

# UNDERGRADUATES IN RESEARCH: TWO PERSPECTIVES

I hear, and I forget;  
see, and I remember;  
I do, and I understand.

Chinese Proverb

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## Abstract

This paper focuses on describing research experiences for undergraduate students who are interested in pursuing graduate work. A key element to a successful research internship is the faculty-student mentoring alliance. Involving undergraduates in independent research projects can provide students with valuable input in the decision to *continue their education or not*. The faculty mentor must provide the student with clear expectations, timely feedback about performance, and positive reinforcement and constructive criticism. Involving undergraduates in research can be a fruitful learning and teaching experience.

## Introduction

As today's job market becomes more competitive, undergraduate students are discovering that learning situations outside the classroom are important to meet a challenging employment situation (Garkovich, Bunch, and Davis). Moreover, recent literature has emphasized the role of educators in the development of students' professionally applicable skills (Russell, Henneberry, and Batchelor). Experiential education, including internships and work-study, features significant tasks with real outcomes and concrete learning achievements, as well as increases a student's motivation for commitment to continued learning (Chickering; Fenwick and Gartin; Harris, Denise, and Thomas).

Students often criticize both the abstract nature of their formal coursework and the lack of application to real world problems and issues (Bastian, Menkhaus, and Yakunina). They also often find it difficult to relate theoretical materials from courses to practical situations in

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business or industry (Henneberry and Beshear). "Experiential education provides students opportunities to apply, integrate, and evaluate a body of knowledge of a discipline via firsthand participation" (Harris, Denise, and Thomas, p. 10). Results of studies which have evaluated outside of the classroom experiences suggest that these experiences are helpful to students in finding employment and advancing their careers (Garkovich, Bunch, and Davis).

This paper focuses on describing research experiences for undergraduate students who have expressed interest in pursuing graduate work. Thus, we are interested in a slightly different initial career track than is assumed for students participating in for example, a business internship program. The objectives of a research experience, however, are similar to those of a business internship and include: develop professional skills; apply concepts from formal courses to real world problems; further assess interest in graduate education; enhance opportunities for acceptance into graduate school and financial assistance; mentor relationships between student and faculty; and introduce students to preparing and presenting a paper at a professional meeting.

## The Research Project--General

This project was associated with and followed the general prescribed procedures used in the McNair Scholars Program. Undergraduate research activities could be conducted in a special topics or independent study course, but there are attributes of the McNair Scholars Program which are useful for structuring undergraduate research exercises.

The McNair Scholars Program, dedicated to Ronald E. McNair who was killed in the Challenger accident, seeks to prepare low-income, first generation college students, and students from groups underrepresented for graduate study. Undergraduates participating in the program develop and

enhance their academic skills through research and scholarly activities, as preparation for graduate study. The goal of the research internship is to provide undergraduates with experience in all aspects of the research process: conceptualizing a problem; preparing a proposal; reviewing literature; designing the research; gathering data; analyzing data; and reporting results in both written and oral form. General program responsibilities include (Program Handbook):

- Select faculty and graduate student mentors.
- With the faculty mentor, prepare a formal research proposal which specifies the topic, research objectives, methods, and analysis procedures.
- Conduct the research under the supervision of the faculty mentor and with the assistance of the graduate mentor.
- Maintain a journal of research activities.
- Submit a working draft of the research report.
- Present this research to fellow McNair Scholars and mentors.
- Prepare the final research report.
- Discuss graduate program selection and application processes with faculty and graduate mentors.
- Use the research internship to help build a portfolio for graduate admission purposes. For example, submit paper(s) for review for presentation at professional meeting(s).

Success of the McNair Scholars Program is perhaps most attributable to the mentoring alliance. Mentoring undergraduates through a research experience can be a vital part of student development. Roles of the faculty and graduate student mentors, in general, might include (Reysa and Rogers):

- Serve as a role model for the student in the process of defining and setting professional goals.
- Provide information about opportunities, procedures, methodologies, and expectations of the professional and academic world.
- Offer advice, encouragement, and feedback.
- Show interest in furthering the students' academic and professional career.

Finally, during these times of resource constraints in universities, undergraduate students can be valuable contributors in research activities. Moreover, if the research experience was positive, students may find leaving to attend

a graduate program at another school difficult. In this case, both the student and the academic unit in which the student participated in the research internship would benefit by retaining a student who might have a significant start on a masters thesis. Thus, the undergraduate research internship can be a useful means for recruiting students into the graduate program.

### The Research Project--Specific

Selecting a research topic is perhaps the most critical prerequisite to a successful research experience for the student. Thus the selection should be done with input from the faculty and graduate student mentors and the student. The topic must be one that is focused, can be completed in a short time, and can yield meaningful results. A reasonable guideline is selection of a topic which interests the student and which might evolve into a more extensive investigation.

The literature suggests characteristics and techniques useful in the design of an undergraduate research project (Merritt; Schaefer). These include incorporating:

- A problem-solving component.
- A communication component - oral and written.
- A theoretical and/or empirical component.
- A task-oriented, cooperative attitude by using a team approach.

Reduction of student stress and anxiety enhances the learning process (Krohne and Laux). Accordingly, well defined and communicated teacher expectations and a non-threatening attitude contribute to a successful project and experience (Russell, Henneberry, and Batchelor). Involving the student in the topic selection fosters feelings of personal control, which enhances learning (Dellmeier and Friend).

In the case reported here, the specific research project had the objectives of: (1) determining current and emerging issues facing Wyoming agriculture; (2) determining if the issue(s) would be a future concern; and (3) determining if the current and emerging issues were primarily social, political, economic, environmental, or cultural. Data were collected by conducting personal interviews of individuals representing a broad spectrum of interests. A literature review to understand what the popular press viewed as the critical and emerging issues provided a starting point for structuring the interviews. The results from the personal interviews were compiled and summarized as the final research report. The report was orally presented to fellow McNair Scholars and their mentors at a conference at a professional meeting.

## Undergraduate Research--Student Perspective

In a society that is demanding higher levels of education for its work force, having a bachelors degree is becoming more of a necessity. A masters degree may increase a student's marketability, but is graduate school for everyone? Involving undergraduates in independent research projects can provide students with valuable input to answer this question. Other factors, of course, enter into the decision to attend graduate school such as the desire to teach, which may have been motivated by an outstanding teacher. This may suggest a need to involve undergraduates in teaching experiences. Numerous invaluable experiences can be derived from an undergraduate research activity. Classroom concepts and principles that undergraduates often question receive real-world application, which gives them a better understanding for attending college. Other educational benefits also arise out of this involvement of undergraduates. Specific to this case, the McNair Scholars Program provided useful procedures that ultimately enhanced the research experience. For example, technical writing skills were sharpened with a required research report. Oral communication skills were strengthened with a required presentation to students and faculty involved in the McNair Program. Results from the study can lead to presenting a paper at professional meetings and the possibility of a published article, both of which make the student more competitive in the quest for acceptance into a graduate program.

From a student's perspective, among the most important criteria in being involved in research is selection of the faculty and graduate mentors. A willing professor and graduate student excited to serve as mentors for undergraduate research are the best choices. For someone who has never undertaken such an activity, the time and energy requirements alone can be an intimidating factor. The mentors must place rigid, yet realistic expectations upon the student to avoid a last minute, half-hearted effort. If the student and the mentors can foster strong working relationships, chances are heightened for successful project completion. Constructive ideas and criticism from the faculty and graduate student mentors are essential to keep the student motivated and on track.

A successful research internship requires the student to (Reysa and Rogers):

- Be a hard worker and have an attitude which reflects the desire to learn.
- Communicate, particularly regarding areas where there may be confusion or misunderstandings.
- Build relationships with faculty and graduate students in the discipline and

discuss careers and advanced study opportunities, and issues related to the research topic, with them.

- Accept constructive criticism and to learn from it.
- Develop a plan (goals and objectives) and adhere to it.
- Complete assigned tasks in a timely manner.

## Undergraduate Research--Faculty Perspective

A crucial responsibility of the faculty member is to identify a research topic. The research topic must be selected using input from the student, be focused so that it can be completed in a short time, and provide the student with a meaningful experience, as well as yield meaningful results. Another responsibility related to the identification of the topic is to keep the frustration level low so the student does not become discouraged. In this respect, it is important to keep the student informed of expectations and to meet frequently with the student to answer questions and provide assistance. Moreover, the faculty mentor must be a taskmaster--keeping the student on schedule and requiring progress reports, etc. This latter responsibility, however, dictates that the faculty mentor guide and provide organization to the experience and promptly return materials with meaningful suggestions for improvement. Frequent assessment of progress is mandatory, along with assisting the student with the preparation of updated plans of work.

The success of the overall research-teaching effort may be partially evaluated based on how the student-faculty relationship evolves during the project. Ideally, the relationship should evolve from a student-faculty to a colleague-colleague relationship. Such a collaborative relationship contributes to the success of the learning experience. This is not always easy and involves breaking traditional barriers from the perspectives of student and faculty. Nevertheless, this relationship is another crucial element for a successful experience for the student and faculty mentor.

While the undergraduate research exercises are rewarding teaching experiences for the faculty, there also are side benefits related to research; undergraduate students can provide useful research support. The research topic explored here provided background for a grant proposal and a masters thesis research topic.

Ryan and Rogers provide additional ideas for mentors which can facilitate a research internship. These include:

- Make the student feel welcome and that a contribution is being made.
- Clearly provide expectations.

- Open lines of communication by talking about career and research experiences. Talk frequently about academic matters, expectations, problems, procedures, etc.
- Provide feedback about the student's performance, including positive reinforcement and constructive criticism.

### Evaluation and Concluding Remarks

We as a society are steadily progressing toward a preference and necessity for higher levels of education. Yet, attempting to obtain admission, much less funding, from graduate programs can overwhelm and discourage potential applicants. Providing undergraduate students with a research internship can benefit the student, faculty and department alike. Students become more marketable to graduate programs, while being able to apply their classroom knowledge to complete a research activity. Faculty gain experience on how to further help students use the concepts they are being taught and obtain useful research support. The department can benefit when undergraduate research prompts an idea for additional study. Involving undergraduates in research can be a rewarding experience for both students and faculty, and key to the success of the research internship is the mentoring alliance between faculty and student.

### References

Bastian, Chris T., Dale J. Menkhaus, and Alla V. Yakunina. 1996. "Experimental Economics in the Classroom: Reinforcing Selected Concepts Related to Consumer Demand." *NACTA Journal*, 40(2):12-14.

Chickering, Arthur W. 1976. "Developmental Changes as a Major Outcome," in Morris Keton and Associates, *Experimental Learning*, Jossey-Bass, San Francisco.

Dellmeier, Gisela and Ted Friend. 1984. "Term Paper Design and Evaluation When Assignment Emphasizes Student Choice." *NACTA Journal*, 28(4):4-7.

Fenwick, J.F. and S.J. Gartin. 1990. "Assessment of Experimental Education." *NACTA Journal*, 34(1):23-25.

Garkovich, L.E., Kimberly Bunch, and Joe T. Davis. 1992. "The Role of Experimental Education: An Analysis from Students' Perspective." 36(4):25-29.

Harris, Ian M., Paul S. Denise and Richard M. Thomas. 1989. "Experimental Education for Community Development," in Paul S Denise and Ian M. Harris (eds), *Experimental Education for Community Development*, Greenwood Press, Westport, CT.

Henneberry, Shida R. and Michelle Beshear. 1995. "Bridging the Gap Between Theory and Reality: A Comparison of Various Teaching Methods." *NACTA Journal*, 39(4):15-17.

Krohne, H.W. and L. Laux. 1982. *Achievement, Stress and Anxiety*. Hemisphere Publishing Corp., N.Y.

Merritt, Richard H. 1984. "Challenges for Undergraduate Education in Agricultural Sciences." *NACTA Journal*, 28(3):9-14.

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