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ABSTRACT

While the mentoring process appears to occur regularly and usually quite effectively in the sciences, it seems not to occur as readily in non-science areas such as the humanities and the social sciences. This study is a follow up to earlier studies that examined interview responses of students who participated in summer research programs. The objectives of those studies were to qualitatively compare the perceptions of mentoring related experiences of African American college students in the sciences with those in the humanities and social sciences. The purpose of this study was to follow up the early studies and to examine students' responses from questionnaires that were given at the end of each program. Results indicate that the students engaged in directed humanities and social science research had a higher proportion of positive responses. An important observation was that students in the humanities have strong affinities toward mentor-student related experiences. Implications for humanities and social science programs as well as for graduate studies are discussed. Contains 18 references. (JRH)

Comparing Science and Non-Science Minority Students' Perceptions and Satisfaction With a Short-Term Research and Mentoring Program

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Abstract

Given the traditional apprenticeship in training science students, conventional wisdom would suggest that science students would have more positive perceptions regarding than experiences in a summer research program compared to students involved in humanities and the social sciences research. Collected student responses over seven years indicated, however, no essential differences between those in "the hard sciences" compared to those in the humanities and social sciences.

Comparing Science and Non-Science Minority Students' Perceptions and Satisfaction With a Summer Research and Mentoring Program

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Over the last 15 or so years, the focus on the concept of mentoring in higher education has increased. The mentoring process has been defined as: "A dynamic, reciprocal relationship in a work environment between an advanced career incumbent (mentor) and a beginner (protege)" (Healy and Welchert, 1990). Moreover, some investigators have attempted to more clearly define the term relative to higher education by including some degree of teaching and motivational encouragement among the duties of mentoring (Blackburn 1981; Blackwell, 1983; Cameron and Blackburn, 1981; Frierson, 1990). Accordingly, educators such as Hartnett (1976), Arce and Manning (1984), and Girves and Wemmerus (1988), have pointed out the importance of mentoring in the academic and professional development for graduate students. Blackwell (1983) further pointed to the particular importance of mentoring for minority students.

Individuals such as Cusanovich and Gilliland (1991), reiterate that mentoring plays a crucial role in the academic development of graduate students. For minority students, the implications may be particularly significant, for it is contended that many minority graduate students are less likely to receive mentoring of any kind (Blackwell 1983; Frierson, 1990). This may be especially true in humanities and social sciences disciplines. With data reports by Simmons and Thurgood (1995) and Carter and Wilson (1995) as examples, there is ample documentation of the continued underrepresentation of African American and other minority groups in graduate programs and academic professions.

Another important consideration in the mentoring process should be the student's discipline. There are different expectations regarding how students are mentored when specific disciplines in the sciences, social sciences, and humanities are examined. The accepted and traditional pattern in the sciences is that a student will work closely with a faculty member during graduate studies and it is quite likely that faculty member will become the student's mentor. Moreover, this situation can occur at the undergraduate level as well for some students. Such relationships, however, between student and faculty occur far less often in the social sciences and particularly the humanities. Indeed, the scholarly pursuit in the humanities is often described as a lonely journey where little if any collaboration between student and faculty take place.

While the mentoring process appears to occur regularly and usually quite effectively in the sciences, it seems not to occur as readily in non-science areas such as the humanities and, to some extent, the social science. Thus, a critical question is, can mentoring be as effective for students in non-science areas as in the natural and physical sciences?

This study is a follow up to earlier studies (Frierson, Hargrove, and Lewis, 1992; 1993; 1994; Hargrove and Frierson, 1994; Boyce, Spaulding, and Frierson, 1994; Frierson, 1994; Spaulding, Frierson, and Boyce, 1994; Boyce and Frierson, 1995) that examined interview responses of students who participated in a summer research program at a major research university. The objectives of those studies were to qualitatively compare the perceptions of mentoring related experiences of African American college students in the sciences with those in the humanities and social sciences. Consequently, the purpose was to observe whether there were distinct differences in the perceptions of students in the sciences, were traditional mentoring is commonly expected, compared to students in the social sciences and humanities were such mentoring is not normally expected to occur nearly to the same extent, if at all.

With attention given to race and ethnicity in academic environs, there has been similar attention paid to the mentoring minority students, even at the undergraduate level. One such program with that focus, the Summer Pre-Graduate Research Experience (SPGRE) Program at the University of North Carolina at Chapel Hill, attempts to involve promising minority undergraduates in not only hopefully fruitful mentoring experience, but a realistic graduate-level research experience as well. These students are from colleges across the country; many attend historically Black colleges and universities, while others are from predominantly White colleges and universities. The participants are largely African American, but include Native American, and Hispanic/Latino students, and a majority of the students have been women.

The 10-week program is designed to reinforce and promote interest in the pursuit of graduate study through participation in directed or on-going faculty research projects. The participating students are matched with preceptors from the university faculty. Full effort is made to match students according to their research interests and the research of prospective preceptors. Support for students is provided in the form of a stipend, food allowance, housing, social activities, as well as full use of university resources.

Several evaluation studies based on interview responses have been conducted to assess the SPGRE program and to identify the extent to which variables such as those mentioned above play a role in the perceptions of the students. These studies report, as have other authors asserted, that race, gender, and college racial makeup are central factors affecting the perceptions and attitudes of students in the program (Frierson, Hargrove, and Lewis, 1992; 1993; 1994; Hargrove and Frierson, 1994). This study continues the inquiry by examining self-report, questionnaire data obtained at the end of the program. The purpose of this study was to follow up the early studies and to examine students' responses from questionnairs that were given at the end of each

program. The results are based on SPGRE students' responses over an seven-year period.

Method

Participants

Between the years 1988 and 1995 (excluding 1990 for which data was unavailable), 208 (95%) of the 219 SPGRE participants for that period completed the end-of-program evaluation questionnaire. Almost all (92.8%) of the students had completed their junior year and the remainder were academically classified as juniors. The students were high academic achievers (the average grade point average for all participants was approximately 3.5) who expressed an active interest in obtaining experience in research with UNC-CH faculty. They represented a variety of majors, ranging from the humanities and social sciences to the physical and biological sciences.

Of the 208 students who responded to the questionnaire, 53.4% (111) participated in research related to science disciplines and 46.6% (97) participated in research in humanities and social science disciplines. Further, 66.3% (138) were women and 33.7% (70) were men. Of the 187 students (89.9% of the total sample) who specifically responded to the question regarding their ethnicity, 82.9% (155) labeled themselves African American, 1.6% (3) were Mexican American, 4.8% (9) were Native American, 0.5% (1) was Puerto Rican, and 12.2% (19) responded as "other" or "not applicable" (please note that on the application form for the program, all participants reported themselves as as being in one of the five ethnic groups with the exception of one student who listed himself as Cuban-American).

Of the 199 students who reported their home institution, 65.8% (131) reported that they came from historically Black colleges or universities, 33.2% (66) were from predominantly White

colleges and universities, and 1.0% (2) was said to be from a historically American Indian institution.

Procedure

At the conclusion of each programmatic year, all students are requested to complete a questionnaire to assess the program. The students complete questionnaires anonymously. The purpose of the questionnaire is seek and to determine the honest degree of students' satisfaction with their mentoring and research experiences and their satisfaction with the program in general.

Data from completed questionnaires from the years 1988 through 1995 (except 1990) were examined and analyzed. Chi Square (χ^2) tests were used to determine whether differences associated with gender existed.

The students responded to items addressing their overall perceptions of the program by responding to a series of individual item statements on 6-point and 4-point Likert-type scales. An examples of the range for the 6-point scales were 6=very favorable to 1=very unfavorable, and an example of the range for the 4-point scales was 4=yes, definitely to 1=no, definitely. Eleven specific items were examined which addressed students' satisfaction with program, the relationship with their mentors, the program's effect on their perception of research, and their effort in the research enterprise. In addition to the 11 Likert-type items, responses from several open-ended questions that allowed students to elaborate on their previous responses and provide suggestions for improvements to the program were examined for additional qualitative information. The item stems associated with the 11 Likert-type items were as follows:

1. How well did SPGRE meet your expectations?
2. Given your experience in SPGRE are you pleased that you participated?

3. Your overall impression regarding the total program.

4. The program was worth [your] time and effort.

5. Your overall impression regarding your effort [devoted to] your specific research activity or project.

6. Your overall impression regarding [your] relationship with your mentor.

7, My relationship with my mentor was productive.

8. Overall, I found my relationship with my mentor to be positive and satisfying.

9. The program stimulated my desire to pursue graduate studies.

10. The program stimulated an interest in my pursuing a research career.

11. I would recommend this program to others.

Results

Of the 207 students who responded to the question, "How well did the summer research program meet your expectations?", there was no difference between the responses of science and nonscience students (χ^2=.87, p<.84). Of the respondents, 87.9% (182) reported that their expectations were either met or exceeded. Only 3.3% (7) indicated that their expectations had not been meet.

For the question, "Given your experiences in the summer research program, are you pleased that you participated?" The difference between the responses of the science and nonscience students was significant (χ^2=6.60, p<.04). A significantly greater proportion of nonscience students were more unequivocally positive in their response. Of the nonscience respondents, 83.5% responded "Yes, definitely," compared to 76.4% of the science students.

There was no difference (χ^2=4.26, p<.38) regarding the students' overall impression of the

program. Of the 201 respondents, 90.6% indicated that their impressions were very favorable or favorable. In response to the statement, "The total program was worth my time and effort," male and female students did not differ in their endorsements of the statement, (χ^2=2.62, p<.46). Regardless of research discipline, of the 207 students who responded to that particular statement, 93.2% indicated that they either "strongly agree[d]" (144 students) or "agree[d]" (49 students) with the statement.

Concerning the students' perceptions of their particular efforts regarding the research projects on which they worked, there was no difference related to research area (χ^2=2.30, p<.69). Of the 204 students who responded, 90.7% were were either very favorably or favorably disposed toward the specific effort they generated.

Regarding participants' perceptions of their relationships with their mentors, research area did not appear to play a significant role. Regarding the students perceptions of their relationship with their mentors, there was no statistical difference (χ^2= 5.09, p<.28). Of the 207 respondents, 90.8% indicated that their relationships were very favorable or favorable, and 83.6% indicated that the relationship was very favorable. In responding to the statement, "My relationship with my mentor was productive," no differences related to research area was observed (χ^2=3.28, p<.66). The majority, 55.1% or 114, of the 207 responding students endorsed the "strongly agree" option, while an additional 53 students or 25.6% indicated that they "agree[d]" with this statement. An additional statement phrased, "Overall, I found my relationship with my mentor to be positive and satisfying," was also most positively endorsed by the majority of respondents (53.6% or 111 students); again no significant research area related effects were found (χ^2=6.15, p<.30).

Similarly, there was no differences associated with research area on the degree to which

204 respondents rated their "effort regarding [their] specific research activity or project," (χ^2=2.30, p<.69). Moreover, a large proportion of the students, 46% (94), described the effort they expended on their research activity as "very favorable".

With respect to students' perceptions of future research interests, the questionnaire asked students to rate the degree to which they agreed or disagreed with the statement: "The program stimulated my desire to pursue graduate studies." This question attempted to assess the degree of the students' interest in pursuing graduate studies after participating in the program. There was no difference associated with research area (χ^2=3.24, p<.67), and 71.5% of the 207 respondents either strongly agreed or agreed that the program had stimulated their desire to pursue graduate degrees. Only 11.6% of the respondents indicated that the program did not have a positive effect on their desire to pursue graduate studies.

To the related question--"The program stimulated an interest in my pursuing a research career"--which attempted to assess the degree of the students' interest in pursuing a research career after the experience of participating in the program, again no difference related to research area was observed (χ^2=4.00, p.<.55). Of the 205 respondents, 55.1% indicated that the program stimulated their interest in pursuing research careers. Relatedly, there was no research area difference in responses to the statement.

A key question related to whether the students would personally recommend other students to participate in the SPGRE Program. The responses to the question, "I would recommend this program to others," indicated no difference related to research area (χ^2=4.81, p<.31). Of the 207 respondents, 93.7% (194) indicated unequivocal agreement with the statement with 73.9% (153) indicating that they most strongly agreed.

Table 1 presents an overview of the percent of positive responses by both science and

nonscience students in each of the 11 major areas addressed in this study. The mean percentage of positive responses for students involved in "hard science" research and those in humanities and social science research was the same at 93%. Table 2 provides examples of the students positive responses to the open-ended items.

Insert Table 1 about here

Insert Table 2 about here

Discussion

The results indicated that for participants in the summer research program, the students' research focus was significantly associated with the only one of the 11 major areas examined. That areas was whether they were pleased that they participated. While the responses of both categories of students was overwhelmingly positive, the students engaged in directed humanities and social science research had a higher proportion of positive responses.

For a short-term research program involving students and faculty from an array of disciplines, conventional wisdom would dictate that differing perceptions would be prevalent across those disciplines particularly when science and nonscience areas are compared. Moverover, because of the tradition and common occurrence of mentoring of students among science faculty, it would seem that the students in the humanities and social sciences would not find the one-on-one experiences with faculty as positive as those in the sciences. The

expectations would have normally been that comparatively more positive perceptions regarding research and interactions with faculty preceptors by science students would be observed. That expectation was dashed in a previous study when attained interview responses from science and nonscience students indicated that humanities/social science students had more generally positive perceptions than the science students at both the beginning and end of the short-term research program. While significant differences were not regularly observed, the results of this study confirmed that students participating in research in the humanities and social sciences had perceptions of the program and experiences with their mentors just as positive, if not more so, than their peers who participated in "hard science" research. This has occurred despite the nature of how undergraduate students are incorporated in research projects by science faculty and the limited extent which it happens in the social sciences, and specifically so for the humanities.

For this study, the important observation, however, was that students in the humanities, especially, and the social sciences have strong affinities toward mentor-student related experiences. Moreover, the humanities and social science students reacted quite favorably to those conditions and to a greater degree than those students in the sciences. This occurred despite, as stated earlier, the broader experience that many of the science faculty had in guiding and mentoring students in research efforts.

An implication of the findings is that more humanities and social science programs should be vigorously encouraged to provide students with directed research experience with faculty and accordingly, humanities and social science faculty should not be reticent to take on undergraduate students, particularly minority students, to involve them in research projects. Just as African American undergraduate students were involved in research project over a summer period, similar experiences can be provided more widely, and throughout the academic year, to African American

and other culturally diverse students in the humanities and social sciences. This should engender more enriched academic experiences, the opportunity to acquire research skills, and provide those students with considerable encouragement to pursue graduate studies.

The implications for graduate studies are also significant. By more broadly applying effective concepts of mentoring in faculty-student interactions of humanities and social science doctoral students may quite likely have positive outcomes in decreasing the time-to-degree. The expansion of time-to-degree is a problem which has become quite symptomatic in the humanities and social sciences. For graduate students, a meaningful and work related student-faculty relationship, as occurred for a number of students in the short-term summer research program, is likely to significantly increase the prospects that those students will receive a richer and more productive graduate education. A true mentor-protege relationship, however, would further enhance considerably the occurrence of such an outcome.

Generally the responses of the students toward the program were quite positive. Overall, both "science" and "nonscience" students rated almost every aspects of the program quite favorably. Moreover, a large proportion of the students reported a continued and/or enhanced interest in pursuing graduate studies and/or a career in academia. Notably, 63% of the SPGRE students who have graduated from baccalaureate programs have pursued or completed graduate programs; another 20% pursued or completed post-baccalaureate professional programs such as medicine and law.

The underrepresentation of African Americans, Mexican Americans, American Indians, and Puerto Ricans in graduate education has been longstanding. To address this underrepresentation, widely applied means to encourage more underrepresented minority students to pursue graduate studies and academic careers are needed. If mentoring is an effective

mechanism to increase the numbers and successes of minority students in higher education, clearly it warrants examination and broader application.

In light of the heated political debate over the fate and appropriateness of affirmative action programs, the implications for the future of similar programs of the type examined here are unclear. Given the disparate representation of minority graduate students and particularly the low representation of minority doctoral recipients and faculty in colleges and universities the need for attention to this issue continues. If however, equity continues to be a desirable goal and is to be achieved at academic institutions, attention must continually be paid to creating rich opportunities for all students to enter and complete graduate degree programs. Proportionately few minority students seriously consider doctoral programs in graduate school or research and academic careers. Summer research programs for undergraduate students, such as SPGRE, can played a major role in providing equal access and opportunities for students to embark upon academic and research careers via graduate school. Clearly, the responses of students, those both in the sciences and nonsciences, speak to the value and need of research programs for undergraduate minority students.

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Table 1

Percent of Positive Responses of Female and Male Student Participants

	Science	Hum.\Soc Sci
Program met expectations	89%	87%
Pleased participated in program	100%	97%
Overall impression of program	97%	95%
Program worth time and effort	99%	98%
Pleased with effort regarding research	93%	97%
General relationship with mentor	96%	97%
Productive relationship with mentor	94%	94%
Positive/satisfying relationship with mentor	91%	92%
Program stimulated desire to pursue graduate studies	88%	89%
Program stimulated an interest in pursuing a research career	73%	79%
Would recommend this program to others.	99%	97%
Mean Positive Response Index	92.6%	92.9%

Table 2

Examples of Positive Statements By Students Regarding Program Satisfaction

"I enjoyed the program and the workshops. [The program] gave me a good idea of what grad school demands. I have because of the program decided to pursue a career in chemistry."

"Overall the program was wonderful; I believe it succeeds in its intentions."

The program on a whole was great and if a GA [graduate assistant] is needed next year upon my notification of [acceptance to] grad school here I would love to be one."

Overall I enjoyed the program. I feel my summer was well spent. I learned a lot, made a lot of friends, and also a lot of connections."

"I felt it was a great experience and it met its outlined goals. In my eyes the program needs no improvement."

"In one sentence, the program was exceptional in scope and an invaluable experience."

"Great program. Great experiences. Will highly recommend to others."

"I really enjoyed the research experience and it confirmed my interest in my field as well as pursuing graduate school."

"The program was very beneficial to me. I enjoyed it and will be glad to pass the experience on to my colleagues at my school."

"I really enjoyed the program. I can't express what a great experience this has been."

"I enjoyed the program. Overall it was great. I'd participate again if I could."

"The overall experience was excellent and I would do it again."

"I just simply wish this program can be continued. It is a very special opportunity, a real privilege."

"This program is a very useful tool in the development and growth of minority students. It has left a life-long impression on me. I hope other students will have this chance. Thank you very much for having me."

"I Thought it was wonderful that we were left alone to do our own thing with our mentor. That's how it would be in grad school."

"This has been a great summer. Perhaps the best in my life in terms of learning experiences."