

Just a Paycheck? Assessing Student Benefits of Work on Faculty Research Projects

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Just a Paycheck? Assessing Student Benefits of Work on Faculty Research Projects

Abstract

The benefits that students gain from designing and implementing their own independent undergraduate research projects is often presented as a valuable step in their academic career, and a stepping stone to graduate school success. However, it is not clear what benefits students receive when working as undergraduate research assistants on faculty research projects where they, the students, have little or no input into the project or its design. This paper reports on a survey of undergraduate students who participated as wage laborers on two separate faculty-directed research projects. The results of the study suggest that students gain valuable knowledge and skills that serve as constructive preparation for work, personal lives and graduate school careers; in addition, their participation in research enhances their overall undergraduate experience.

Introduction

Undergraduate research means different things to different people. The most common and highly regarded form of undergraduate research involves students engaging in original research under the mentorship of a faculty mentor. Typically, this research takes place outside of class in a lab or independent course setting. However, students also engage in undergraduate research within the context of their regular coursework. The assessment of this second type of research is typically subsumed

under the learning objectives for the particular course in question. A third type of undergraduate research is the research that undergraduates conduct as part of an internship or paid labor arrangement. In these cases, the research students are engaged in is not their own but rather the research project of a faculty mentor or boss. This wage labor research, rarely studied in the literature, is the focus of this paper.

The bulk of the literature on undergraduate research focuses on those projects of the 1st type described above, research that students design and implement with the guidance of a faculty mentor. However, faculty frequently engage undergraduate students in their research doing fairly mundane tasks such as data gathering, data entry, and other rote activities. This study focuses exclusively on assessing the benefits of student participation as paid laborers in faculty research projects. Students who worked as wage laborers on two distinct research projects led by the same faculty member were surveyed and asked to assess their experiences. Results indicate that students clearly benefit from this work academically, personally and professionally. Indeed, many of the benefits that students report receiving are similar to those that are reported by students who engage in their own original research.

The remainder of the paper is organized as follows. A review of the literature on undergraduate research and student development is provided, along with a description of the setting in which the study took place. The research projects are described along with the work that students did on the projects. The fourth section explains the methodology used to assess student benefits from work on faculty research projects, while the fifth section outlines the results of the assessment. The paper concludes with

a discussion of the results, implications and suggestions for future research on the topic.

Previous Research

There has been significant interest in the impact of undergraduate research on student development. These benefits typically recorded include clarification of career plans, improved preparation for graduate school, skill development, and personal benefits. Seymour et al provide an excellent typology of these studies, categorizing them based on whether or not the benefits to students were claimed and well supported or simply stated or claimed but not adequately demonstrated. In their qualitative study, 76 students were interviewed at four liberal arts colleges about their undergraduate research experiences in the sciences. They found that students were overwhelmingly positive about their experiences and described benefits of several different types, including preparation for graduate school, “thinking and working like a scientist”, shifts in attitudes to learning and working as a researcher and other benefits.

A segment of the literature on the benefits of undergraduate research focuses on the so-called “pipeline” benefits associated with a greater likelihood of graduate school enrollment for students who have engaged in hands-on research as undergraduates. Most of this research has been in the natural science fields. Russell, Hancock and McCullough analyzed surveys of 15,000 students in science, technology, engineering or math (STEM) fields at various types of institutions. They found that undergraduate research opportunities increasing understanding of how to conduct a research project, confidence in research skills and awareness of what graduate school is like (p.548). In

addition, they found that a key element in increased interest in STEM careers and higher degrees was the “inculcation of enthusiasm” about research. Ward, Bennett and Bauer conducted a content analysis of free-form evaluation letters from undergraduate research students in engineering and the sciences. They found that students perceived their learning in the out of class setting (conducting undergraduate research) to be greater than through ordinary classes. Some of the benefits identified from undergraduate research by these students include skill acquisition, ability to act independently, appreciation of team work, and the ability to work with setbacks and/or ambiguity, among others.

There has been less study on the effects of undergraduate research experiences in the social sciences and humanities. Ishiyama attributes this to the fact that social scientists and humanists do not often employ the type of experimental research that is conducive to undergraduate participation. Ishiyama studied students at Truman State University who participated in undergraduate research and found that early participation produced significant gains in social science and humanities students’ analytical and logical abilities and the ability to learn on their own.

A unique project studying undergraduate research in the social sciences was conducted by Rosenthal. Her study was developed as “an experiential learning strategy and field research project as a means of transforming students’ gender understandings” (p.63). She engaged undergraduates in the research process in a political science class, *Gender, Power and Leadership*. The study concluded that the “systematic application of Kolb’s experiential learning cycle...appears to provide real advantages for teaching about gender and politics.”

It appears as if the experiences of undergraduate researchers can be beneficial to students and their learning in many different contexts. This study examines the benefits of a specific type of undergraduate experience that has not yet been adequately studied in the literature: student wage laborers on faculty-directed research projects. The primary research question was, “do students hired as wage laborers receive benefits from their experiences that are similar to those of more traditional undergraduate researchers?”

Evidence by Light suggests that learning outside of classes is a very important part of the most important and memorable experiences of students in college (p.8). Light admits surprise to learning that some undergraduates indicate that a particularly profound experience was a mentored internship not done for academic credit (p.9). His research also found that

students who get the most out of college, who grow the most academically, and who are the happiest organize their time to include activities with faculty members, or with several other students, focused around accomplishing substantive academic work (p.10).

The experiences described by Light are very similar to those of student experiences working on (some) faculty-led research projects. This study examines whether students hired as wage laborers on two faculty-directed projects experience significant benefits other than the paychecks they received.

The Setting

UNC Asheville is a small, public liberal arts university located in Asheville, North Carolina. The university is a primarily undergraduate institution of just over 3000

students. While UNCA prides itself on its dedication to excellence in teaching, faculty regularly engage in research as well. Since faculty do not have access to graduate student labor to assist with their research, they rely on undergraduates to serve as research assistants.

This study examines the experiences of students working on one faculty member's research projects over a period of several years. These projects were the Blue Ridge Parkway Scenic Experience Project, conducted 1999-2004, and The Farmland Values Project (www.unca.edu/farmlandvalues), conducted 2005-2009. The two projects engaged over 30 undergraduate students as wage laborers, executing essential elements of the research. The projects had many similarities including the same project director (the author) and a survey research component that used students as the primary implementation and data assistants. The two projects are described below, along with the tasks that students were hired to complete as part of their work on the projects.

The Blue Ridge Parkway Scenic Experience Project

The Blue Ridge Parkway Scenic Experience Project (BRPSEP) was designed to assist a local national park, the Blue Ridge Parkway, with the management of their scenic resources. The study, funded by a grant from the Blue Ridge Parkway Foundation, was conducted in two sections of the park, southwest Virginia and northern North Carolina. The primary methodology of the study was a visitor survey implemented in 2000 (Virginia) and 2002 (North Carolina) at several sites in the park. Sixteen undergraduate students were hired to assist with the implementation of the

survey and analyze the results; all students were paid to conduct specific tasks as assigned by the faculty member. Fifteen students worked on survey implementation over the two phases of the project, while one student assisted with production of reports

The students who assisted with implementation of the survey (n=15) worked on site set-up and break down, contacted potential respondents on site and invited them to participate per our Institutional Review Board-approved protocol, and served as resources for those individuals who had questions about the survey. In addition, students assisted with trouble shooting computer problems experienced during the implementation and other issues, including data management. One student assisted with the preparation of the final report, including data analysis and layout.

The Farmland Values Project

The Farmland Values Project (FVP) is an integrated project funded by the National Research Initiative of USDA-CSREES. The FVP studied the ways that residents and visitors in four western North Carolina counties benefit from the presence of farmland in the area. Specifically, the project collected, analyzed and communicated the nonmarket values associated with farmland in the study region. The FVP was characterized by significant student involvement with a total of 16 undergraduate students from 9 different majors being hired to complete various aspects of the project. The FVP required significant community involvement as the project conducted interviews, focus groups, surveys and a community mapping activity to gather the information from residents and visitors about the benefits they have for farmland in the region. Students were hired to assist with the execution of these tasks, including

administrative assistance, implementation of the survey, focus groups and mapping exercises, and data entry and analysis.

Between these two projects, a total of 32 students worked as paid members of a grant-funded research team. The duration of their work on the research projects ranged from three months to two years; student activities on the projects included data gathering and field work (including fairly mundane preparatory work), data entry, and data analysis, among others. While several students 'spun off' their own independent undergraduate research projects, this paper focuses on assessing the benefits of the work that was assigned as part of students' duties as wage laborers.

Methodology

A survey was used to assess the benefits of student work as wage laborers on the two research projects. The survey was implemented after the completion of student work on the research projects, in 2005 and 2008, respectively. Students were asked to assess the personal impacts or benefits, academic impacts or benefits, and their work experience overall in a series of open and closed ended questions yielding some quantitative and some qualitative responses. The assessment questions used for each project are available in Appendices 1 and 2. The assessment was similar to that used by Seymour et al in that it provided both closed ended and open ended questions to students. The assessment allowed students the chance to think about the larger implications of their participation (if any) in addition to the specific benefits that they experienced. The core set of questions was similar for both the BRPSEP and FVP

student workers; some sub-items were unique to one assessment due to the different nature of the projects.

The survey was sent to all 32 former student workers via email after their work on the project was complete. Nineteen students responded including five students who worked on the BRPSEP and 14 from the FVP. There are two reasons why the number of students who responded from the BRPSEP is much lower than the FVP. The first is that several of the email addresses from students in the BRPSEP were no longer valid leading to a high rate of undeliverable surveys (50%). The second reason is the lag in sending the assessment survey to students from the BRPSEP. By the time the survey was sent in early 2005, it had been over a year since some of the students had completed their work on the BRPSEP. This may have led to a lower level of interest in completing the assessment.

Assessment of Student Benefits from Work on Faculty Research Project: Results

Content analysis of the assessment surveys was conducted separately by project (FVP or BRPSEP). Results are reported collectively for the shared items which made up the bulk of the assessment. Where appropriate, the distinctions between responses from students who worked on the BRPSEP and FVP are noted. The subheadings refer to the question from the assessment instrument.

What impacts, if any, did this project have on you?

Student responses to the question asking whether the project had any impacts on the student can be organized into three types of impacts or benefits from working on

the project: personal, academic, and work-related. Some of the personal benefits that were mentioned by students included discovering that they like research and a reaffirmation of their long term goal of attending graduate school. Some students indicated that they learned that they need to communicate more clearly; others indicated that they gained self confidence from working on the project since they were often working independently. In addition, one student indicated that they “began to think of (my) place in the world differently.”

Academic benefits were also cited as impacts that working on the project had for students. Students noted an expanded interest in the (economics) major while others indicated that working on the project broadened their perspective since the research required looking at one issue through many different lenses. One student emphasized the benefit of learning the importance of looking at “the big picture” of any research topic.

More tangible, work-related benefits were also frequently mentioned by students. Students indicated value in having the experience to work closely with others, and to learn about how to search, collect and analyze data. Some students also reported an improvement in their writing skills.

Did participation in the research help your understanding of...?

When asked whether their participation helped their understanding of various content areas, there were many similarities among student responses. For the items that were asked of both sets of student respondents, most students indicated their understanding of economics (89%), research methods (83%), natural resource or

environmental issues (89%) and government policy (81%) were improved. Most BRPSEP workers also indicated an improvement in their understanding of park management issues (60%) and the National Park Service (80%); these items were not asked of the FVP workers since that project did not deal directly with a national park unit. FVP workers indicated varying responses to the question of improved understanding for the concepts related to that project. The areas where most students noted an improvement were local land use issues (100%), data collection (85%), interdisciplinary research projects (93%), and community dynamics (92%). In some other areas, improved understanding was less uniformly noted by the student workers: data analysis (64%), GIS and other research tools (43%), agriculture (69%). In the areas that students indicated their understanding was not improved, most students indicated that it was due to the fact that they weren't working on the parts of the project that related to those concepts. These results are summarized in Table 1.

One student took the opportunity in this question to demonstrate her/his liberal arts background. When indicating that s/he gained an improved understanding of data collection s/he wrote that s/he learned, "That, like Blanche DuBois, USDA researchers 'always rely on the kindness of strangers'."

Table 1: Gains in Understanding in Various Content Areas

Did your participation help your understanding of....?			
	BRPSEP Workers <i>N=5</i>	FVP Workers <i>N varies by item</i>	Combined <i>N varies by item</i>
Economics	5 (100%)	12/14 (86%)	17/19 (89%)
The research process or research methods	5 (100%)	10/13 (77%)	15/18 (83%)
Natural resource or environmental issues	4 (80%)	12/14 (86%)	16/18 (89%)
Government policy	3 (60%)	10/13 (77%)	13/16 (81%)
Park management	3 (60%)	--	--
The National Park Service	4 (80%)	--	--
Data collection	--	11/13 (85%)	--
Data analysis	--	9/14 (64%)	--
Interdisciplinary research projects	--	13/14 (93%)	--
GIS and other research tools	--	6/14 (43%)	--
Local land use issues	--	14/14 (100%)	--
Land use planning in general	--	10/12 (83%)	--
Agriculture	--	9/13 (69%)	--
Community dynamics	--	12/13 (92%)	--
-- indicates the item was not asked on the survey for that particular group of student workers.			

Did working on this project help to improve your undergraduate college experience generally?

Students indicated unanimously that working on the project helped improve their undergraduate college experience generally (19/19 or 100%). Students were asked to

explain *how* working on the project improved their experience, and the responses were varied. One student indicated,

College coursework can be a very individual experience. This project gave me the opportunity to collaborate with students and professors on meaningful work that is not graded. I think this allows for more creativity and room for mistakes than a classroom may provide. I learned as much from what I did wrong in research as I did from what I did right. Given the potential for mistakes, the interaction of people tends to be more like “real life” than in a classroom.

Other students reported that working collaboratively with faculty and other students on a team was important to them, such as

I started working for the project during a summer, and it was a treat to be involved in the campus community during the summer. I believe it also helped with my liberal arts education, because I was able to work on an interdisciplinary project with people from various departments.

One student picked up on the practical aspects of the experience:

I think it’s important to see how the abstract theoretical tools you learn can be applied in real life, especially before going to graduate school where people expected me to already know how to apply much more abstract theories

Did working on this project help to improve your understanding of other college classes?

Student respondents indicated that working on the project helped improve their understanding of the material from several different courses, including several economics courses. Those listed included econometrics, statistics, approaches to research, land economics, public finance, natural resource economics, growth and development, and microeconomics. Courses from outside of economics that were mentioned include research methods in business/management and environmental studies courses.

Other Benefits?

Some of the other benefits of their work on the project mentioned by students include improved communication skills as a result of working with the public, getting to know a professor and fellow students outside of the classroom context, camaraderie and developing friendships and study partnerships with work colleagues. One student noted, “an intangible benefit was the feeling you get when working with a group of people who are dedicated to a task and enjoy what they are doing.” More tangibly, students noted that the professor can write better letters of recommendation for them, that they learned about the structure/operation of grant projects, and that they were able to hear first-hand different perspectives on an issue.

Do you think you would have engaged in this work if it had been an unpaid position?

The assessment asked if students would have engaged in the work if the position had been unpaid. About half of the students indicated they would like to have done the work without pay, but would not have been able to work as much due to the fact that they needed to be engaged in some kind of wage-earning work to pay their bills (3/5 on BRPSEP and 7/14 on FVP; 10/19 or 52%). The remainder indicated that they would not have taken the work if they were not paid.

Were the benefits greater than the money you earned?

Students were asked if the benefits they received from working on the project were greater than the dollar amount they were paid to perform their duties. Most

students indicated they were: 12/14 on FVP and 5/5 on BRPSEP, or 17/19 (89%)

overall. One student summarized her perspective by saying:

I would not trade this experience, for any other I had in school. I feel lucky that as an undergraduate I was exposed to economic research techniques. It has given me more creditability on my resume than my BA.

Another agreed and reported:

I probably could have made more money working in a fancy restaurant, but I wouldn't for a minute trade the experience I gained for that bit of extra money. This project has been a valuable experience for me because I am interested in the subject matter, I've been able to use/expand my skills, and I've learned a lot about working in a research team. I also really appreciate the flexibility: when I began work on the project, I found places where I thought I could contribute and where I thought we needed things done (ex: the photo catalog and the map of locations in Google Earth).

One student was less sure about what the benefits were, but still agreed that the benefits were greater than the money earned:

My instinct is that many of the intangible benefits of this work will come into focus for me as time passes. Precisely what something has meant for one's personal development often takes time to become clear, but I have no doubt that working on the FVP has had a strong personal impact on me.

Course credit in lieu of wage?

Students were also asked to consider whether they would have found course credit as an appealing substitute for the hourly wages they earned on the project. About two thirds of the student respondents (68%) indicated that they would have been interested in pursuing course credit for their work instead of an hourly wage (9/14 on FVP, 4/5 on BRPSEP). Several students indicated that they would have considered either internship or undergraduate research credit. All of the students that indicated they would not have found credit appealing to them indicated that they already had sufficient

credit to graduate. One student indicated that she thought it would have been “a valuable resume builder. But to be honest, being paid for work always makes me feel more attached to and responsible for the outcome. It shows that your employer values the work you are performing, more so than course credit.”

Should there be more opportunities for students to work on faculty research projects?

Among those students who responded to the question (n=18), there was unanimous agreement that more opportunities to work on faculty research projects should be offered to students. The students indicated that they think both summer and academic year opportunities would be beneficial. When asked which level to target the opportunities, several indicated that starting at the sophomore level would be ideal. Their reasons included that is the time when students are thinking about major selection “so it may help to have experiences outside of the classroom.” The students who worked on the project over several years appreciated the fact that as their skills grew, their responsibilities on the project grew which led to more skills development and varied experiences. One student said, “As I progressed, I could do more, and as a result, I did a wide variety of jobs which kept me interested and exposed me to a lot of tools and materials.”

Discussion

The results of the survey indicate that students clearly benefit from working as hired labor on faculty-directed research projects. Academic benefits included expanded interest in their major field of study, additional interaction with their professor, and a

broadened perspective of what research entails. Benefits related to work experience included not only the activities they were actually tasked to do (such as data organization and analysis), but also gains in knowledge about “how grants work,” the operation of the university and project management. Personal benefits included gains in self-confidence, a reinforcement of a desired career path, and personal discoveries such as that they liked research and that they need to communicate more clearly. These benefits mirror those reported by students engaging in their own original research.

Students indicated that the experience of working on a faculty-led research project as a wage laborer adds to their learning. This is an important outcome for faculty to consider when determining how their programs evaluate student learning outcomes. The content students learn in their work on the project is not part of the regular curriculum and is, in many cases, complementary to the learning they are doing in the classroom. This learning is necessarily contextual: the research projects provide the context for the application of concepts from their courses. This provides an enriching experience for students at a time when the concepts are fresh in their minds. A logical implication is that when departments assess the learning of their students, they should not only assess the learning that occurs in the classroom or by undergraduate researchers who are working on their own original research, but also those who are worked as hired laborers on other research projects in the department.

For some of the students who worked on the BRPSEP, there was nearly a two year lag following their work on the project before they completed the assessment of their participation. This may have allowed students the chance to think about the larger

implications of their participation (if any); it may also have led to some students having a rosier view of the experience. Blackwell et al indicate that “retrospective views of graduates tend to be more positive than those of current undergraduates” (p. 284). In future assessments, more consistent timing of the assessment would be ideal. For example, the assessment could be given during the last days of work on the project, such as is the case with senior exit interviews, or in the week or month following the completion of the work on the project.

Both Russell, Hancock and McCullough and Ishiyama noted that the earlier the students are exposed to undergraduate research experiences, the greater the gains. This result is confirmed by the students surveyed in this assessment who indicated that engaging students as sophomores would be most beneficial.

Implications

The results of this study should be of interest to both faculty at primarily undergraduate institutions and research universities. The results indicate that students learn a great deal from their participation in faculty-led research projects. This type of out of class, engaged learning should be included as part of the portfolio of option increasingly offered as a method of attracting and retaining students. This work, however, is clearly also beneficial to the researcher who is paying students' wages. Thus it appears we can both help students learn material they would not gain in a traditional classroom while also helping move our research agendas forward. In an era of increasingly tight budgets, it may be that undergraduate researchers may be more

frequently called upon in settings other than the primarily undergraduate institutions. This research suggests that both students and faculty can benefit from the experience.

The method of assessing student participation used in this study may be of interest to those who supervise other out-of-class learning activities, such as study abroad or internships. It would be ideal to replicate this pilot study with other types of research projects in other universities to allow for a larger sample in order to determine whether these results are stable across project types, faculty leadership and university settings.

A regular assessment of student participation as workers on faculty research projects should continue as it provides insight into the value of the work done by students. It also provides information that can be useful for managing student labor which can benefit the faculty member. A selection of lessons learned from this experience and strategies for mentoring undergraduates appear in Appendices 3 and 4. These kinds of assessments can be used to hone faculty teaching and research practices, and to augment departmental assessments of student learning outcomes.

Conclusion

When faculty hire students as wage laborers, we should be aware that we are not only helping students earn wages but also teaching students information that they cannot receive in a typical college classroom. As we direct student work on our research projects, we are effectively teaching the *application* of concepts. These applications provide a valuable teaching environment that can't be duplicated in the classroom or textbook.

Students indicate that they earn more than just a paycheck from their work on faculty research projects. Students learn about disciplinary content, as well as the ability to make connections across disciplines and between classroom and real life. This helps improve disciplinary understanding, and also helps put disciplinary tools in perspective. Student work on faculty research projects appears to help with other things, too, such as finding a job, learning whether they would like to pursue work in the area of study, and learning more about themselves.

Future research should provide more formal assessment of student benefits of hired work so that we can get a fuller picture of the benefits of this type of engagement. If it does indeed provide significant benefits to student development as is suggested here, then colleges and universities should expand these opportunities for students. Given that these situations also provide greatly needed assistance for faculty, this model may be a useful strategy for making the most out of scarce university budgets.

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Appendix One: Blue Ridge Parkway Scenic Experience Project Student Assessment Instrument

Student Assessment of Research Participation January 2005

I am collecting this information in order to assess the value to student learning (if any) from participation in applied research projects. I may wish to quote you directly in academic papers about this topic; please let me know if you wish to be quoted anonymously (i.e., student #3) or just using your first name instead of your full name. As you complete these questions, I welcome any elaboration or additional comments that you wish to provide. Thank you in advance for your help!

Please answer the following questions related to your participation in the Blue Ridge Parkway Scenic Experience Project.

1. Is there something about your participation in this project that has stood out for you in some way? [This might be a particularly meaningful interaction, a very memorable experience (good or bad), something that reaffirmed a decision or nudged you to move down a separate path in life.]
2. What impact(s), if any, did this project have on you? [These might be personal, professional, or both.] Did participation in this project help you to develop a sense of professional identity?
3. Did participation in this project prepare you for work? If so, did it help you to prepare for work in....research? non-profit environments? Others?
4. For each of the following, please answer Yes or No, and explain your response. Did your participation help your understanding of:
 - Economics?
 - The research process, or research methods?
 - Park management?
 - The national park service in general?
 - Natural resource or environmental issues?
 - Government Policy?
 - Other issues? (If so, identify them in addition to explaining them)
5. Did working on this project help to improve your undergraduate college experience generally? If so, how?
6. Did working on this project help to improve your understanding of other college classes? If so, which ones?
7. Did working on this project have other benefits that I may not have mentioned? If so, what were they?

8. Most of you were paid for your time working on this project. Do you think that you would have engaged in this work if it had been an unpaid position? Please comment.
9. In retrospect, were the benefits you received (learning, personal, other) greater than the \$ amount you were paid to perform your duties? Explain.
10. If course credit would have been offered to you for your work on this project instead of an hourly wage, would this option have appealed to you? Why or why not?
11. Do you think more opportunities such as this should be offered for students? If so, do you think they should be during the summer? Academic year? Both? Which grade level (freshman, sophomore, junior, senior) do you think they should be targeted?
12. Do you have any other comments about working on the Blue Ridge Parkway Scenic Experience Project?

Thank you very much for your input!

Appendix Two: Farmland Values Project Student Assessment Instrument

Student Assessment of Research Participation Farmland Values Project

I am collecting this information in order to assess the value to student learning (if any) from participation in applied research projects. I may wish to quote you directly in academic papers about this topic; please let me know if you wish to be quoted anonymously (i.e., student #3) or just using your first name instead of your full name. As you complete these questions, I welcome any elaboration or additional comments that you wish to provide. Thank you in advance for your help!

Please answer the following questions related to your participation in the Farmland Values Project.

1. Is there something about your participation in this project that has stood out for you in some way? [This might be a particularly meaningful interaction, a very memorable experience (good or bad), something that reaffirmed a decision or nudged you to move down a separate path in life.]

2. What impact(s), if any, did this project have on you? [These might be personal, professional, or both.] Did participation in this project help you to develop a sense of professional identity?

3. Did participation in this project prepare you for work? If so, did it help you to prepare for work in....research? government? non-profit environments? Others?

4. For each of the following, please answer *Yes* or *No*, and explain your response. Did your participation help your understanding of:

- Economics?
- The research process, or research methods? These might include....
 - Survey research
 - Data collection
 - Data analysis
 - Interdisciplinary research projects
 - Other?
- GIS and other research tools?
- Local land use issues?
- Land use planning in general?
- Agriculture?
- Community dynamics?
- Natural resource or environmental issues?
- Government policy?
- Other issues? (If so, identify them in addition to explaining them)

5. Did working on this project help to improve your undergraduate college experience generally? If so, how?
6. Did working on this project help to improve your understanding of other college classes? If so, which ones?
7. Did working on this project have other benefits that have not been mentioned in the previous questions? If so, what were they?
8. Most of you were paid for your time working on this project. Do you think that you would have engaged in this work if it had been an unpaid position? Please comment.
9. In retrospect, were the benefits you received (learning, personal, other) greater than the \$ amount you were paid to perform your duties? Explain.
10. If course credit would have been offered to you for your work on this project instead of an hourly wage, would this option have appealed to you? Why or why not?
11. Do you think more opportunities such as this should be offered for students? If so, do you think they should be during the summer? Academic year? Both? Which grade level (freshman, sophomore, junior, senior) do you think they should be targeted?
12. The research environment is less predictable than classroom environments; both the type and amount of work can vary from week to week and month to month. How did you feel about the fluidity of the work on the project? Can you identify measures that could have been taken to improve your experience dealing with the uncertainty inherent in the research process? If so, what are they?
13. Do you have any other comments about working on the Farmland Values Project?

Thank you very much for your input!

Appendix Three: Lessons Learned From Working with Undergraduate Research Assistants

1. Undergraduates can be effective members of a research team
2. Working with the rhythms of the semester is essential
3. More communication is always better than less
4. Students appreciate being 'co-learners' with their professors
5. Having fun and making fun is a great motivator for students....as is the ability to
 - Make mistakes
 - Be creative
 - To be considered equals on the team and coauthors on papers/posters
6. Food will improve every meeting
7. Let students know their work is integral to the research project

For classes: have an assignment that is usable by the research team
8. Allow twice as much time as you think you'll need
9. Embrace the uncertainty that the project/class may go in directions that you can't predict
10. Allow students some choice; it builds investment in project

Appendix Four: Strategies for Mentoring Undergraduates

- Plan, plan, plan
- Be prepared to adjust your plan
- Hire good students who
 - have a flexible set of skills
 - an interest in the project other than money
 - can identify their own possible research projects as subsets of your own
- If you have multiple students, delegate logistical tasks to one student (schedule, timesheets)
- Meet regularly (as a group) to provide updates
- Give students a neat title that they can use on their resumes and appropriate credit for their work (as coauthors on papers/posters, if applicable)