

Undergraduate Research Experience in Psychology as a Predictor of Graduation and Retention

David Nalbone

Abstract

Students who had and who had not taken an undergraduate research course in psychology were compared to see if there were differences in graduation and retention rates between them. Students with such experiences were much more likely to be still enrolled or to have graduated than students without such experiences. The need for greater student involvement in such experiences, as well as possible limitations of the results, are discussed.

Introduction

Much has been written about the benefits of directly involving students, including undergraduates, in the conduct of research. Such active or discovery-based learning has been theorized to lead to greater interest in and retention of the material covered, greater success in applying the material later, and better learning overall. This greater success may stem, at least in part, from the fact that active learning employs many of the “best practices in undergraduate education” delineated by Chickering and Gamson (1991). For example, such experiences certainly encourage student-faculty contact, emphasize time on task, and communicate high expectations. In addition, undergraduate research experiences may foster the sort of outcomes and skills that businesses want to see in future employees and that students want to acquire for themselves (Hansen, 2000), and many colleges and universities are feeling greater pressure from their stakeholders to include undergraduate research experiences as part of the curriculum (Dotterer, 2002; Hutchinson, 1992; Kinkead, 2003). Early results are encouraging, although there is some question as to whether such approaches are effective for younger (e.g., elementary school) students. By extension, such active learning may also predict greater persistence among students, as the increased motivation to learn may lead to greater involvement in and enjoyment of coursework more generally.

Much of the emphasis in the research literature on retention has focused on demographic factors predicting retention (e.g., Murtaugh, Burns, & Schuster, 1999; Peltier, Laden, & Matranga, 1999) and specifically on improving retention among minority students, perhaps due to the changing demographics of the college population, which is expected to affect future students’ retention (Reason, 2003). For example, in a longitudinal study of minority student retention and academic performance, Jonides (1992, 1995) reported that a heavily involved undergraduate research program focusing on faculty-student partnerships, workshops, research peer groups, and peer counseling led program participants to have higher retention rates (especially among African-Americans), slightly higher GPAs, and better adjustment (e.g., higher self-esteem and better coping strategies). Similarly, a study (Walters, 1997) of minority students in graduate and professional science degree programs among current, prospective, or recent graduate students revealed that participation in a summer undergraduate research program increased students’ rated importance of advanced research experiences, program information about graduate and professional programs, preparation for graduate work, and mentoring by faculty and administrators. These results were consistent with the student retention model tested (Tinto, 1975, 1987), which views retention as a complex function of the interactions between academic integration and social integration. Specifically, Tinto’s theory posits that greater academic integration (such as through more in-depth faculty-student interactions) leads to greater commitment to an institution, which in turn leads to greater retention (see also Braxton, 2000; Braxton & Lien, 2000).

The Present Study

All psychology majors at Purdue University Calumet are required to take certain courses as part of the major, including required foundational courses in math, statistics, and research methods, as well as a number of advanced (300- and 400-level) electives. Neither PSY 491 nor PSY 590 is a required course, and thus students who take either or both may differ from those who do not in systematic ways. The 491 course is an independent study course designed for students to have a one-on-one relationship with a faculty member; students taking such a course generally fall into one of three categories: (a) teaching assistant, in which the student works with a faculty member to assist in grading and course administration; (b) guided research, in which the student works with the faculty member on research in the faculty member's area of expertise; or (c) independent research, in which the student works on a research project of his or her choosing under the supervision of the faculty member. The majority of students at Purdue University Calumet fall into the last category. The 590 course is an advanced research-based course ("Personality Testing") in which students work in groups with a faculty member to develop and carry out an empirical research project, which is later presented at an undergraduate psychology research conference and at an on-campus research colloquium. The author has supervised only a few PSY 491 and PSY 590 students in the last few years, working with a small number of students primarily on guided research.

Hypotheses

Based upon the premise that a specific instance of active learning—namely, participation in one or more research-based courses in psychology—leads to increases in student persistence (both retention and graduation), I formulated two hypotheses:

- Students taking at least one research-based course are more likely to remain enrolled in school.
- Students taking at least one research-based course are more likely to graduate from the university.

Method

Data from all psychology majors from fall 1994 to fall 2003 were extracted from the student database of Purdue University Calumet, a regional comprehensive Midwestern university with some master's programs. Three-fourths of the university's students are first-generation college students, most work either part-time or full-time in addition to their studies, and all lived off campus during the time period of the study (on-campus student dorms have since been added). All students who took PSY 491 or PSY 590 (the psychology program's elective research-based courses) from fall 1994 to fall 2003 were coded as having taken a research-based course ("Yes"); all other students were coded as not having done so ("No").

Due to unequal sample sizes (233 Yes versus 1271 No students), a systematic subsample of the No students was taken for these analyses, by selecting every sixth student from an alphabetical list of the No students after a random start. Thus, only one-sixth of such students (211) were sampled; this resulted in roughly equal sample sizes,

which reduced the likelihood of violating statistical assumptions (namely, homogeneity of variance among groups) inherent in the analyses presented below.

Table 1 presents the demographic characteristics of the sample used. The racial and ethnic breakdown of the sample is similar to that of the larger population, but there was a larger than expected percentage of women in the sample than men (which, however, is somewhat typical of psychology majors). Individuals from a wide range of ages were sampled, reflecting the non-traditional nature of the campus, which was a commuter-only campus at the time of the study.

Table 1. *Demographic Characteristics of Sample*

Demographic Variable	Value	%
Gender	Female	79
	Male	21
Race/Ethnicity	White/Caucasian	78
	Black/African-American	11
	Hispanic	10
	Other	1
Age	Range = 18-72	Mean = 29.3, SD = 8.5

Results

I performed two chi-square tests to assess whether or not differences in retention and graduation rates differed for the students who had and who had not taken one or more research-based courses.

The data in Table 2 indicate that psychology majors who participated in research courses as undergraduates (namely, by taking PSY 491 or PSY 590) were much more likely to have been retained (defined as either still enrolled or already graduated) than students who did not participate in such courses. Nearly nine of every ten students who took such a course were retained, whereas only about half of the students who did not take such a course were retained. Thus, taking one or more research-based courses nearly doubled the odds of a given student being retained.

Table 2. *Cross-tabulation of participation in research courses and retention status*

			Was student retained?		Total
			No	Yes	
Did student participate in PSY 491 or 590?	No	# Row %	109 52%	102 48%	211 100%
	Yes	# Row %	30 13%	203 87%	233 100%
Total		# Row %	139 31%	305 69%	444 100%

Note. $X^2(1, N = 444) = 112.6, p < .001$.

The data in Table 3 indicate that psychology majors who participated in research courses as undergraduates (again, PSY 491 or PSY 590) were much more likely to graduate from the university than students who did not participate in such courses. Approximately three-quarters of students who took such a course had graduated by fall 2003, whereas only about one quarter of the students who had not taken such a course had graduated. Thus, taking one or more research-based courses nearly tripled the odds of a given student graduating.

Table 3. *Cross-tabulation of participation in research courses and graduation status*

		Did student graduate?		Total	
		No	Yes		
Did student participate in PSY 491 or 590?	No	# Row %	157 74%	54 26%	211 100%
	Yes	# Row %	56 24%	177 76%	233 100%
Total		# Row %	213 48%	231 52%	444 100%

Note. $X^2(1, N = 444) = 77.4, p < .001$.

In order to address a possible confound—namely, that students who self-select into these courses are systematically different from those who do not, a series of *t*-tests were conducted comparing those who did and did not take these research courses, using the full sample (i.e., including all 233 Yes and 1271 No respondents). Students who took such courses did not differ from those who did not in terms of being White vs. non-White [79% vs. 71%, $t(1475) = 0.66, p = .51$], gender [both groups were 79% female, $t(1499) = 0.08, p = .94$], or average SAT scores [914 vs. 937, $t(1120) = 1.72, p = .09$]. However, students taking such courses tended to be older [mean ages = 30.6 vs. 29.1, $t(1501) = 2.40, p = .02$] and to have a higher average GPA [mean GPAs = 3.16 vs. 2.77, $t(1467) = 6.85, p < .001$].

Discussion

As predicted, participation in research-based courses with psychology faculty (PSY 491 or PSY 590) was related to higher retention and graduation rates. Since retention and graduation of more students is one element of strategic planning of most colleges and universities, more resources devoted to faculty who teach such courses (e.g., professional development funds, release times, travel funds for undergraduate conferences) might increase the ability of institutions to increase both retention and graduation. Assuming such findings hold up across programs and departments, these results indicate a general need for greater funding of such courses, and greater efforts to encourage students to enroll in such courses, to increase the rate of student success.

Given the recent shift in higher education toward greater accountability, an emphasis upon undergraduate research may lessen some of the criticism of the educational system, especially since such experiences may help students to acquire needed and valued skills (Hutchinson, 1992). This increasing emphasis upon undergraduate

research may in turn lead to better teaching among the faculty involved (Cross, 1996, 1998), as well as to better learning outcomes for students. Further, undergraduate research experiences may help faculty to better bridge the obsolescent divide between teaching and scholarship, as codified in the new classification of educational activities put forth by the Carnegie Foundation (e.g., Shulman, 2000).

Limitations. Several limitations might lead to questions about the generalizability of the results. First, it is unclear whether or not students taking any upper-level course (e.g., 400-level or higher) are more likely to persist in school and to graduate, or if only students taking research-based courses at that level are. Given the high attrition rate early in many students' educational trajectories (Murtaugh et al., 1999; Tinto, 1996), it is possible that these results reflect greater persistence among those who continue into their second and later years generally, as opposed to those who took specific upper-level research-based courses. Second, the variety of courses listed as PSY 491 in this sample might be associated with very different experiences. One student might be conducting an empirical project, a second a detailed literature review, and a third may only serve as a research assistant who shepherds participants through a research protocol. Whether such different experiences all lead to similar increases in retention and graduation is an empirical question not addressed in this study. Third, it is unclear whether or not the present results apply to disciplines other than psychology as well, or to a smaller group of related disciplines, or are unique to psychology. In order to address these issues, future studies of this sort ought to examine multiple disciplines (or groups of related disciplines; e.g., sciences vs. arts and humanities), and control for number and type of other courses taken as well as the specific experiences in the research-based course. Such an analysis would help to clarify whether aspects of the PSY 491 or PSY 590 research experience itself, or other factors, are responsible for the difference in outcomes observed. In addition, an identification of which factors (e.g., close working with faculty, independent writing) do and which do not lead to better outcomes ought to be addressed. Fourth, it is possible that the graduation and retention rates varied over time in this study; no tests of this possibility were possible, as data were provided without dates. If graduation or retention did increase over time, the role of research-based courses, such as those identified in this study, would need to be taken into consideration as one possible explanation for the increase, as there may have been a concomitant rise in the number of offerings of (or students enrolled in) such courses.

Future research might also address the impact of earlier experiences, as available evidence indicates that over half of all non-retained students drop out after their first year (Murtaugh et al., 1999; Tinto, 1996), and thus early interventions are the most efficient way to increase retention and graduation rates (Levitz, Noel, & Richter, 1999). Additionally, the role of self-selection of both faculty and students into such courses must be considered. Although it would be difficult (if not impossible) to randomly assign some faculty to work with students in such courses, and others not to do so, only such a test can provide the strong causal inferences necessary to determine whether or not self-selection affects student outcomes from such courses. Perhaps of more importance, it is likely that students self-select to engage in (or avoid engaging in) such research-based courses, which often represent a more rigorous challenge than a standard classroom course. The results do indicate that there are some differences between students who did and who did not partake in such courses: Students who did

tended to be a bit older and to have higher GPAs. However, it is difficult to pinpoint the cause(s) of such differences, and thus further analyses of such causes is in order. Other factors which might also relate to this self-selection, and which future researchers might examine in further detail, but which were not included in this study, include self-reported motivation for, and subjective experiences after, taking such courses. This question of causality—are greater graduation and retention rates due to participation in research-based courses, or is the relationship due to some third variable(s)—can only be addressed with a true experiment, in which students are randomly assigned either to such courses or to a control condition. Without such a rigorous design, one can only tentatively infer that participation in such courses leads to greater graduation and retention rates, while seeking to rule out other plausible alternative explanations.

On a more positive note, the lack of differences in terms of race, gender, and SAT scores indicates that pre-existing differences among students do not seem to influence the decisions of faculty members to encourage students for such courses, or of students to self-select to participate into such courses.

Conclusion

In sum, the research reported here reveals that taking one or more advanced research-based courses in psychology is associated with sharp increases in both student retention and graduation relative to students who did not take such courses. The value to colleges and universities in terms of greater student persistence of encouraging such active learning experiences appears to justify the devotion of greater resources and energy to encouraging more students to have similar experiences. Thus, it would appear to be in the best interests of higher educational institutions in general to devote more resources and emphasis upon undergraduate research experiences, as such experiences are associated with both higher retention and higher graduation rates.

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