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Exploring the Role of Mentoring in Agricultural Economics Ph.D. Training

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Mentoring is used in many fields to prepare graduate students for a professional career. This study focusses on mentoring of Ph.D. students in agricultural economics, including the effects of mentoring on expected research output and students' satisfaction with time spent with their major professor. The sink-or-swim mentoring method seems to create the most discord among students and also negatively influences expected research output. The student's gender and citizenship seem to also impact expected output.

Key words: gender, major professor, mentoring, research

Introduction

A major difference between undergraduate and graduate education is the greater personal interaction between graduate students and faculty. As Phillips (p. 339) states:

> The relationship between professor and student is intimate in every sense of the word. Because they must work closely together, it is customary for student and advisor to spend a great deal of time in each other's company. Disclosures are often made or, at a minimum, the individuals learn a great deal about each other....It is not unusual for graduate professors to form long-lasting and very intense personal relationships with their students.

Such a relationship is a product of the mentoring approach commonly used in graduate education.

The term *mentor* has its origins in Greek mythology. When Odysseus went off to fight in the Trojan War, legend holds that he delegated to his household manager, Mentor, the responsibility of educating and developing his son, Telemachus. In carrying out this assignment, Mentor functioned as a taskmaster, coach, confidant, teacher, counselor, and friend. A mentor in education also fulfills many of these roles and can have a major impact on the student's professional and personal life. Perhaps the most visible sign of the significance of mentorship in the agricultural economics profession is the recent creation of appreciation clubs by the AAEA Foundation. In most cases, these clubs were created by former students who wanted to honor their mentors.

The role of mentors has been explored extensively in education (Bey and Holmes), in business (Kram; Collins and Scott), and also has been examined in other fields such as nursing (Fagan and Fagan) and counseling (Haring-Hidore). Given this interest in mentoring, it is surprising that little work has been done on examining the role of mentorship in training researchers. For example, mentoring was not even mentioned in the recent American Economics Association study of U.S. graduate programs in economics. This omission is particularly noteworthy because (as we note later) a number of the problems present in economics graduate programs can be traced to how students are mentored.

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In this study, we explore the ways in which mentoring influences a graduate student interested in a research career. Our focus is on the major professor–student mentoring relationship.[1] We divide mentoring approaches into four distinct categories and examine the characteristics of students mentored under each approach. We then explore how the mentoring approach relates to the student's expected research output, as well as student satisfaction with time spent meeting with the mentor.

Mentoring Roles

Head, Reiman, and Theis-Sprinthall identify five major roles performed by mentors in K–12 education, where the major emphasis is developing quality classroom teachers. These roles also are important in any major professor–graduate student relationship, even if the ultimate professional objective for the student is a nonacademic position. The roles are as follows.

Trusted Associate

For any mentoring relationship to be successful, there must be a bond of trust and concern between the major professor and the student. The student must feel that the major professor will be supportive when unexpected setbacks occur, will provide useful counsel, and in general, will do things that are in the student's best professional interest. The major professor, in turn, trusts that the student will make his/her best effort in all phases of graduate education and will be forthright about problems that may hinder completion of the degree. This type of association is best achieved when the relationship is entered into voluntarily by both parties. A true mentoring relationship begins with friendship; having administrators assign students to major professors is problematic.

Coach/Parent

The major professor helps the graduate student develop his/her talents as a researcher. The professor functions much like a coach or parent in this role. As one Ph.D. student stated, "It is my belief that faculty mentors *are* 'parents' in a sense—our intellectual and professional parents. Like our biological parents, the experience and example of faculty mentors should aid and inspire us as we make our way through life" (Gaffney, p. 2). Students who speak highly of their mentors emphasize not only the academic training they received but also the things they learned about morality, ethics, and humanity. Good mentors, like good coaches and parents, help to develop the entire person.

Role Model

The graduate student mentor should have substantially more experience and ability in conducting research than the student. A professor who has written grant proposals, carried out important research projects, written for refereed journals, or presented papers at professional meetings has gained valuable experience in the process. Passing on knowledge gained

[1]We recognize that students will often consider several faculty as their mentors and may not even consider their major professor as their most influential mentor. Nevertheless, it is our observation that major professors invariably have some mentoring responsibilities and often seem to be the most influential mentor for a student.

from these experiences to the graduate student can aid his/her efforts in pursuing or keeping a research position in academics, government, or private industry. In addition, the professor often serves as a model, exhibiting the characteristics needed to be successful as a professional researcher. When working in an intimate professor–student mentoring relationship, an observant student can often acquire subtle aspects of success that are not obvious when working in less intimate situations.

Supervisor/Gatekeeper

The professor–graduate student relationship not only includes teaching and building trust but also contains elements of accountability and quality control. This part of the mentorship is especially important when students are receiving financial assistance for their research efforts. Professors must mentally challenge students, inspiring the students to learn and develop skills that will serve them in their professional careers. At the same time, professors serve as the principal quality-control agent to the profession, ensuring that students have the necessary abilities and skills to function successfully as professionals after graduation.

Anthropologist

The agricultural economics profession, like all professions, represents a complicated culture that is not easily deciphered by new graduate students. Major professors can serve a valuable role in educating the students about this discipline, including its value system, its nuances, its elite, its controversies, and the sources of these controversies. Good mentors will provide graduate students with a solid understanding of the discipline, thereby helping them understand what they must do to be successful.

Survey Description and Approach

In spring 1994, a survey was conducted to gather information about agricultural economics graduate students and their attitudes toward educational training. The survey population consisted of Ph.D. students at the top 18 agricultural economics doctoral programs in the United States.[2] These top 18 programs were identified by Perry as having average to excellent Ph.D. programs in agricultural economics. The sample population was further narrowed to those students entering their respective Ph.D. programs between fall 1991 and spring 1993. A summary of the survey questions relevant to this study is provided in the appendix.

Choosing second- and third-year students to assess mentoring may seem problematic, given that most mentoring is perceived to occur during the dissertation stage of a student's program. We believe, however, that mentoring at this stage of a student's doctorate program is more important than at any other program stage. As Bowen and Rudenstine note, this time period is unusually difficult for graduate students as they progress from coursework to dissertation work. Students spend the first year or so learning advanced theory and quantitative methods, in part, by critiquing the work of others. They perceive that a well-chosen

[2]The programs included in the survey were UC-Berkeley, UC-Davis, Cornell, Florida, Illinois, Iowa State, Maryland, Michigan State, Minnesota, North Carolina State, Ohio State, Oregon State, Penn State, Purdue, Stanford, Texas A&M, VPI, and Wisconsin.

dissertation topic could help them obtain a job and set their career on a successful course. So they consider potential topics with a critical eye and high standards and often have difficulty committing to a particular topic. Quality mentoring during this stage can greatly help the student find a direction for his/her research and move forward in a timely fashion. Thus, surveying student attitudes at this stage in the education process seemed desirable.

The initial sample population consisted of 293 students. Students at Florida, Purdue, and Stanford received their surveys through their graduate program coordinators. The remaining students received their surveys directly in the mail. A reminder card was sent approximately two weeks after the initial survey was sent. A second survey was sent about two weeks after the reminder card. The total response rate for the survey was 67%.

Analysis of Mentoring Approaches

There are probably as many mentoring approaches as there are mentors. In fact, potential mentoring approaches represent a spectrum of choices, ranging from complete control of the student to no control and no accountability to the major professor. In our survey we subdivided this continuum into four groups. These we denote as (*a*) command-and-control, (*b*) heavy direction, (*c*) light direction, and (*d*) sink-or-swim. Under command-and-control, students are essentially told what to do throughout the entire research process. They function as subordinates of the professor, with little of the give-and-take that is beneficial in a mentoring relationship. The heavy-direction method still involves the professor setting the direction and approach of the research but allows the students an opportunity to make changes with approval of the professor. The light-direction method allows still greater freedom. The professor continues to set a general direction for the research, but students are free to select their own research approach. With a sink-or-swim system, students basically set their own research program, determining their research direction and how it will be approached.

Mentoring approaches usually evolve as students gain experience and confidence as researchers. Our experience suggests that students beginning graduate school typically have little experience conducting independent research, thus function best under a command-and-control system. As they learn through experience, the mentoring approach evolves to give students greater responsibility. By the time students complete the Ph.D. degree, they should be capable of functioning under a sink-or-swim system (and, we would hope, could swim). Of course, this evolutionary process may not occur for every student, because previous training and natural ability may accelerate or prolong the process. In addition, circumstances may cause the student to terminate his/her graduate program before completion.

A complicating factor in the description outlined above is the professor's attitude toward mentoring. At one extreme would be the professor who views the student as a resource to be exploited for personal gain. This type of professor would likely use a command-and-control system, assigning the student to menial tasks that need to be accomplished during the research process. At the other extreme is the professor who believes he/she is "too busy" to advise graduate students, so gives them low priority in his/her schedule. Also at this end of the spectrum is a faculty member who states "my door is always open," but who never acts when a student fails to enter that doorway for months. In both cases, the mentoring approach is of the sink-or-swim variety.

So which of these approaches is most commonly used and how effective is each approach? To address these questions, we asked each student to indicate which of the four

approaches listed above best described the working relationship they had with their major professor. Twenty-seven percent of the respondents indicated that they were not currently working on a research project.[3] These students were instructed not to complete the portion of the questionnaire on mentoring; their responses were dropped from the data set. A summary of the results for the remaining survey respondents is given in table 1. Statistical inference was made using the chi-squared distribution for all discrete variables and the *t*-distribution for all continuous variables.

The light-direction approach was most commonly indicated among the four options listed on the survey, with just over 40% of all students falling into this category. The next most common was the sink-or-swim approach, used with almost one-third of the students surveyed. Least used was the command-and-control approach, which represented less than 8% of the respondents. The fact that so few students were in this last category is probably the result of students having had some research experience at the master's level.

Unfortunately, no statistics exist to compare these percentages with the mixture of mentoring approaches used in economics departments. In a recent review of Ph.D. programs in economics, Hansen identifies a number of problems (e.g., few papers submitted for publication, lack of faculty contact) that seem characteristic of sink-or-swim mentoring. Indeed, conversations with graduates of economics programs suggest sink-or-swim mentoring is the common mode of operation in these programs. Doctorate programs in other liberal arts fields also seem to commonly use sink-or-swim mentoring (Bowen and Rudenstine).

Average age ranged from 28.4 years for the heavy-direction group to 30.5 for the sink-or-swim group. The ages for the heavy-direction and sink-or-swim groups were significantly different from one another (*t*-statistic 2.38), with no other significant differences noted. No reason was identified for the difference in age between these two groups.

Consistent with the survey population design, most (83%) of the students surveyed were in their second or third year in graduate school. The average number of years in school for the sink-or-swim group (2.6 years) was only slightly ahead of the light-direction (2.5 years), heavy-direction (2.5 years), and command-and-control groups (2.3 years). There was no statistically significant relationship between year in school and mentoring approach ($\chi^2 = 4.629$; $\chi^2_{9,.05} = 16.92$). The command-and-control group contained the highest percentage of female students (45%), with the smallest percentage of female students in the light-direction group (30%). No significant relationship was found between gender and mentoring approach ($\chi^2 = 0.971$; $\chi^2_{3,.05} = 7.81$).

Some difference existed, however, in the proportion of international students in each category. Only 27% of the students under a command-and-control system were from the United States or Canada. By contrast, 64, 66, and 59% of the students in the heavy-direction, light-direction, and sink-or-swim groups, respectively, were from the United States or Canada. The difference between command-and-control and the other three systems was significant at the 95% confidence level ($\chi^2 = 5.328$; $\chi^2_{1,.05} = 3.84$). One hypothesis or a combination of hypotheses could explain this result. One possibility is that international Ph.D. students are less prepared to conduct independent research than their domestic counterparts. A second possibility is that a greater proportion of international students seek out this type of mentoring approach. A third possibility is that faculty who prefer a command-and-control approach tend to seek out international students because they are more willing to function under this kind of system.

[3] A disproportionate number of these students not on projects were male students, those in the first year of their program, and students from countries other than Canada and the United States.

Table 1. Summary of Survey Responses by Key Characteristics and Mentoring Approaches

Mentoring Approach	Percent in Category	Median Time per Week (minutes)	Average GRE Score	Average Undergraduate GPA
Command-and-control	7.8	60	1888	3.62
Heavy direction	20.6	52	1949	3.48
Light direction	40.0	60	2027	3.53
Sink-or-swim	31.2	30	2025	3.48

Students were also asked to indicate how many minutes per week they interact with their major professor (excluding classroom time or socializing time). In the first three mentoring situations, the median time spent with the major professor was essentially the same (one hour per week).[4] The median time spent with the major professor under a sink-or-swim system was only 30 minutes per week. There is no inherent reason why a major professor interested in a student's research progress would spend less time with that student under the sink-or-swim system versus the alternative mentoring approaches. However, major professors who are not interested in a student might choose the sink-or-swim approach, simply because it represents the least-cost approach for faculty. These results lend support to the assertion that perhaps many of the sink-or-swim mentoring systems used in agricultural economics are adopted to reduce time demands on the major professor.

There also was some correlation between the mentoring relationship and the major professor's professional activity. Sixty-eight percent of students in the sink-or-swim group felt their major professor was very active or moderately active in the AAEA and similar professions. Major professors in the command-and-control and heavy-direction groups had much higher professional activity levels (91 and 96%, respectively). The activity level of major professors in the light-direction group was 77%. We rejected the hypothesis that no relationship existed between mentoring method and professional activity ($\chi^2 = 9.899$; $\chi^2_{3,.05} = 7.81$).

Various hypotheses could explain this association between less mentoring control and less professional activity. One hypothesis is that, as faculty become less active professionally, they become more obsolete in their knowledge base. Because the professor no longer is familiar with the research frontier, he/she must give the graduate student more research freedom so the student can reach the frontier on his/her own. To do otherwise would mean training students in outdated skills and abrogating the major professor's responsibility to serve as gatekeeper to the profession.

A second hypothesis relates to age and experience. Although undocumented, the tenure system probably induces greater professional activity when faculty are younger (i.e., functioning as assistant and associate professors). Hence the relationship between mentoring and professional activity is really a relationship between mentoring and the experience of the major professor. Under this hypothesis, major professors over time become less control-

[4]The median time is reported rather than the average because a few students in all categories reported large amounts of time spent interacting with their major professor. Not only did these values seem fallacious, they substantially inflated the averages for all students in their mentoring group.

ling in the mentoring relationship because (*a*) they find the freedom results in a better trained student, or (*b*) they become less interested in mentoring students but feel obliged as a faculty member to continue accepting students.

Average Graduate Record Exam (GRE) scores tended to be higher for students operating under a more independent environment. Although the GRE scores were not statistically significant from one another (based on a *t*-distribution test), the difference in means tends to support the idea that mentors adjust their approach based on the student's ability. Contradictory evidence is found in the average undergraduate grade point average (GPA) scores, which tended to decline as students were given greater research freedom. The undergraduate GPA scores were also not statistically significant and were smaller (in percentage terms) than the difference in GRE scores.

Mentoring and Research Expectations

Next we investigated whether a relationship existed between mentoring approach and research output. Students were asked to indicate the quantity of research output they expected to list on their vitae when they graduated. This output was reported in three categories: refereed journal articles, papers presented at meetings, and other professional publications. The expected output in each category was hypothesized to be a function of (*a*) mentoring approach, (*b*) student age, (*c*) gender, (*d*) whether the student was domestic or international, (*e*) how many years they have been in their Ph.D. program, and (*f*) their composite GRE score. In addition, students were asked in the survey to rate the opportunities provided by their Ph.D. program to write for journals and to participate in seminars and professional meetings. These ratings, which were on a 1–5 scale (1=poor, 5=excellent), were included in the regression equations for categories (*a*) and (*b*). The dummy variables for the sink-or-swim mentoring approach and for first-year students were dropped from the regression model for estimation purposes. A summary of the results is reported in table 2.

In the first model, which treated expected journal articles as the dependent variable, none of the three alternative mentoring approaches were significantly different from the sink-or-swim approach, although the estimates for the heavy- and light-direction approaches suggested greater output was expected. The coefficients for second- and third-year students were significant and negative. This result was expected and reflects the fact that students are more optimistic at the beginning of their program about what they will accomplish than they are later on. Both gender and domestic student variables were significant at the 90% confidence level. A positive gender coefficient means that men expect to publish more journal articles than women. A negative domestic student coefficient suggests that international students expect to publish more journal articles than students from Canada or the United States. GRE scores and departmental opportunities to write for journals seemed to have little impact on journal publication expectations.

The second model treated expected paper presentations as the dependent variable. In this model coefficients for all three mentoring approaches were positive and for the light-direction approach was significant at the 98% confidence level. The coefficient for age was also much larger and significantly different from zero at the 90% confidence level. This result was also expected, reflecting the fact that older students have usually worked before entering their Ph.D. program and so had more opportunities to present papers at professional meetings. The other results were much the same as those obtained in the first model.

The third model used total miscellaneous publications (e.g., experiment station bulletins) as the dependent variable. This category was very broad and, as a result, did not result in as good an explanatory model as was estimated for journal articles and presented papers.

Table 2. Regression Analysis of Expected Publications for Ph.D. Students

Variable	Journal Articles	Presented Papers	Other Publications
Intercept	3.844 (1.878)	−1.6094 (3.2116)	3.9967 (4.5404)
Command-and-control mentoring	−0.0683 (1.2429)	−0.0701 (2.1242)	−0.3665 (3.6856)
Heavy-direction mentoring	0.5227 (0.7205)	1.8221 (1.2344)	0.3794 (1.7582)
Light-direction mentoring	0.5225 (0.5933)	2.4229** (1.0083)	2.1382 (1.4382)
Age	0.0172 (0.0699)	0.2161* (0.1198)	0.1238 (1.1764)
Gender	1.0281* (0.5346)	2.1156** (0.9237)	0.8295 (1.2989)
Domestic student	−1.1222* (0.6074)	−1.7235* (1.0058)	−0.5226 (1.4174)
Second-year student	−2.7511** (1.0738)	−3.4700* (1.8453)	−3.5638 (2.5735)
Third-year student	−3.9479** (1.1057)	−4.5133** (1.8985)	−5.6207** (2.6571)
Fourth-year student	−0.8918 (1.7450)	−5.4208* (3.0550)	2.1542 (4.2624)
GRE score (V+Q+A)	0.0002 (0.0013)	0.0002 (0.0022)	−0.0010 (0.0032)
Ranking of opportunities to write for journals	0.0127 (0.2732)	NA	NA
Ranking of opportunities to present papers	NA	−0.0812 (0.5297)	NA
N	64	64	62
R^2	0.264	0.303	0.243

Note: Standard error in parentheses. Single asterisk indicates significance at the 0.10 level. Double asterisk indicates the 0.05 level.

Although the estimated coefficients continued to manifest the same signs as occurred in the first two models, virtually all were statistically insignificant. Gender and domestic student effects were, in particular, much smaller in this category of research output.

Additional insights about differences between the mentoring approaches were reflected in another question. Students were asked where they had gained most of their knowledge about economics. A summary of responses to this question by mentoring type is given in table 3. Multiple answers were possible, with students commonly identifying class work, independent reading and study, research experiences, and interactions with fellow students and faculty as important in the learning process. Of particular interest in this table are the importance of research experiences and reading and study in the educational process. Next to classwork, research experiences were the most commonly mentioned method for the

Table 3. Response by Mentoring Type to "Where Have You Gained Most of Your Knowledge about Economics"

Source of Knowledge	Command-and-Control	Heavy Direction	Light Direction	Sink-or-Swim
			%	
Classwork	70	79	65	67
Research experiences	50	62	55	42
Reading and study	20	34	35	60
Interaction with faculty	40	28	33	30
Interaction with students	20	10	18	23
Teaching undergraduates	0	7	11	5
Seminars	0	10	0	2
Other	0	10	0	2

command-and-control, heavy-direction, and light-direction groups. For the sink-or-swim group, however, reading and study was mentioned almost as often as classwork and was far ahead of research experiences.

Given these results, we hypothesize that the sink-or-swim mentoring approach causes students to focus less on research output, with a proportionally greater focus on journal articles than other forms of communication. As we already noted, sink-or-swim students spend less time with their major professor and are given more freedom to direct their research program. The table 3 results lead us to believe the sink-or-swim students are probably encouraged to conduct extensive literature searches as part of their research effort. Although this kind of experience can help a student develop a solid understanding of the issues involved in a particular topic area, it does not seem to help students make the transition into research. The fact that sink-or-swim students expect to present fewer papers suggests that their mentor is not communicating the benefit of this exercise to them. Presenting papers at seminars and meetings provides an opportunity to subject a research project to critical review early in the process, to permit mistakes to be corrected, and to help identify areas of interest to the profession.

The significance of the gender and domestic student variables was surprising. We suggest two possible hypotheses to explain the significance of these results. Hypothesis one is reflected in a comment by Haring-Hidore (p. 147) that grooming-mentoring (or traditional mentoring):

> relationships tend to be homogeneous because mentors are likely to choose protégés who are similar to themselves. Often this choice results in grooming-mentoring relationships involving two men, because men are more likely than are women to be in positions of institutional power, from which they can act as mentors for others. . . . [G]rooming-mentoring is based on favoritism because mentors commit their resources to promoting their protégés over others. . . .
>
> Favoritism is a problem because in the past it has been used in selecting men for positions of importance. Women's quests for equal status generally is in contrast to favoritism.

The idea here is that, because agricultural economics is a male-dominated field, the male faculty who have a choice about whom they mentor (because they are perceived to be good mentors) will choose male students. Women students will be left with the lower quality

mentors, who will not prepare them as well for professional life. Alternatively, because of gender differences the mentor-student relationship will not be as close nor as strong for female students, resulting in less professional guidance. The lower publication expectations of female students could be one example of the consequences of poor mentoring.

This argument should be equally valid when comparing international and domestic students. Given that the overwhelming percentage of faculty at the institutions in our study are from the United States, one would expect international students to be less comfortable working with U.S. faculty than the domestic students would be. Cultural differences and language barriers would seem to inhibit good mentoring relationships as much as gender differences. Using the logic outlined above, international students should expect to publish less than domestic students. The results suggest the reverse.

An alternative hypothesis, relating to market forces, seems to better explain the results. Currently, the academic job market favors domestic and women candidates. Domestic students are favored because English is their native language and because they usually are more familiar with the institutions involved in agriculture and natural resource management. Women candidates are favored because of affirmative action. Mentors communicate this information to their male and international graduate students, who react by using articles and presented papers as methods of offsetting their competitive disadvantage. The major differences between male and female and domestic and international students occur in the journal article and presented papers categories, because these weigh most heavily in the job interview process.

Mentoring Time and Student Dissatisfaction

One problem with the sink-or-swim mentoring approach was the lack of contact time students had with their major professor. After asking students how much time they spent per week interacting with their major professors, they were asked to indicate whether this amount of time was enough. Only 46% of those functioning under the sink-or-swim approach felt the amount of time spent with their mentor was satisfactory. By comparison, 75% of the command-and-control group, 59% of the heavy-direction group, and 78% of the light-direction group were satisfied with the amount of time spent with their major professor.

That the sink-or-swim approach generated greater dissatisfaction about time spent with the major professor was not surprising, given the median time spent with the major professors was half the time students in the other three groups spent with their major professors. But is time the only factor influencing this level of dissatisfaction? To answer this question, a probit model was estimated using the satisfaction response as a binary variable. Explanatory variables were the number of minutes spent per week with the major professor, dummy variables representing the mentoring approaches, age, gender, domestic versus international, and year in school. Again, the intercept represented first-year students mentored under the sink-or-swim system. The estimation results are reported in table 4.

As expected, actual time spent with the mentor was a significant factor in the probit model. Also noteworthy are the positive coefficients estimated for each of the three mentoring approaches explicitly included in the model. The coefficient for the light-direction mentoring approach was substantially larger than that estimated for the other approaches and was significantly different from the sink-or-swim method. This result leads us to conclude that the sink-or-swim approach is undesirable relative to light direction (and seems to be the least desirable of all approaches) because both the quantity and quality of time spent mentoring students is not satisfactory. Age, gender, nationality of student, and year in

Table 4. Probit Model Relating Student Satisfaction with Time Spent with Mentor

Variable	Estimated Coefficient	Standard Error	*t*-Statistic
Constant	−1.3002	1.2506	−1.040
Time	0.0114	0.0038	2.960**
Mentoring approaches:			
Command-and-control	0.2297	0.5673	0.405
Heavy direction	0.1888	0.3646	0.518
Light direction	0.6791	0.3150	2.156*
Age	0.0389	0.0377	1.031
Gender	0.1432	0.2696	0.531
Domestic student	0.2872	0.2550	1.126
Year in school:			
Second	−0.7149	0.5279	−1.354
Third	−0.7140	0.5443	−1.312
Fourth	−0.0787	0.7431	−0.106
Log likelihood	−67.992		
Madalla R^2	0.224		

Note: Standard error in parentheses. Single asterisk indicates significance at the 0.10 level. Double asterisks indicate the 0.05 level.

school were all insignificant. Though insignificant, the results for the year coefficients are worth noting because they are relatively large and negative. An interpretation of these results is that, as students progress in their program, they must have an increase in time spent with their major professor or a change toward a more desirable mentoring approach to maintain their satisfaction.

Conclusions

In this study we examined the influence of mentoring on Ph.D. students in agricultural economics. The major source of information for this study was a survey of Ph.D. students at 18 leading Ph.D. programs in the United States. Survey response rate was 67%.

Our principal findings are as follows. First, the type of mentoring approach used by the major professor matters. A student operating with little guidance in his/her research program (a sink-or-swim mentoring system) spends less time with the major professor, is less satisfied with that time, and expects to have fewer publications and presented papers than do students operating under the other three mentoring systems examined. Students seemed to perform best and receive the greatest satisfaction from a light-direction mentoring method, where students are given a general direction in their research and allowed to select the appropriate method to carry out the research.

Second, students under the sink-or-swim mentoring method seem to spend more of their research time conducting literature reviews, building their knowledge of economics in the

process but perhaps leaving them less prepared to undertake the task of dissertation research. Third, international and male students have higher publication and paper presentation expectations during their graduate programs. This higher expectation may occur because of differences in how these students are mentored or, more likely, is an attempt by these students to compensate for other factors working against them in the job market.

This survey focussed on second- and third-year students in Ph.D. programs, a critical stage in the mentoring process. Of course, the mentoring process was usually not complete for these students, as most had one or more years of dissertation work ahead of them. Consequently, a follow-up study of the same student population would be useful as a base of comparison to this study, to see if their attitudes on mentoring change once the Ph.D. experience is behind them.

As we noted earlier, there exists a spectrum of mentoring approaches available to and used by faculty members. The survey results, combined with personal experience, suggest that the most productive mentoring occurs away from the extremes of this spectrum. At the command-and-control end of the spectrum, the student is largely disengaged from the research process. At the sink-or-swim end of the spectrum, the major professor is disengaged from the student's research. Optimal mentoring occurs in the middle of the spectrum, with both student and major professor learning from one another. Faculty would do well to seek this middle ground in their mentoring relationships with students.

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Appendix: Survey Questions That Pertain to Mentoring Issues

1.Where have you gained most of your knowledge about economics? (Possible answers include classroom work, interactions with faculty, interactions with fellow students, research experiences, independent reading and study, and teaching undergraduate courses)

Are you currently working on a research project with your major professor? YES NO

If you answered YES, please answer the following questions. If you answered NO, skip this section.

1. How would you characterize your working relationship with your major professor?
a) HE/SHE GIVES INSTRUCTIONS AND I CARRY THEM OUT
b) HE/SHE SETS THE DIRECTION AND APPROACH, I MAKE CHANGES WITH APPROVAL
c) HE/SHE SETS THE DIRECTION, I CHOOSE THE APPROACH
d) HE/SHE PROVIDES LITTLE GUIDANCE, I SELECT THE DIRECTION AND APPROACH

2. In your judgment, how active is your major professor in the AAEA and similar professions?
a) VERY ACTIVE
b) MODERATELY ACTIVE
c) OCCASIONALLY PARTICIPATES
d) COUNTING THE DAYS TO RETIREMENT

3. On average, how many minutes per week do you interact with your major professor _____ (Do not include classroom time or time spent socializing)

Do you think that amount of time is enough? YES NO

Background Information

1. Age: _____ 2. Sex: _____
3. Citizenship: _____ 4. Year in Ph.D. Program: FIRST SECOND THIRD
5. Did you receive your undergraduate training in the U.S. or Canada (circle one)? YES NO
   a) If you answered YES, what was your undergraduate GPA? _____
6. If you took the GRE exam, please provide the results:
   VERBAL _____ QUANTITATIVE _____ ANALYTICAL _____