
Undergraduate Research Experience As Preparation for Graduate School

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Graduate students learn to be sociologists in part by doing research. Many undergraduate institutions whose roles have been primarily defined by teaching have inadequately addressed the need of their students to obtain research experience. When such opportunities are available, and when they are properly structured and coordinated with the undergraduate curriculum, advantages accrue to both students and the profession. This paper examines curricular and extracurricular ways to strengthen undergraduate research opportunities as preparation for graduate school. It is suggested that such preparation is also beneficial to many students who do not go on to graduate school.

The terms, interactive learning, investigative labs, and hands-on research experience have become shibboleths distinguishing progressive from old-fashioned educators.¹ The notion of moving the undergraduate learning experience out of the classroom is an appealing, even obvious idea. As we know from the graduate school experience, students can learn some of their most important lessons by doing social research, most easily by participating in the research of their professors. Too often however, the underlying rubric of learning is an osmosis theory which assumes that students cannot help but benefit from exposure to the practice of good science. This is almost certainly untrue, at least with regard to the efficiency of learning and the quality of what is learned.

Although research training may not be appropriate for all students, this article argues that it will benefit both students who are considering graduate school, whether in sociology or not, and those who will undertake a wide variety of careers with only the bachelor's degree in hand. However, the educational value of the research experience depends on its incorporation into a curriculum involving coursework, independent study, and apprenticeships in research. In brief, effective research training requires attention to the structure of the experience

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and its relationship to other learning modes. That structure can be regularized without sacrificing the formation of creativity and flexibility normally associated with research experience.²

Perhaps the most important aspect of sociology is not now central to many undergraduate curricula—the excitement that accompanies first hand investigation of important issues. The wonder, the curiosity, and the satisfaction of research are both the motivation and the reward for sociological inquiry. To the extent that an undergraduate curriculum incorporates those feelings by stressing research, it will be more attractive to many students while at the same time being a more complete introduction to the discipline.

Potential Advantages of Undergraduate Research

What follows is a brief discussion of several potential advantages of undergraduate research experience in sociology which are not easily accomplished in the normal curriculum.

Critical Thinking

Another of the popular buzzwords of current discussions of educational reform, critical thinking can be defined as the ability to evaluate, construct, and adapt approaches, arguments, and evidence in pursuit of explicitly stated objectives. (c.f., Ruggiero 1988). Certainly, classroom instruction must and can pursue so worthy a goal as well, but the research task is especially well suited to conscious attention to and practice in the process of critical inquiry. The research process is, in practice, the progressive solving of situation-specific problems that threaten to impede the pure research models one learned in the classroom.

Problem Identification

The identification of problems in a way that allows empirical study, and especially the breaking down of the process into analyzable parts, is key to successful research. A typical problem of students, or better, of inexperienced researchers, is to identify interesting research areas, but to bring insufficient focus to the problem. The ability to focus in ways that allow empirical measurement and analysis, and that may therefore lead to academic or even policy implications, can be fostered by participation in the research process.

Technical Skills

One could never justify sociological training solely on the basis of that part of its technical sophistication that is transferable to other careers. On the other hand, competent use of computers and other equipment, and of statistical and demographic techniques, are valuable assets even to students who will not go on graduate school. Like other tools, they are inherently made one's own by practice, as in class projects and outside research.

Theory and Research

The ability to understand theory, and to do theoretically meaningful research, is advanced by engaging in such research. The links from abstract representations to research agendas and to particular projects are best understood by participation in the process. Certainly, not all research is of this variety, but conscious attention to such links can strengthen the educational value of any research experience.

Informed Decisions About Graduate School

The importance of the advantages discussed so far to success in graduate school is sufficient to encourage greater undergraduate pursuit of research experience. The most direct rationale for undergraduate exposure to research however, is to allow students a first-hand evaluation of the strengths and weaknesses of the empirical heart of their discipline. Such students may therefore make a more informed choice about the appropriateness of at least certain types of graduate training for their futures.

In sum, undergraduate research experience leads to a better prepared and motivated graduate student. At the same time, such preparation is appropriate for any student who wishes to apply sociological theory and methods to problems of social importance. While some of these students will attend graduate schools others will look for jobs with only the bachelor's degree in hand.

The same public service, personnel, and communication-related jobs sociology students have always competed for (Ruggiero and Weston 1986; Salem and Grabarek 1986) will increasingly have a research component. Even when research, per se, is not carried out, the skills of critical thinking, problem identification, and technical proficiency are highly valued by employers (IMPULL 1983).

Sociologists have long argued that their students have a unique perspective and therefore a unique potential to evaluate, advise, and plan in the nonacademic world. Undergraduate training that includes an integrated development of research and practice may significantly strengthen that potential. Many students, whether graduate school-bound or not, may therefore benefit from research training.

Unfortunately, the opportunities for undergraduate research at many institutions are insufficient. Even where such opportunities exist, they may be inefficiently structured to pursue these goals.

Achieving the Advantages: Structuring the Learning Process

The key point is that the research experience must be part of an integrated curriculum. It should not be an independent, or stand-alone, experience. This point is elaborated in two areas. First, coursework must be sequenced and coordinated. Second, research outside of classes must be structured as well.

Sequencing Coursework

Sequenced coursework is required to prepare students to do research. The themes across courses must be increasing self-direction and increasing complexity of tasks. Means to those ends include 1) stressing hands-on projects, from detailed homeworks to independent study courses, 2) insisting that projects be as realistic as possible, and 3) maximizing student interaction with other students and with the instructor. These means are significantly aided by incorporation of computers into the curriculum. Microcomputers are especially useful since they tend to be relatively easy to use and knowledge is transferable across sites.

This approach is incorporated in the following curriculum. This curriculum, while no doubt far from a model way to approach the problem, is illustrative of the principles discussed. Although these courses have been in place in our department for only two years, that experience has provided some interesting evidence which is summarized in this article. A brief description of the administrative structure of the program is provided in the following section.

Sociology majors may choose to take this program of courses as a research track in addition to other required and elective courses. Students from outside the department may take it as a minor. Students would normally enter the program as sophomores. The first three courses, Methods I, Statistics I, and Microcomputer Applications in Research are prerequisites to the other, more integrative, courses (the statistics course requires prior completion of the college mathematics requirement). All courses except Statistics II are required of students in the program. Statistics II is recommended though not required for graduate school-bound students. Students are encouraged to pursue substantive interests in sociological or other issues through electives.

Methods 1. In addition to a first exposure to the logic and structure of the research enterprise, the introductory methods course also provides an opportunity to observe and practice some of the basic skills of research. This approach has received significant attention, and numerous exercises, computer modules, and class project ideas are available to the instructor (Maier 1989; Scheuble 1989; St. George 1978).

Two overviews of these developments will advance the argument of this article. First, research experiences, which more closely mimic the actual practice of research, are brought into the methods classroom as realistic data sets and important theoretical problems are dealt with. Computer labs encourage such experiences since the student may as easily test a hypothesis with the General Social Survey data, or Public Use Sample data as with a survey of classmates. This is not to say that the data collection experience should be avoided. Quite the contrary, but that task too may be more realistically and efficiently performed using the actual tools of the discipline, technical as well as theoretical.

Second, the explosion of interactive and investigative exercises experienced in the introductory methods class must be followed by a coordinated experience in later classes. Longer, more detailed projects with increasing self-direction should be the rule as a student advances through the curriculum.

Statistics 1. The hands-on and applied focus of the sequence of courses as a whole is carried through in this course. As for the first methods course, many excellent projects and computer labs have been designed. Greater sharing of ideas and greater evaluation of results must follow.

Microcomputer Applications in Research. The use of microcomputers for work processing, data base management, spreadsheet work, and graphics is stressed as they are germane to the research task. Especially important is the ability to transfer data between hardware and software. Although our department has always taught this course, it makes at least as much sense for students to get this material in a computer science or computer applications department. Students will use these skills extensively in their independent projects and research practicums.

As computer exercises are developed in the statistics and methods courses, as non-credit seminars are strengthened, and as research apprenticeships are becoming more widely available we are considering dropping this course from the program. Many students are simply picking up these skills in other places and are performing ably in the practicums without this course. The course might still be important for students who are not exposed to the full program however.

Methods 2: Evaluation Research. Frequent and telling forays of social science research methods into programmatic and policy realms have been made under the rubric of evaluation research (Rossi and Freeman 1985; Caro 1977). Explicit study of the use and usefulness of research in such situations fills out a student's understanding of methods. Most basically, a student must recognize that social research can be relevant to worlds outside the university, and that such relevance depends on sufficient understanding of methods to be able to adapt them to variant concerns, purposes, control over situations, and audiences without destroying their descriptive and inferential value. Perhaps such a perspective will affect the orientations of some future graduate students, or even attract a few new students to a graduate school track.

The variety of particular tasks that students may perform in this course should be less limited than in the first methods course, since familiarity with both the terminology and the techniques used is built upon. Our experience has been that students do quite well in a term project which requires an evaluation of either an actual program in the community, or a literature based review of a well-documented program. Since only about half the semester is actually spent on the individual projects, if the first option is chosen we will usually accept a well-documented design for an evaluation for this course and encourage carrying out the evaluation in a later course in the sequence.

Statistics 2. More advanced statistical approaches are studied, again by actually using them to analyze existing data sets. Appropriateness of approaches is stressed, as is reporting of results. A final project involving a theoretically grounded analysis of secondary data using at least one of the techniques discussed in the course is required. The mathematical background of students must be considered in designing presentations and exercises. Fortunately, statistical software which matches a variety of levels is available (Brackett, forthcoming).

Theory and Research. Students do a semester long literature review project wherein they trace a theoretical perspective through to a contemporary research agenda and then to a research plan for a contemporary substantive problem. Students concentrate on the necessity to ground empirical investigation in a coherent theoretical framework.³ As in the evaluation research course, students may elect to actually carry out their proposed research in an independent study or in their senior practicum. Because of the small numbers of students involved at this stage of development of the program, and because of the diverse topics pursued, this course has been done as a directed readings course to this point.

Research Practicum. The practicum is either taken as a group research project, usually a survey, or as an individual internship in a research setting. In both cases, a student must carry through the research task from problem delimitation to report writing and presentation. The skills learned in other courses are brought to bear in producing a theoretically grounded piece of empirical research.

If the group survey is chosen, the student is solely responsible for one section of the survey. If the internship is chosen, the student must carry through a complete research project with the additional constraint that the project be based on primary data gathered on the job. Student presentations are made orally and in written form at least twice during the semester.

This course serves as an excellent integrative experience for the student and therefore provides an excellent opportunity to evaluate both students and the program.

A series of noncredit seminars and workshops are also available to students who wish to participate. Opportunities to present original research, as well as to engage in the discussion of the work of other students and faculty are considered essential for graduate school-bound students. Workshops stress particular skills useful to the applied researcher (e.g., Using SPSS on the microcomputer). Additional advantages in camaraderie and in increased opportunities to share in the excitement of research are also achieved.

In sum, we have always trained undergraduates by encouraging them to work with the theoretical tools of our discipline. Shortcuts in conceptual approach are unacceptable and dangerous practice. The same logic must be applied to training with the methodological tools of the discipline. As technology, cost, and expertise allow, increasingly realistic training must take place.

The Structure and the Research Experience Outside of Class

Class-based research training should be supplemented with research experience outside of class. The variety of problems, methods, and applications that may be experienced are thereby multiplied. The complexity and importance of the work may also be an exciting inducement to advanced training. The key is to expose the student to enough of the research task to foster interest, but to require that early experiences be focused enough to allow understanding and mastery of the parts being learned. Increased responsibility and involvement over the course of the student's training allows this balance.

A real problem at institutions with heavy teaching loads is the lack of faculty connections to potential research contracts. An increasingly popular first step to reestablish such connections is the local research center. The defining orientations of such centers are their desire to apply professional social science expertise and methodologies to local and regional needs, and to provide real hands-on research opportunities to undergraduate students.

Our experience has been that there is no shortage of important work to be done or of clients willing to contract it, given some lag in publicizing and proving the competence of the center's work. At all levels of research, it is important that good ideas not wither for lack of technical advice or well-trained student and collegial help. The research center can serve as a facilitator of such work, especially collaborative projects among faculty. Many national funding agencies are consciously trying to spread the research dollar around a little more. Small universities and colleges must pool resources, knowledge, competent students, and equipment to compete. The research center and research curriculum can facilitate these efforts. The center may also serve as a physical center of hardware and documented data sets which students may access in class and for independent study.

Assuming that research projects can be developed, student participation in such projects must be carefully structured and coordinated with coursework. As in class projects, students learn by discussing, explaining, and observing research problems together. More senior students also learn supervisory skills by practicing them with more junior research assistants. Interaction with clients, when possible, provides another dimension of experience to students. Student involvement in the planning and budgeting phases at the beginning of a project, and the dissemination phase at the end are also important. Students with sufficient training may be realistically encouraged to spin off projects of their own.

The result of research training and experience for undergraduate students is more complete and useful undergraduate education in sociology, better prepared graduate students, better workers in private and public social service positions, and perhaps, more productive undergraduate faculty. Teaching and research too often are perceived as competing for faculty time. They can be combined to the advantage of both. The central theme, again, is that good teaching of research

clearly involves more than allowing students to do the leg work on one's research, but requires conscientious and careful development of their potential to reproduce the logic and practice of social science research.

Emergent Strengths and Weaknesses of the Program

The program described here is clearly not for everyone. Even among those who participate in it, some students will take only one or two courses, others will supplement the required courses in different ways, and others will participate more or less intensively in the research opportunities available through the center.

In our brief experience, an apparent weakness of the program has been the relatively slow rate at which new students have been attracted. This however, is largely due to the fact that no organized recruitment has been initiated. Word-of-mouth, even before official recognition of the program by the university, provided the students we needed to develop the program. The need for small class sizes, to provide research experience to students, and for a large degree of student self-motivation argues against rapid expansion of the number of students involved. Despite the low-key approach to recruitment, however, the number of students in the research track has risen steadily. Only seven graduated in the spring of 1989, the second year of the program. This number will rise to about 15 per year by 1991.

Real weaknesses have arisen in regard to recruitment. In order to present the research track as an option to a wider variety of students, we are finding it necessary to encourage a reappraisal of the rigor and relevance of sociology on the part of many students and of many advisors, especially those in other departments. In addition, while small numbers are advantageous as the bugs in the program are worked out, the apprenticeship process works most smoothly when a critical mass of students is present at each level. Division of task and learning from other students is more difficult to accomplish in the early years when few students are on board. Stability of funding for research positions is also important for this purpose of supporting continuity and variety of training.

In a related vein, while paid internships are now increasingly available in the center, they may be difficult to provide in the early years of a program. This would certainly be true if an effort were made to funnel all, or even very many of a department's students into the program very quickly. Internships in outside agencies for the senior practicum are even harder to find and to coordinate. We have made students responsible for finding such a placement if they choose that option. Consequently, few students have chosen this alternative to the group practicum. Other programs may want to stress this practicum to a greater degree and would therefore pay more attention to organizing and providing such opportunities (c.f., Obermiller 1987).

Another potential weakness of the program is that its highly structured format may discriminate against nontraditional students who must often shoulder heavy

family and work burdens. While several such students have participated in our program, it is still possible that others have been deterred. Advisement must encourage these students to participate, especially since, with training, they are often extremely well suited for applied research positions. The scheduling of classes and research work must also be flexible enough to accommodate nontraditional students.

An obvious weakness of a program that requires frequent and intense faculty-student interaction is the difficulty of staffing. Part of this burden is simply worthwhile and must be accepted as a policy decision by the department. Part of the burden may be removed however, by the use of upper-level students and by the fact that teaching and research tasks can become more closely linked.

Among the clear strengths of the program that we have observed is the strong placement record our students are achieving, both in jobs and in graduate schools. Of the seven 1989 graduates, two have obtained research jobs with government agencies while five are in graduate school. Within graduate schools, alumni of the program are receiving financial support and offers of research assistantships that were very rare for our previous students. Finally, of the eleven junior and senior students currently in the program, seven plan to attend graduate school. While these results are based on a brief experience, they are so different from past expectations that we are very encouraged.

We have observed as well that the GPAs (in courses outside the program) and standardized test scores of students in the program are substantially above the average of other students in our department and college. Enthusiasm and sense of accomplishment are also very high. These are additional signs of a healthy program. Though the numbers of graduates are still quite small, it is already clear that we are attracting a different type of student and preparing program participants for a different type of postcollege career than in the past.

Summary

Preparation for graduate school means familiarity and practice with the skills, tools, and tasks of graduate students and professional sociologists. Many students who will not pursue graduate training will also benefit from such research practice. If research training is to become a conscious goal of undergraduate education, it must be specifically addressed in undergraduate curricula. Such curricula should include sequenced courses stressing the use of methods and theory, independent study opportunities, and research apprenticeships through a coordinating center.

Notes

*This research was supported in part by a grant from the National Science Foundation (8852039).

1. These approaches are, in fact, the basis for funding in several federal programs aimed at undergraduate science education (e.g., the National Science Foundation programs: Research In Undergraduate Institutions, Research Experience For Undergraduates, and the Undergraduate Faculty Enhancement Program).

2. Although most teachers of sociology would argue that it is difficult to teach creativity and flexibility (Roberts 1989), research experience often is thought to foster those qualities. This article argues that this approach is correct but undeveloped as a teaching tool for undergraduates.
3. It is, of course, important that the explicit stress on the linking of theory and research within the program be filled out and reinforced by such a focus in the other substantive courses in sociology. As we pay increasing attention to such issues, we strengthen the sociology curriculum, for the researchers and for others.

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Erratum

The text in Wolf Heydebrand's article, "Sociology at Washington University" (*TAS* vol. 20, no. 4, p. 330, line 13) should read: ". . . Robert Lynd's question 'knowledge for what?' . . ." The question "knowledge for what?" was, of course, posed by Robert Lynd and not Robert McIver. Professor Heydebrand and the editors regret the error.