among supervisors, discrepancies on how to document the research, and learning new software.

Table 1 provides results from the rating scale questions and the percentage of responses obtained from the 68 participants who completed the survey. Overall findings reveal that participants not only completed their research project but also enjoyed conducting it. As shown in Table 1, a total of

64 participants (94%) agreed or strongly agreed that they had fun researching their topic. According to the results of the second statement in Table 1, only 10 participants (15%) disagreed or strongly disagreed that they had an adequate amount of time to conduct their research. This statement contained the largest number of disagree and strongly disagree ratings in the survey. As shown in Table 1, a total of 64 participants (94%) agreed or strongly agreed that their research was affordable, even though only 53 participants (78%) indicated earlier in the survey that their research was not funded through an undergraduate research grant.

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research. This means that only four participants who conducted undergraduate research did not plan to publish or present it. Almost all participants persisted with their project. Specifically, 65 of the 68 participants who completed the survey (96%) had either completed their project or were in the process of completing it.

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Table 3. *Most important aspects of conducting research*

Response	Respondents	Respondents
	Raw	%
The benefits it had for my future	4	5.9
Working with my faculty mentor	4	5.9
Gaining knowledge outside classrooms and textbooks	5	7.4
Seeing the results	7	10
Disseminating/sharing the results	10	15
Exploring a topic of interest	18	26
Other	30	44

Note. Other responses included working with participants, gaining leadership skills, earning credits, contributing knowledge to the academic community, the challenges it presented, reaching set goals, aiding the community, getting the grant approved, knowing how much work was put in, completing the project, programming, and collecting field data.

Table 3 provides responses that participants who completed the survey listed when asked what aspects of conducting their research were most rewarding. The popular response was “exploring a topic of interest,” concurring with Table 1 in which 65

participants (96%) strongly agreed or agreed that they were interested in their research topic. A total of 10 participants (15%) responded that disseminating or sharing the results of their research was the most rewarding aspect. Another seven participants (10%) responded that seeing the results was the most rewarding aspect. Though only four participants (5.9%) said that working with their faculty mentor was the most rewarding aspect, participants rated mentors highly in rating scale statements earlier in the survey.

DISCUSSION

Most participants had either completed or were in the process of completing their undergraduate research project, and few terminated their project. It can be concluded that the clear majority of participants’ projects were successful, perhaps due to researchers’ interest in their topic. Because so many participants who claimed to have completed multiple research projects only shared one experience, it is possible they chose to withhold less successful projects.

Almost all participants responded positively to rating scale questions regarding faculty mentor interactions. A few participants even reported interactions with their mentors as the most rewarding aspect of their undergraduate research experience. As WUSTL (2013) claims, designing a manageable project with a reasonable budget is an effective mentor-student interaction. Though it is not determined whether participants worked with their mentors to develop a reasonable budget, most participants claimed that their research project was affordable. In this study, affordability appeared to play a minor role in researchers’ experiences, though affordability is undoubtedly linked to the type of research conducted. All 15 participants who used undergraduate research grants agreed or strongly agreed that their research was affordable, which suggests that research grants were helpful.

Participants were visibly faced with time constraints. There appears to be a conflict between students’ allotted time frame and their ability to complete work on time. WUSTL (2013) claims that mentors should meet with researchers to set deadlines and

discuss appropriate time management to promote a more successful project. Results from this research suggest that faculty mentors and student researchers should schedule buffer time to account for unforeseen circumstances when planning the project.

Some participants listed dissemination as one of the most positive aspects of their research project, which confirms that sharing results can enhance the experience and thus, mentors should encourage it. Only a few participants who conducted undergraduate research did not plan to publish or present it. Therefore, the act of disseminating and showcasing the work may play a factor in why participants perceived their projects to be predominantly successful.

Few participants negatively responded to questions regarding library resources. It may be safe to assume that the institution is offering library resources, and some researchers are utilizing them. However, it is likely that participants who responded with “not applicable” to statements regarding library resources did not take advantage of them. Failure to use library databases suggests that students either use search engines to find secondary research materials or acquire secondary research materials from their faculty mentors. Though students still had positive experiences when researching their area of interest, they are missing out on an important aspect of research that can benefit their future and contribute to the success of their project.

The survey on undergraduate research confirms what is already known, but it also brings something new to the table: through undergraduate research, students should be extending their research skills and utilizing the resources available to them to make the most of their experience. Library resources are an integral part of the research process, along with a faculty mentor. Secondary research can help students in both professional and personal instances. If students encounter future problems, experience accessing credible secondary source materials will help them be more equipped to research a solution.

Suggestions for Future Researchers and Mentors

Though there are numerous benefits from conducting undergraduate research, unforeseen obstacles will arise. Researchers and mentors should create a research plan with dates to accomplish activities and schedule extra time for complications. Because some student researchers are missing out on one of the main benefits of research—how to locate, interpret, and integrate secondary research into one’s project—mentors should help students learn how to use resources or provide opportunities for students to interact with librarians by scheduling class time for librarians to demonstrate how to find applicable resources. Researchers and mentors should also seize opportunities to disseminate and share research, as this appears to be a rewarding part of the research experience.

Recommendations for Future Research

This study examined results at one institution and is limited in its ability to transfer to other institutions. Replication of these methods would help confirm the findings of this study and allow the results to be generalized to larger populations. To fully understand undergraduate researchers’ experiences, further investigations could include questions that ask: What components contributed to your most successful and unsuccessful research projects? Did you develop a research plan with timelines? Please explain why you accessed or declined to access library resources and a research librarian. Understanding components that enhance or inhibit the carrying out of projects can add to understanding of how to effectively support student researchers.

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APPENDIX A: UNDERGRADUATE RESEARCH SURVEY**Preliminary Information**

1. Select your current class status:
- | | |
|------------------|-----------|
| Freshman | Sophomore |
| Junior | Senior |
| Graduate Student | Alumnus |

2. Have you conducted undergraduate research?
Undergraduate research is when you investigate a topic to reach new conclusions or confirm new ones.

Yes	No
-----	----

3. Did you or do you plan to publish the research/and or present it outside of a class setting?
- | | | |
|-----|----|----------------|
| Yes | No | Not applicable |
|-----|----|----------------|

Number of Projects

4. How many research projects have you started for publishing or presentation purposes? (with or without completing)

One	Two
Three	Four or more

First Undergraduate Research Experience

5. Did you finish this project?
- | | | |
|-----|----|-------------|
| Yes | No | In progress |
|-----|----|-------------|

6. How many faculty mentors did you have?

Zero	One
Two	Three
Four or more	

7. How many students helped you conduct this research?

Zero	One
Two	Three
Four or more	

8. Was your research funded through an undergraduate research grant?

Yes	No
-----	----

9. Please rate the following statements based on your research experience

You were interested in your topic

Strongly Agree	Agree
Disagree	Strongly Disagree

You had an adequate amount of time to conduct your research

Strongly Agree	Agree
Disagree	Strongly Disagree

You had fun researching your topic

Strongly Agree	Agree
Disagree	Strongly Disagree

Your research was affordable

Strongly Agree	Agree
Disagree	Strongly Disagree

10. Please rate the following statement based on how you connected with library resources.

You successfully accessed and used library databases

Strongly Agree	Agree
Disagree	Strongly Disagree

Librarians were available to help you

Strongly Agree	Agree
Disagree	Strongly Disagree

Librarians met your needs

Strongly Agree	Agree
Disagree	Strongly Agree

The library's hours of operation were adequate

Strongly Agree	Agree
Disagree	Strongly Agree

11. Please rate the following statements based on your experience with your faculty mentor(s).

You were comfortable with your mentor(s)

Strongly Agree	Agree
Disagree	Strongly Agree

You met with your mentor(s) regularly

Strongly Agree	Agree
Disagree	Strongly Agree

Your mentor(s) responded to you in a timely manner

Strongly Agree	Agree
Disagree	Strongly Agree

Your mentor(s) was/were helpful

Strongly Agree	Agree
Disagree	Strongly Agree

12. What were the most rewarding aspects of conducting your research?

13. What difficulties did you have in executing your research?

14. Please include other comments about your undergraduate research experience for this project.

15. Do you have another undergraduate research experience to share?