Undergraduate Student-Faculty Research Partnerships Affect Studen Retention

Biren A. Nagda, **Sandra R. Gregerman**, **John Jonides**,
William von Hippel, and **Jennifer S. Lerner**

Tables

In 1993, 2.4 million students entered college; of those, some 1.1 million will leave without a degree (Tinto, 1993). This is not a new trend. Data from the American College Testing Program show that the first-year attrition rate for all students in four-year public universities has remained largely unchanged over the last decade. In 1983, this rate was 29.1%; in 1992 it was 28.3% (Tinto, 1993). The other end of the undergraduate time-scale looks equally distressing. In 1983, the graduation rate at the same institutions was 52.6% while in 1992 it had *declined* to 46.7%. The phenomenon of college attrition is even more exaggerated among certain underrepresented minority groups. Hispanics graduated at a rate of only 35%, and African **[End Page 55]** Americans at a rate of only 45% (Brower, 1992), far below the rates for White students (Tinto, 1993).

What kind of efforts at the college level can counter this trend? In this paper, we offer a typology of retention efforts to date that have been informed by a variety of presumed causes of attrition. We examine factors that promote student retention and success as a way of thinking about innovative and effective programs. We describe and report on the evaluation of one such program--student-faculty research partnerships--that bridges the academic and student services domains while at the same time being responsive to the institutional context.

The causes of attrition are numerous, thereby leading to multiple retention efforts that concentrate on different factors. Indeed, Tinto's (1993) model of attrition identifies a variety of factors that ought to predict attrition, in accord with the variety of issues that face students as they move from high school through college. Broadly speaking, retention efforts that have addressed one or another of these factors can be classified into two categories. The first assumes that students who do not graduate were underprepared for college work at entrance; individual student deficiencies are thus seen as responsible for attrition (Boykin, 1994; Levin & Levin, 1991). Responses to this perspective typically take the form of various remedial and tutorial programs (Kulik, Kulik, & Schwalb, 1983; Nelson et al., 1993). The second theory assumes that various structural factors inherent in educational institutions fail to support particular students, leading to significant attrition. Retention efforts are, therefore, geared to meet the numerous needs of students with a range of programs that concentrate on financial aid, academic counseling, and personal support (Kulik, Kulik, & Schwalb, 1983). These two classes of theory have motivated the majority of retention efforts in higher education (Tinto, 1993).

They are limited in scope, however. The first focuses on factors having to do with individual students and the second on factors having mainly to do with social and institutional structures. A more recent approach to student life and student attrition concentrates on students' interaction with the social structure and the extent to which they are integrated into the institutional fabric. This approach emphasizes the impact of college structure, resources, and programs on student learning and development (Volkwein & Carbone, 1994). Solutions attempt to create communities and groups that involve changes in the situational/institutional climate while simultaneously involving students in skill- and interest-building activities. Examples include living-learning settings that give students a "home-base" in the larger college environment and mentoring programs in which other students or faculty act as "expert" guides and models.

The concept of integrating students into the fabric of the institution seems important in retention (Tinto, 1993), but there may be drawbacks to effecting **[End Page 56]** this principle. Living-learning programs, for example, may not be sufficiently far-reaching to integrate students into the larger college; they create smaller communities that become the focus of student life and often do not include faculty well in the on-going activities. In other words, students in these programs interact with the university, not directly, but through the intermediate peer environment. Mentoring programs, as another example, often do not have a sufficiently high priority for faculty and students to be

more than peripheral to the daily life of the students whom they are supposed to serve. And as Tinto (1993) observes, the evidence on student attrition suggests that retention efforts need to move beyond "largely a social matter for the staff of student affairs" (p. 71). A firmer implementation of the integration principle would, therefore, involve students in a focused activity that is at the heart of the institution's mission, one that counteracts the individual's feelings of being socially and intellectually isolated from the institution (Tinto, 1993). Such a strategy would simultaneously prepare students to be successful in navigating the larger institution and aid in the student's own academic development and sense of competency.

Lack of integration, or isolation of the student within the institution, has been identified as an important factor in contributing to student departure. The effects of weak student-with-student and student-with-faculty contact have been cited repeatedly as causes of student withdrawal from college (Terenzini & Pascarella, 1977; Pascarella & Terenzini, 1977, 1991). Indeed, Pascarella and Terenzini (1979) cite the absence of sufficient interaction with other members of the college community as the *single leading* predictor of college attrition. The desired interaction must go beyond the formal and expected environment of the classroom (Stage, 1989; Pascarella & Terenzini, 1977) and beyond the often limited contact involved in mentoring or academic advising. It must include sustained informal contact among members of the college community, contact that involves students with both students and faculty. It must provide this contact early in students' careers in college, at a time when they are most likely to depart (Levin & Levin, 1991). Finally, contacts must foster both the social and the academic integration of students into the institution (Tinto, 1993).

As important as integration is for the retention of students in general, it appears to be even more crucial in retaining underrepresented minority students at largely majority institutions. For African American students, for example, the amount of faculty contact affects both retention (Braddock, 1981) and academic performance (Nettles, Thoeny, & Gosman, 1986). Furthermore, faculty contact for African American students plays an even more critical role at predominantly White universities than at historically Black colleges (Braddock, 1981; Fleming, 1984). It may be that faculty serve as institutional brokers for minority students at majority universities, connecting minority students to the academic and intellectual mission of the **[End Page 57]** university. This interaction may further contribute to institutional identification and a sense of belonging among minority students. Consistent with this possibility, institutional identification is a more important factor in retention for African Americans than for other students (Astin, 1975, 1982; Sedlacek & Brooks, 1976; Tracey &

Sedlacek, 1984, 1985, 1987). Fox (1986) also found that academic integration was more salient than social integration in the success of academically and economically disadvantaged students. All of this evidence points to the importance of institutional integration for racial and ethnic minority students.

This study reports on the Undergraduate Research Opportunity Program (UROP). The program builds directly on one of the key academic missions of a large, public Research I university and, by design, weaves students into its academic mission early in their careers.

Method

Program Rationale and Highlights

UROP was founded in 1989 in the College of Literature, Science & the Arts (LS&A) at the University of Michigan. This university's fall 1995 undergraduate student population was 23,505, of which 13.9% were underrepresented minority students (Office of the Registrar, 1995). During the first three years of its existence, UROP enrolled underrepresented minority students exclusively; since the 1992-1993 academic year, however, it has been open to all first-year students and sophomores.

UROP's major goal is to broker intellectual relationships between faculty and first-year and sophomore undergraduates through research partnerships. Research projects are available in most liberal arts departments (e.g., psychology, political science, English, history of art, and economics, among others), and in the professional schools (medicine, law, social work, business, and natural resources and the environment). Through individual meetings with their sponsors and/or team meetings with other project collaborators, students are involved in various aspects of the research. Their duties include conducting bibliographic research and literature reviews, formulating research questions and hypotheses, and conducting studies and analyses. Some UROP students have also coauthored research presentations and journal articles with their sponsors.

While there has been an increase in undergraduate research programs throughout the country (Strassburger, 1995), UROP is unique in a number of ways. First, UROP focuses exclusively on first-year and sophomore students because they are at the greatest risk of attrition. Second, UROP enrolls students during the regular academic year (fall and winter semesters) rather than during the summer so that the research becomes an integral **[End Page 58]** part of their academic life, not a separate activity conducted when they are not "in school." In this way, the students

can gain academic credit or pay (based on financial need) and avail themselves of an elaborate support system--peer advising, peer research interest groups, skill-building workshops, speakers, and research presentations. Third, faculty sponsors come from all the schools and colleges of the university, ensuring students a broad choice of research partnerships. Fourth, UROP is not an "honors" program; average and even "marginal" students interact closely with faculty. UROP specifically targets underrepresented minority students and women with an interest in the sciences, two groups that are at special risk of attrition. Finally, although many other undergraduate research programs exist across the country, few, if any, systematically assess the impact of participation on student retention and academic performance.

Core Program Components

The infrastructure of UROP includes seven components:

1. *Student recruitment.* Students are recruited for UROP either before they begin their first year at the university or toward the end of their first year by direct mailings, advertisements in residence halls and classes, presentations at high school outreach programs, and publicity at incoming student- and parent-orientation sessions.

2. *Peer advising.* The actual research partnership is supplemented by peer advising to smooth the transition to a new experience. Students meet monthly with peer advisors who are program alumni; they talk about their on-going research, problems they encounter with their faculty partners, research skill development, time management, academic course work, and course selection.

3. *Peer research interest groups.* Students are assigned to research groups of about 25 students. Facilitated by the peer advisors, these groups are organized around common research themes--biomedical, social science, physical science and engineering, biological and environmental sciences, humanities, and women-in-sciences. The groups take skill-building workshops, share research experiences with peers, hear guest speakers, discuss interesting and controversial issues in the field, and learn about campus resources.

4. *Faculty recruitment.* Faculty are recruited through direct mailings, presentations at faculty meetings, and staff/faculty newspapers. Over 90% of faculty sponsors return as sponsors every year and also encourage their colleagues to participate in the program.

5. *Faculty-student matching.* Students in the program are not

assigned to a faculty sponsor; rather, students and faculty sponsors go through a mutual selection process. After careful examination of the available options, **[End Page 59]** students select six projects of interest and arrange interviews with the faculty investigators to find a good fit.

6. *Research presentations.* Students are encouraged to present their research in numerous forums. First, each student makes a short research presentation in his or her peer research interest group. Second, two large research symposia are held each year. The Martin Luther King Jr. Symposium highlights multicultural research projects and includes presentations by faculty-student research teams. The Annual Spring Research Symposium includes both oral and poster presentations by students.

7. *Academic credit and assessment.* Students who participate in UROP for academic credit have a choice of either a letter grade or pass-fail notation. Faculty sponsors submit grades for students' research performance and final projects, and the peer advisors submit grades for students' participation in program activities and journal-writing.

Participants

In this study we investigated the impact of UROP participation on student retention. We have limited our analyses to three subgroups of students who are represented in sufficiently large numbers for meaningful analyses: African American, Hispanic, and White students.

We selected 1,280 first-year and sophomore undergraduates from a total of 2,873 applicants. Given the limited number of spaces and the large number of applicants, we used a stratified random sampling method for selecting students. The assignment of students to the experimental or control groups was done by a matched random assignment. First, within each yearly cohort, we sorted all applicants into subgroups based on their race/ethnicity, SAT/ACT scores, and first-year college grades (for prospective sophomores) or high school grades (for prospective first-year undergraduates). Second, we randomly assigned two students within each subgroup, one to UROP or the other to the control group, dropping any other students. They also were not admitted to UROP. This procedure yielded an experimental group of 613 students who actually participated in UROP and a control group of 667 students who did not. We sent all applicants a letter stating that there had been more applicants than positions so admission was determined by lottery. Thus, all of the students--those in UROP, those in the control group, and those not admitted--understood that their status had been determined by chance. In this way, we avoided making the students in the

control group feel that rejection was based on their credentials--as indeed it was not.

Measures

We obtained retention data from the university's Office of the Registrar. It included demographic information (race and gender), term and year of entry, term and year of most recent active enrollment, current enrollment **[End Page 60]** status, grade point average for each term, cumulative grade point average, and enrollment status by term for each student.

We defined retention as students' persistence through graduation, and attrition as students' departure from the University of Michigan. Hence, our study counted in the attrition group at least some students who may have transferred to another institution of higher education. We constructed this variable based on student's registration status by term. Persisters included two categories of students: one, who graduated or showed continuous enrollment from term of entry to fall term 1994; and two, those who departed for a certain period of time but returned to continue their studies, that is, stop-outs. This point of measurement (fall 1994) represents a period ranging from one semester to three years after the students' matriculation from UROP. Nonpersisters were students who were initially enrolled but had neither graduated nor enrolled for fall term, 1994. Thus, it is possible that some nonpersisters may eventually return to the University of Michigan or some other institution to finish work toward their degree and that some persisters will drop out before completion of theirs.

Results

Persistence in College

Two facts about differences in retention rates govern the analyses reported here. First, recognizing that the retention rates of minority and majority students differ at predominantly White institutions, we separately report retention for these two groups. Second, retention rates among different groups of underrepresented minorities differ from one another (Brower, 1992; Tinto, 1993). We therefore report data separately for African American and Hispanic students, the only two minority groups included in our sample in substantial numbers.

When UROP participants are compared to nonparticipants, each race/ethnic group demonstrates a significant positive effect of participation on retention. Underrepresented minority participants in UROP from 1989-1990 to 1993-1994 had an attrition rate of

11.4% compared to 23.5% for nonparticipants. White students in UROP (from 1992-1993 to 1993-1994) had an attrition rate of 3.2% versus 9.8% for nonparticipants. There is, however, the possibility that UROP participants were more motivated in the first place to pursue career-enhancing activities than nonparticipants. The remaining analyses, therefore, compare UROP students to their matched control groups. These samples are restricted to African American and Hispanic students who entered the university in summer/fall terms of 1990, 1991, 1992, and 1993, and were in the experimental or control groups for **[End Page 61]** program years 1991-1992, 1992-1993 and 1993-1994, and White students who entered the university in summer/fall terms of 1991, 1992 and 1993, and were in the experimental or control groups for program years 1992-1993 and 1993-1994. We restricted the study sample to students entering the university in the summer or fall terms only so as to provide a comparison with university-wide information from the Office of the Registrar and to ensure that the students participated in the program for the full year (see Office of the Registrar, 1994a).

To confirm that the participant and control groups were similar on the randomized selection criteria, we conducted student t-test analyses comparing the two groups on high school GPA and composite SAT and ACT scores. The results, as displayed in Table 1, verified that the groups exhibited no significant differences on the pre-college academic aptitude measures.

The main objective of this study was to assess the impact of participation in UROP on students' persistence in college. Table 2 shows results from 2 x 2 chi-square analyses comparing the attrition rates of UROP participant and control groups. The analyses show a nonsignificant difference in attrition rate of 7.2% for all UROP students compared to 9.6% for all control group students, X^2 (1, n = 1280) = 1.858, p = .17. We then separately compared African American, Hispanic, and White students in UROP to their respective control groups. African American students in UROP have an attrition rate of just over a half that of the control group (10.1% vs. 18.3%, p < .03). White students in UROP also showed a lowered attrition rate, about a half that of their control group (3.2% vs. 6.1%), but this difference is not statistically significant. Hispanic students in UROP had a statistically insignificant higher attrition rate than control group students (11.6% vs. 11.3%).

One might argue that the superiority in the retention of African American and perhaps White UROP students compared to their controls was a function, not of increased retention due to UROP, but of decreased retention of the control group students due to their rejection from UROP. On the face of it, it seemed unlikely that not being accepted in a single program in college could have

a dramatic effect on retention. More objectively, however, we noted that each of the specific race/ethnic control groups had a lower attrition rate than their counterparts in the population at large--that is, students who were not part of the UROP participant or control group. For African American students, the difference was marginally significant (18.3% vs. 25.2%, X^2 (1, n = 1495) = 3.071, $p < .08$). For Hispanic students (11.3% vs. 20.4%, X^2 (1, n = 945) = 22.020, $p < .001$) and White students (6.1% vs. 10.0%, X^2 (1, n = 10,220) = 6.705, $p < .01$), this difference in attrition rate was significant. We could therefore have confidence that the **[End Page 62] [Begin Page 64]** effect of UROP on retention was not attributable to a detrimental rejection effect for control group students.

We should note that the data in Table 2 are consistent with overall national trends in attrition. Comparing the overall attrition rates (combining UROP and control groups) among the different race/ethnic groups revealed three results: (a) attrition among African American (13.4%) and Hispanic students (11.4%) did not differ significantly; (b) attrition rates for African American and White students differed significantly (13.4% vs. 5.0% respectively), X^2 (1, n = 1112) = 23.284, $p < .001$; and (c) attrition rates for Hispanic and White students also varied significantly (11.4% vs. 5.0%) X^2 (1, n = 889) = 8.644, $p < .001$.

Retention and Grade Point Average

Academic success, as represented by student grade point average, is one of the factors that positively affects retention (Pascarella & Terenzini, 1991; Wilder, 1983). We examined the extent to which retention differed as a function of students' cumulative grade point averages. To do this, we divided the students into low- and high-GPA groups by splitting the samples approximately at the point of their median cumulative GPA. The medians (on a 4.0 scale) vary by race/ethnic group: B- (2.700) for African American students, B-/B (2.850) for Hispanic students, and B+ (3.300) for White students. We defined students below the median as "Low-GPA" and those above the median as "High-GPA." Table 3 presents attrition data as a function of race/ethnic group, whether the students were in UROP or the control groups, and their level of academic performance. Low-GPA students as a group showed an attrition rate of 13.5% compared to 4.3% for High-GPA students, X^2 (1, n = 1187) = 29.60, $p < .01$. These rates are consistent with the typical finding that students performing poorly are at greater risk of attrition (Edwards & Waters, 1982). Overall, Low-GPA students in UROP showed a lower attrition than those in the control group (11.9% vs. 14.1%) but not significantly, X^2 (1, n = 549) = 0.405, $p < .52$.

The same analysis for High-GPA students reveals a parallel pattern (4.1% vs. 4.4%, X^2 (1, n = 564) = 0.000, p < 1.00). Analyses for the separate race/ethnic groups showed that UROP participation impacted most positively on the retention of low-achieving African American students (attrition rate of 15.3% compared to 27.1% for the control group, p < .07). None of the other results--that is, comparisons among high-GPA African American, and low- or high-GPA Hispanic and White students--approached significance.

Retention and Year in School

In contrast to UROP, many undergraduate research programs restrict participation to students beyond their second year. UROP focuses on first-year and sophomore students with the hypothesis that early intervention **[End Page 64]** will have a salutary effect on student retention. Table 4 displays attrition data for students who participated in UROP for the first time either in their first or second year in college. There is almost no difference in retention overall for first-year students. That is, attrition among first-year UROP students was 9.2% compared to 9.4% for control students, X^2 (1, n = 720) = 0.001, p = .98. On the other hand, the effect for sophomore students was substantial; UROP sophomores showed an attrition rate of 4.3% while control group counterparts had an attrition rate of 9.5%, X^2 (1, n = 553) = 4.963, p = .03. [1] Furthermore, African American students participating in UROP in either the first or sophomore year showed higher retention rates compared to the control group, but the differences are not significant at this level of specificity. In the case of Hispanic students, first-year students showed no significant difference while sophomores showed a marginally significant effect (p = .07). White students in UROP showed a similar trend; that is, there was no appreciable effect of participation in their first-year while the difference for the sophomore year was marginally significant (p = .10). While none of these differences for the separate race/ethnic groups reaches conventional levels of statistical significance, it does appear that attrition overall had differential effects based on the year of participation **[End Page 65]** and that the positive effects of UROP may be more pronounced for sophomores.

Discussion

The primary finding from this research indicates that participation in the Undergraduate Research Opportunity Program increased retention rates for some students. In general, this effect was strongest for African American students and for sophomores rather than first-year students. More specifically, the program

appeared to benefit African American students whose academic performance was below the median for their race/ethnic group. There were also positive trends for Hispanic and White students who participated in UROP during their sophomore year.

The data documenting varying effects of UROP on two different underrepresented racial/ethnic groups is consistent with the hypothesis that different race/ethnic groups face different challenges on campus. For African Americans, our data indicate that UROP has a reliable effect in promoting retention, especially among the low-achieving students. For these students, academic integration and institutional identification may promote a greater involvement with the academic life of the university (Astin, 1975, 1982; Sedlacek & Brooks, 1976; Tracey & Sedlacek, 1984; 1985; 1987; Fox, 1986). Related research in anthropology and social psychology identify mechanisms that may account for lower academic achievement and increased college attrition among African American students. For example, the theories of racelessness (Fordham, 1988) and lack of identification with college (Osborne, 1995; Steele, 1992) imply that African American students **[End Page 66]** cope with peer pressure or stereotypes of academic inferiority by disassociating their racial identity and self-esteem from their academic achievement. We can hypothesize that UROP may be effective in preventing such disidentification and in promoting academic integration; the programmatic structure provides for a positive peer and mentoring culture in the context of collaborative academic and intellectual activities.

The challenge of integration may be different for Hispanic students. The Michigan undergraduate student population includes only 4.5% Hispanics/Latino(a)s (AAO/OAMI, 1994); they are thus "a minority within a minority." Furthermore, over half of the Hispanic students at the university are not from Michigan (Office of the Registrar, 1994b). Hispanic students may thus experience severe isolation at the university due to an absence of family support and greater pressure from family obligations. Celis (1993) has shown that Hispanic students are especially likely to leave college to support the family, or to transfer to institutions closer to home. Research also suggests that a critical number of students from a similar race/ethnic group is needed to provide "safe havens" and facilitate social integration (Murguia, Padilla, & Pavel, 1991; Tinto, 1993). Thus, a combination of a relatively small ethnic community on campus and distance from home may cause Hispanic students to place higher priority initially on social connections and social integration. Perhaps for this reason, UROP had no apparent effect on the retention of Hispanic participants during their first year. What these students may need more than academic integration at this stage is a more nurturing social environment to ease the high school-to-college transition

and bridge the home community and college connection (Durán, 1994).

We cannot yet say anything definitive about the effect of UROP on the retention of White students. Their attrition rate is sufficiently low overall that it is difficult, even with the sample size included in our study, to find a difference that is reliable by conventional standards. Nevertheless, the overall ratio of attrition for White students in UROP compared to their controls is approximately 1:2 and this effect is accounted for exclusively by students with relatively low GPAs. On the basis of this trend, we cautiously speculate that UROP may be effective in promoting academic integration among this group. White students, like African American students, may benefit from opportunities outside the classroom that emphasize the value of intellectual work, interactions with faculty and peers, and academic support.

Methodologically, the strength of this study lies in having a matched control group composed of students who applied to the program. First, the comparable high school grades and SAT/ACT scores ensured that the participant and control groups were similar on measures of precollege academic **[End Page 67]** performance. Second, the higher retention rate of control students in comparison to the general population of students across each race/ethnic group showed that the control group students did not seem unduly harmed by being rejected for this program. We note, however, the possibility of a self-selection bias among students who apply to UROP. Thus, random assignment of applicants into participant and control groups is imperative to assess the effectiveness of interventions such as UROP.

At present, we have little basis for analyzing which components of UROP were especially effective in promoting student retention. We can, however, venture that the regular faculty contact provided an engaging, one-on-one, relationship to foster academic competency (computer literacy, bibliographic searches, critical thinking, and team-work) and academic integration. It also provided students with opportunities for continued discussion of intellectual issues outside the classroom by virtue of the tasks they shared with their faculty sponsors and student colleagues. Most saliently, students were able to see an idea take form, come to fruition, and seed other ideas and studies. Students' involvement in investigating, understanding, and producing knowledge wove them into the central mission of the university. An evaluation by a student indicates that being part of a research setting extends students' intellectual challenges in a way that the classroom does not:

> UROP has given me the chance to work in the real
> world of research and definitely feel the power and

responsibilities of research. I have not only learned new techniques specific to my project, I have been able to apply my own knowledge and, most importantly, critical thinking to solve problems and hypothesize outcomes of experiments. I have gained a way of thinking that cannot be taught in textbooks and learned to deal with complications which randomly arise. It has indeed broadened my horizons.

The peer-advising component was also a crucial part of the students' research experience. In addition to its skill building and informational usefulness, it helped bridge the gap between students' social and intellectual lives. By meeting with students individually and leading the peer research interest groups, the peer advisors facilitated intellectual and social ties to the university community. The research discussions in the groups enabled students to look at their own and others' research from multiple perspectives. These groups also provided students with an accessible community of peers with similar interests; the peer advisors served as role models and mentors, assuring students that a supportive person was available to them.

Of course, the results presented here need amplification. We must identify whether students who did not persist at our university dropped out of higher education entirely or transferred to another institution. We must identify the factors within UROP that lead to greater student persistence. **[End Page 68]** We must go beyond persistence to identify other effects of UROP, those that may extend from academic performance to attitudinal change. We must investigate whether the beneficial effects of UROP are replicable at institutions that may differ from the University of Michigan. For example, Michigan has a highly selected student population for a public university; therefore, we cannot be sure that our findings will generalize to institutions whose demographic characteristics are different. These issues aside, our results lead us to believe that UROP is having both a statistically significant effect on retention and a *practically* significant one as well.

The effects of UROP reported here should help strengthen the case for related programs at other institutions. In addition to the methodological soundness of the study, the programmatic structure of UROP exemplifies Pascarella and Terenzini's (1991) proposition: "Whatever form engagement might take . . . students should be helped early in their careers to find academic and social niches where they can feel that they are a part of the institution's life, where friendships can be developed, and where role models (whether student or faculty) can be observed and emulated" (p. 654). The programmatic richness of UROP provides lessons that are applicable to other institutions. Students should be integrated

into core university missions through challenging, rather than remedial, activities. Moreover, the intervention has to be multi-dimensional, including both faculty and student mentoring, active engagement, skill-building activities, and career-enhancing tasks.

UROP focuses on research as one of the core missions, motivated by the fact that Michigan is among the leading research universities in the country (NSF, 1992). Similar programs at Radcliffe College and the University of Washington have also been found to be effective in enhancing women's aspirations in the sciences and engineering (Brainard, Laurich-McIntyre, & Carlin, 1995). Such efforts, however, do not have to be limited to the research domain; students can also be integrated into the teaching mission of colleges and universities. Brown University's Odyssey Program involves undergraduates in developing course curricula. Hatcher (1995) provides examples of other programs that involve undergraduate as peer facilitators and teaching assistants. Whatever the approach, it appears that a joint, not disparate, partnership between academic and student services is crucial for student retention and academic success.

Institutional support can strengthen programs such as UROP. For example, faculty could receive financial support for their research partnership activities and recognition for their contributions in faculty promotion decisions. Academic development funds can support students in presenting their research at professional conferences and in funding students who wish to continue their work beyond the sophomore year. At the policy level, **[End Page 69]** the success of UROP can spur other initiatives to increase substantive, engaging, and enduring contact among undergraduates and faculty members.

On a broader level, UROP has implications for undergraduate education. The program provides ample evidence that it is possible to concentrate on both the educational and research missions of a university to the benefit of undergraduate students. Undergraduate student satisfaction and success is not incongruous with the mission of research universities, as suggested by Astin's (1993) finding that research universities had the second most negative effect on general education outcomes, retention, and graduation. In fact, Volkwein and Carbone (1994) proposed that "the most powerful undergraduate learning environments may occur in research universities that also attend to the undergraduate program" (p. 163). This conclusion is echoed in a *New York Times* article reporting that the head of a commission to examine the mission of research universities "envisions a climate in which undergraduates are seen as partners and faculty members are viewed as mentors who engage in common research efforts" (Richardson, 1995, p. B9).

UROP may be a vehicle to help realize precisely this climate.

Biren A. Nagda is an Assistant Professor of Social Work at the University of Washington, Seattle. He worked as a Research Associate with the Undergraduate Research Opportunity Program at the University of Michigan. *Sandra R. Gregerman* is this program's Director. *John Jonides* is Professor of Psychology at the University of Michigan, *William von Hippel* is Associate Professor of Psychology at Ohio State University, and *Jennifer S. Lerner* is a doctoral candidate in Social Psychology at the University of California at Berkeley.

Note

1. We note the possibility that the absence of attrition effects of UROP on first-year students may be a function of the university's policy about matriculation for first-year students who perform poorly. These students are often permitted an extra semester's enrollment on a probationary status.

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