

Agricultural Science Graduate Student Education and Public Scholarship

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Public scholarship is central to the mission of land-grant universities and colleges of agriculture. Changes in the socioeconomic and political context of higher education signify that the future of public higher education institutions increasingly will depend on strong institutional commitment to engagement with the community. Changes in the global food system make such engagement particularly relevant for colleges of agriculture and future faculty will need to be prepared accordingly. While research on public scholarship has become more prevalent, this scholarship rarely considers the preparation of graduate students for future careers as public scholars. This study describes the extent to which graduate students at a Northeast land-grant college of agriculture are knowledgeable about and involved in promoting the land-grant mission of public scholarship. In spring 2007, graduate students were surveyed about their graduate education programs. Graduate students in life science programs were significantly less likely to know about the land-grant mission, as well as significantly less likely to participate in extension and outreach activities, than graduate students in social science programs. Our results highlight the importance of expanding the notion of graduate education to provide all graduate students with competencies necessary for building partnerships beyond the campus.

Introduction

Public scholarship is central to the mission of land-grant universities and colleges of agriculture. Changes in the socioeconomic and political context of higher education signify that the future of public higher education institutions increasingly will depend on strong institutional commitment to engagement with the community. Changes in the global food system make such engagement particularly relevant for colleges of agriculture and future faculty will need to be prepared accordingly. While research on public scholarship has become more prevalent, this scholarship rarely considers the preparation of graduate students for future careers as public scholars. In this paper, we contribute to the research on public scholarship by examining agricultural science graduate student awareness of, and involvement in, promoting the land-grant mission of extension and outreach.

Theoretical Framework

The Land-Grant University and the Scholarship of Application

In 1862, the first Morrill Act authorized the donation of public land in each state on which to establish a land-grant university (LGU). The intent was to provide the working class with a liberal, practical education in the fields of agriculture, mechanical arts, and home economics, as well as classical studies. Twenty-five years later, Congress passed the Hatch Act of 1887, thereby establishing agricultural experiment stations and providing each state with funds “to conduct original research ... bearing directly on the agricultural industry of the United States” (Huffman & Evenson, 2006, p. 23). These agricultural experiment stations usually were associated with LGUs and later became the foundations for state Cooperative Extension Services established under the Smith-Lever Act of 1914. According to the Smith-Lever Act, Cooperative Extension Services are to “aid in diffusing among the people of the

United States useful and practical information on subjects relating to agriculture and home economics, and to encourage the application of the same” (Smith-Lever Act, 1914) Thus, the scholarship of application, which Boyer (1990) describes as a dynamic process that “both applies and contributes to human knowledge,” (p. 23) is central to LGUs.

The scholarship of application is often referred to as Extension, community engagement, outreach scholarship, or public scholarship. Extension means “reaching out” or “extending resources to solve public needs with college or university resources through informal, noncredit programs” (Cooperative State Research, Education, and Extension Service [CSREES], 2008). O’Meara and Jaeger (2006) refer to community engagement as “teaching, research, or outreach that connects disciplinary expertise, theories, or ideas to public concerns” (p. 4). Lerner (1999) defines outreach scholarship as “community–collaborative scholarship that merges the expertise of the academy with the expertise of the community in ways that are valued by the community” (p. 194). Peters (2005, p. 14) calls public scholarship “the scholarly practice of engagement in public work.” Because we focus broadly on graduate student knowledge of and contribution to the land–grant mission, we use the term public scholarship to encompass broadly all aspects of the scholarship of application, including community engagement, Extension and outreach scholarship.

Since Congress established the LGUs and Cooperative Extension system nearly a century ago to address primarily rural and agricultural issues, changes in the sociopolitical and economic context of higher education have had substantial impact on the political economy of the LGU system. Such changes include a decline in the percentage of individuals involved in farming, weakening rural infrastructures, public skepticism and demands for accountability of funding, increasing public expectations for institutional involvement in economic development, the rise of the information society and new technologies, the increasing diversity of students, new kinds of educational institutions

and increasing emphasis on learning outcomes (Austin & Wulff, 2004; McDowell, 1992).

Convinced that such changes necessitated a re–examination of the future of public higher education, organizations such as the Kellogg Commission on the Future of State and Land–Grant Universities, the National Forum on Higher Education for the Public Good, and the Committee on Institutional Cooperation have brought together faculty, college and university presidents, students, and community–based leaders to discuss higher education’s commitment to community engagement. Below, we briefly review the roles that each of these organizations has played in shaping the current context of higher education and the scholarship of application. We acknowledge that these examples represent only a fraction of initiatives to promote public scholarship and offer them as an introductory description of the current context of higher education and public scholarship.

Kellogg Commission on the Future State and Land–Grant Universities

In 1996 the National Association of State Universities and Land–Grant Colleges (NASULGC) formed the Kellogg Commission on the Future of State and Land–Grant Universities. The Kellogg Commission encouraged public state and LGUs to renew their commitment to society by “transforming the traditional emphasis on service into active engagement, encouraging more interdisciplinary scholarship, and calling for greater faculty involvement with their surrounding communities” (Kellogg Commission, 1999, p. 20).

Committee on Institutional Cooperation

In 2002 the Committee on Institutional Cooperation (CIC), a consortium of the Big Ten universities and the University of Chicago, established a Committee for Engagement to define and identify benchmarks for engagement. The resulting definition of engagement offered by the CIC is a partnership of university knowledge and resources with those of the public and private sectors to enrich scholarship, research, and creative activity; enhance

curriculum, teaching and learning; prepare educated, engaged citizens; strengthen democratic values and civic responsibility; address critical societal issues; and contribute to the public good.

The CIC recommends that institutions benchmark engagement by documenting evidence of institutional commitment to and engagement with communities, institutional resource commitment to engagement, student involvement in engagement and outreach activities, faculty and staff engagement with external constituents, the impact and outcomes of engagement, and the resource/revenue opportunities generated through engagement (Committee on Institutional Cooperation [CIC], 2005).

National Forum on Higher Education for the Public Good

Also in 2002, the National Forum on Higher Education for the Public Good held a National Summit on higher education's commitment to the public good. Participants of the National Summit adopted a model for transformative change to redress the "alienation between higher education and the society it serves" (Burkhardt & Merisotis, 2006, p.3). This model, referred to as the *Common Agenda*, challenges higher education to (a) build public understanding and support for higher education's civic mission and actions; (b) cultivate networks and partnerships for change; (c) infuse and reinforce the value of civic responsibility into the culture of higher learning; and (d) embed civic engagement and social responsibility in the structure of the higher education system (London, 2003).

The initiatives and reports of the Kellogg Commission, the National Forum and the CIC highlight ways in which the responsibility of LGUs extends beyond the borders of a campus and into the community. To thrive among the current sociopolitical and economic contexts of higher education, "institutions must become more responsive to the growing needs of communities...and the erosion in public trust that has challenged the ivory tower image of the academy from years past" (Strand, Marullo, Cutforth, Stoecker, & Donohue, 2003, p. xx). Accordingly, the next generation of faculty

needs to develop skills and abilities that allow them to become more responsive to, and engage with, communities.

Graduate Education and Public Scholarship

In each of the aforementioned initiatives, the Kellogg Commission, the Committee on Institutional Cooperation (CIC), and the National Forum pay attention to educating students about the ideas and methods of public engagement. They, however, focus primarily on undergraduate education in the future of public scholarship and fail to consider how to prepare graduate students for future careers as engaged faculty (Bloomfield & Dubrow, 2006). Similarly, Boyer (1990) suggested that graduate education is "almost totally preoccupied with academic work and regulatory hurdles" (p. 69). While the work of "higher learning" should remain at the core of graduate education, graduate education "should be more attentive to the scholarship of application" (Boyer, p. 69).

In this regard, we highlight three reasons for conducting empirical research on graduate student education and public scholarship. The first reason is the "increasing recognition of the graduate experience as a significant stage in preparation for a faculty career" (Austin & Wulff, 2004, p. 8). Recent research on graduate education has emphasized that the graduate experience is the initial stage of an academic career, as opposed to earlier research that conceptualized the start of the academic career as the first academic appointment. Austin and McDaniels (2006) pointed out that research by Austin (2002) and Wulff, Austin, Nyquist, and Sprague (2004) "suggests that doctoral students have limited understanding of the meaning of engagement and outreach as part of faculty work" (p. 54). Because the academic career begins with the graduate experience, it is thereby important to consider graduate student socialization with regards to public scholarship.

The second reason for examining graduate student education and public scholarship is that it is a relatively under-researched topic albeit an increasingly important issue within the current context of higher education. O'Meara and Jaeger (2006) argued that the link between discussion about higher education's public mission and

graduate education has been inadequate. Even though graduate and professional students represented 14 percent of all students enrolled in U.S. colleges and universities in 2007 (U.S. Department of Education, National Center for Education Statistics, 2009), discussions regarding student engagement have focused almost exclusively on undergraduates. At the undergraduate level, such research has examined student motives for volunteering or engaging in community service projects (see for example, Jones & Hill, 2003; Moely, Mercer, Ilustre, Miron, & McFarland, 2002; and Serow, 1991). Conversely, other studies have examined faculty the importance attributed by faculty to selected criteria for research problem choice. For example, Glenna, Lacy, Welsh and Biscotti (2007) and Goldberger, Foltz, Barham, and Goeschl (2005) examined whether research faculty place more or less importance on research criteria associated with the public good or with research criteria association with private gain. Such studies, however, are not useful in considering to what extent future faculty will contribute to the public scholarship mission of land-grant universities.

Furthermore, “overly specialized research training leaves future faculty ill-equipped to perform other faculty roles” (Golde & Dore, 2001, p. 2). A study funded by the Pew Charitable Trusts (Golde & Dore) concluded that a mismatch exists between the goals of graduate education and doctoral training. The problem “is that most graduates need more than [strong research skills] to compete in today’s economy” (Mervis, 2001). This problem is particularly challenging for graduate student education in the life sciences where such education has focused traditionally on training students to conduct research (Campbell, Fuller, & Patrick, 2005).

Moreover, this challenge is remarkably relevant to colleges of agriculture, which play an important role as stakeholders in the global food system. The current global food system demands that colleges of agriculture train students – in life and social sciences alike – “to provide solutions for critical issues relevant to the food system” (Smith et. al, 2008, p. 8). Such solutions will require that future faculty in the

agricultural sciences have the necessary skills to build partnerships beyond the campus. Therefore, consideration of graduate student education and public scholarship may illuminate opportunities to improve graduate student education in colleges of agriculture.

Purpose and Objectives

The purpose of this study was to describe the extent to which graduate students at a Northeast land-grant college of agriculture are knowledgeable about and involved in promoting the land-grant mission of extension and outreach. The objectives of this study were to:

1. Determine if agricultural science graduate students demonstrate awareness of the land-grant mission,
2. Describe agricultural science graduate student assessment of the importance of specified criteria in the choice of a research problem,
3. Describe agricultural science graduate student involvement in extension and outreach activities as a example of their contribution to public scholarship, and
4. Determine if differences in knowledge of and involvement in the promotion of the land-grant mission of extension and outreach exist between agricultural science graduate students in life science disciplines and agricultural science graduate students in social science disciplines.

Methods

This project utilized a descriptive survey research design. Data were collected via an online questionnaire designed by the researchers. An online survey was chosen because “Web-based surveys provide a time- and cost-saving option for data collection” (Sax, Gilmartin & Bryant, 2003, p. 410). Additionally, research has shown that Web based surveys have comparable response rates to paper surveys (Kaplowitz, Hadlock, & Leveine, 2004; Porter & Whitcomb, 2007), as well as that students are more likely to provide written comments online (Johnson, 2003). Graduate program coordinators

in a college of agricultural science and identified experts in quality in higher education reviewed the questionnaire for content and face validity. Validity and reliability were assessed further via a pilot test conducted with graduate students in a higher education program. The final version of the questionnaire was composed of six sections designed to collect data about students' perceptions of their graduate programs, departmental climates, advising and mentoring, knowledge and participation in extension and outreach activities, overall satisfaction and demographics.

In this study, the researchers examined data about graduate student knowledge and participation in extension and outreach activities as one measure of graduate student involvement in public scholarship activity. The researchers also examined the importance attributed by graduate students to selected criteria for research problem choice. Understanding graduate student research values provides additional insight about whether they may or may not be engaged in public scholarship activities. We developed these criteria using a list of criteria adapted from Goldberger, Foltz, Barham, and Goeschl (2005) and from Glenna et al. (2007). Cronbach's alpha coefficient for reliability for the 11 research criteria is 0.76.

All graduate students enrolled in a college of agriculture at a Northeastern land-grant university in spring 2007 were invited to participate in the survey. One week before the questionnaire was administered, a pre-survey notification was sent to the target population ($N = 451$). Researchers managed survey

administration and data collection using commercial online software. Graduate students received an email message with a link to the online questionnaire and completed the online questionnaire during an eight-week period from late March to mid-May, 2007. Survey reminders were sent weekly via email to all graduate students. A total of 261 questionnaires were received through the survey management tool. Questionnaires on which a student did not answer at least two-thirds of the questions were eliminated from analysis. A usable sample of 210 questionnaires resulted in a 47 percent response rate.

Post-stratification weights were applied to reduce non-response bias and make the data more representative of the population (Holt & Smith, 1979; Little, 1993). Weighting was based on the proportion of total respondents to the total population at the time the survey was administered. Weights were applied in the categories of age, citizenship, gender, degree type, enrollment status, ethnicity, and discipline. The weights were adjusted downward, or normalized, with respect to the sample size, so that we did not have an overinflated N . Both population and sample demographics are presented in Table 1.

All survey data were analyzed using the Statistical Package for Social Sciences (SPSS). Descriptive statistics and independent sample t -tests were used to analyze the data for this study. The alpha level was established *a priori* at 0.05. Effect sizes were calculated using Cohen's d (1998).

Table 1
Population and Sample Demographics

		N	%	n	%
Age Group	20–29	293	65.0	133	63.3
	30–39	127	28.2	52	24.8
	40–59	29	6.4	11	5.2
	Missing	2	0.4	14	6.7
	Total	451	100.0	210	100.0
Citizenship	US Citizen	275	61.0	133	63.3
	International	176	39.0	68	32.4
	Missing	0	0.0	9	4.3
	Total	451	100.0	210	100.0
Gender	Female	239	53.0	121	57.6
	Male	212	47.0	83	39.5
	Missing	0	0.0	6	2.9
	Total	451	100.0	210	100.0
Race/Ethnicity	Underrepresented	18	4.0	14	6.7
	Other US	228	50.6	105	50.0
	International	180	40.0	68	32.4
	Missing	25	5.4	23	11.0
	Total	451	100.0	210	100.0
Degree Type	MS	160	35.5	67	31.9
	PhD	291	64.5	138	65.7
	Missing	0	0.0	5	2.4
	Total	451	100.0	210	100.0
Status	Full–Time	401	88.9	187	89.0
	Part–Time	50	11.1	14	6.7
	Missing	0	0.0	9	4.3
	Total	451	100.0	210	100.0
Discipline Type	Life Science	356	78.9	160	76.2
	Social Science	95	21.1	50	23.8
	Missing	0	0.0	0	0.0
	Total	451	100.0	210	100.0

Results

Awareness of Land–Grant Mission

Among the 210 respondents, 188 indicated they are aware that the university they attend is a land–grant institution; 10 percent indicated that they are not sure or do not know that the university they attend is a land–grant institution. Among the 10 percent who indicated that that

they are not sure or do not know that the university they attend is a land–grant institution, all are in life science disciplines.

Involvement in Extension and Outreach Activities

Approximately one–third ($n = 60$) of graduate students have been involved in extension and outreach activities. Among

graduate students who have not been involved in extension and outreach activities ($n = 150$), almost two-thirds ($n = 95$) indicated that they would like to be involved in extension in the future. Among those who were involved in extension and outreach activities ($n = 55$), 24 conducted research for an extension project, 23 attended an extension in-service, 22 participated in a program offered by an extension educator, 18 prepared extension educational materials, 13 taught at an extension in-service, and 9 participated in extension in other capacities, such as being a 4-H advisor, interning at an extension office, or presenting a poster at in-service.

Additionally, a relationship exists between discipline type and involvement in extension and outreach activities ($\chi^2 = 6.092, p = 0.014$). Graduate students in social science disciplines

are more likely than graduate students in life science disciplines to be involved in extension and outreach activities (43.1% v. 23.9%).

Criteria for Research Choice

The researchers asked graduate students to indicate the level of importance for 11 criteria that they might take into account when choosing which research problems to undertake (see Table 2). Descriptive statistics reveal that graduate students perceive the criteria *enjoy doing this kind of research* ($M = 4.55$) and *potential for practical application* ($M = 4.32$) as the most important criteria for research problem choice and the criteria *currently a hot topic* ($M = 3.22$) and *potential to patent and license research findings* ($M = 2.35$) as the least important criteria for research problem choice.

Table 2
Importance Attributed by Graduate Students to Selected Criteria for Research Problem Choice (N=210)

Criteria for Choice of Research Problem	Mean	Std Dev
Enjoy doing this kind of research	4.55	0.58
Potential for practical application	4.32	0.80
Public good	4.16	0.82
Scientific curiosity	4.16	0.92
Potential contribution to scientific knowledge	4.15	0.83
Publication probability in professional journals	4.06	0.96
Likelihood of clear empirical results	3.67	1.00
Ability to conduct interdisciplinary work	3.67	1.00
Probability of developing/publishing outreach materials	3.48	1.08
Currently a "hot" topic	3.22	1.02
The potential to patent and license research findings	2.35	1.12

Note. Criteria were measured on a 5-point scale (1 = not important, 5 = very important).

A t-test was used to determine whether significant differences exist between graduate students in life science disciplines and graduate students in social science disciplines and the importance attributed to criteria for research problem choice (see Table 3). Mean importance scores for graduate students in life science disciplines and graduate students in social science disciplines differed significantly for the criteria *enjoy doing this kind of research* ($t = 2.06, p = 0.042$), *public good* ($t = 3.92, p <$

0.001) and *the potential to patent and license research findings* ($t = 2.15, p = 0.047$). Graduate students in life science disciplines place significantly more importance on the research criterion *the potential to patent and license research findings* and significantly less importance on the research criteria *enjoy doing this kind of research* and *public good* than graduate students in social science disciplines. The effect sizes on the differences for all criteria

were small and medium and ranged from 0.15 to 0.54 (Cohen, 1998).

Table 3

t-Values of Graduate Students in Life Sciences and Graduate Students in Social Sciences by Importance Attributed to Selected Criteria for Research Problem Choice

Research Criteria	Discipline	<i>n</i>	<i>M</i>	<i>t</i>	<i>d</i>	Cohen's Index
Enjoy doing this kind of research	Life Science	159	4.51	2.06*	.40	Small
	Social Science	50	4.68			
Potential for practical application	Life Science	159	4.27	1.81	.25	Small
	Social Science	50	4.50			
Public good	Life Science	159	4.04	3.92*	.54	Medium
	Social Science	50	4.54			
Scientific curiosity	Life Science	159	4.21	1.43	.20	Small
	Social Science	50	4.00			
Potential contribution to scientific knowledge	Life Science	159	4.22	1.99	.49	Small
	Social Science	50	3.91			
Publication probability in professional journals	Life Science	159	4.14	1.86	.46	Small
	Social Science	50	3.80			
Likelihood of clear empirical results	Life Science	157	3.72	1.29	.19	Small
	Social Science	50	3.51			
Ability to conduct interdisciplinary work	Life Science	159	3.62	1.26	.18	Small
	Social Science	50	3.83			
Probability of developing or publishing outreach materials	Life Science	159	3.44	1.04	.15	Small
	Social Science	50	3.62			
Currently a "hot" topic	Life Science	158	3.23	1.14	.16	Small
	Social Science	50	3.08			
The potential to patent and license research findings	Life Science	159	2.42	2.15*	.30	Small
	Social Science	50	2.03			

Note. Criteria were measured on a 5-point scale (1 = not important, 5 = very important).

* $p < .05$.

Relationships between Variables

T-tests to examine the relationships among importance of research criteria by involvement in extension and outreach activities suggest a significant relationship exists between involvement in extension and outreach activities and the importance of the research criteria

potential contribution to scientific knowledge, probability of developing/publishing outreach materials, public good, scientific curiosity, the potential to patent and license research, and ability to conduct interdisciplinary work (see Table 4). Regardless of discipline type, graduate students who have been involved in extension

and outreach activities place significantly more importance on the research criteria *public good* and *probability of developing or publishing outreach materials* and significantly less emphasis on the research criteria *scientific curiosity*, *potential contribution to scientific*

knowledge, and *the potential to patent and license research findings* than graduate students who are not involved in extension and outreach activities. The effect sizes on the differences for all criteria were small and medium and ranged from 0.06 to 0.60 (Cohen, 1998).

Table 4
t-Values of Graduate Students Involved in Extension and Graduate Students Not Involved in Extension by Importance Attributed to Selected Criteria for Research Problem Choice

Research Criteria	Involvement	<i>n</i>	<i>M</i>	<i>t</i>	<i>d</i>	Cohen's index
Enjoy doing this kind of research	Not Involved	150	4.54	0.46	.06	Small
	Involved	60	4.58			
Potential for practical application	Not Involved	150	4.27	1.55	.22	Small
	Involved	60	4.46			
Public good	Not Involved	150	4.07	2.46*	.34	Small
	Involved	60	4.38			
Scientific curiosity	Not Involved	150	4.27	2.75*	.38	Small
	Involved	60	3.89			
Potential contribution to scientific knowledge	Not Involved	150	4.26	2.75*	.60	Medium
	Involved	60	3.87			
Publication probability in professional journals	Not Involved	150	4.13	1.70	.35	Small
	Involved	60	3.87			
Likelihood of clear empirical results	Not Involved	147	3.72	1.28	.18	Small
	Involved	60	3.54			
Ability to conduct interdisciplinary work	Not Involved	150	3.75	1.77	.25	Small
	Involved	60	3.48			
Probability of developing or publishing outreach materials	Not Involved	150	3.34	3.01*	.42	Small
	Involved	60	3.83			
Currently a "hot" topic	Not Involved	148	3.28	1.19	.17	Small
	Involved	60	3.09			
The potential to patent and license research findings	Not Involved	150	2.43	2.32*	.40	Small
	Involved	60	2.07			

Note. Criteria were measured on a 5-point scale (1 = not important, 5 = very important).

*p < .05.

Discussion and Conclusion

In this study, the researchers described the extent to which graduate students at a Northeast land-grant college of agriculture are knowledgeable about and involved in promoting the land-grant mission of extension and outreach. The first objective was to determine if agricultural science graduate students demonstrate awareness of the land-grant mission. Only ten percent of graduate students were not sure or did not know that the university they attend is a land-grant university; all of these graduate students were in life science disciplines.

The second objective was to describe agricultural science graduate student assessment of the importance of specified criteria in the choice of a research problem. Overall, graduate students perceived the criteria *enjoy doing this kind of research* and *potential for practical application*, but significant differences exist in graduate student discipline and importance of research criteria. Graduate students in social science programs are more likely to view criteria associated with public scholarship and the promotion of the public good as more important, while graduate students in life science programs are more likely to view criteria associated with private research interests as more important. However, regardless of discipline, graduate students who have been involved in extension and outreach activities place significantly more importance on research criteria that promote the public good, and significantly less emphasis on research criteria associated with private research interests.

The third objective was to determine if differences in knowledge of and involvement in the promotion of the land-grant mission of extension and outreach exist between agricultural science graduate students in life science disciplines and agricultural science graduate students in social science disciplines. Graduate students in social science programs are significantly more likely than graduate students in life science programs to be involved in extension and outreach activities. In addition, graduate students who are involved in extension and outreach activities place significantly more

importance on the research criteria *public good* and *probability of developing or publishing outreach materials* and significantly less emphasis on the research criteria *scientific curiosity*, *potential contribution to scientific knowledge*, and *the potential to patent and license research findings* than graduate students who are not involved in extension and outreach activities.

Based on these research findings, it was concluded that a difference exists between agricultural science graduate students in life science disciplines and agricultural science graduate students in social science disciplines in regards to promoting the land-grant mission of public scholarship. Graduate students in life science programs in a college of agriculture are less likely to promote the land-grant mission of public scholarship; their research tends to be guided less by criteria that promote the public good and more by criteria that promote individual gain. The researchers purport that graduate students in life science disciplines should be socialized to understand the importance of applied research. Such socialization as part of a graduate education is particularly important in the current socioeconomic and political context of higher education in which there has been a shift in emphasis by funding organizations away from purely basic research and toward applied science. For example, the National Science Foundation (NSF) now requires that all grant proposals discuss how the described research will enhance the public good by addressing the criterion of *broader impacts*. Research proposals submitted to NSF must address how the proposed project “will integrate research and education,” as well as describe the “potential benefits of the proposed activity to society at large” (NSF, 2008)

Conversely, agricultural science graduate students in social science disciplines are less likely to emphasize the research mission of a land-grant university; their research tends to be guided less by criteria that promote scientific inquiry and more by criteria that promote the potential for application. The promotion of public scholarship among graduate students in social science disciplines should not supplant

promoting and teaching strong methodological research approaches. Neglecting to foster an appreciation for rigorous research methods and scientific inquiry among social science graduate students negates the very foundation on which LGUs were based: conveying research-based knowledge to the public.

Through the Cooperative Extension System, colleges of agriculture have developed a niche for conveying research-based knowledge to the public. Thus, one of the greatest strengths of colleges of agriculture at LGUs is that they have a long history of emphasizing the triad of research, teaching and service. To respond to the demands of the current global food system, colleges of agriculture will need to maintain this strength. This strength, however, will only be maintained to the extent that future faculty are socialized and provided skills to integrate research and application.

At the college level, it is recommended that administrative leadership in colleges of agriculture examine opportunities for all graduate students to be involved in extension and outreach activities. At the graduate program level, we recommend that faculty consider ways in which they might involve graduate students in community-based research projects. Such opportunities must, however, be grounded in strong methodological research approaches regardless of discipline. Additionally, the researchers believe that agricultural educators should play a special role in contributing to the development and socialization of graduate students in colleges of agriculture: they should be champions for expanding the knowledge and experience boundaries of graduate student education. Agricultural educators' holistic knowledge of the food and fiber system and expertise in applied agricultural learning make them appropriate advocates on behalf of such initiatives.

As an example of an initiative to promote community engagement among graduate students, the researchers propose that colleges of

agriculture create a Web-based directory of community-based research projects with which graduate students may become involved. The directory should allow community organizations to post research needs and for graduate students to browse or search these research needs. Developing a directory of this sort would help institutionalize policies that promote graduate student involvement in community engagement, thereby providing more graduate students with the opportunity to develop the skills that will allow them to be responsive to the global food system while advancing scientific knowledge.

The research described herein explored agricultural graduate student understanding of and contribution to public scholarship. Because this research was conducted at only one college of agriculture, the results may not be generalized across all colleges of agriculture. Therefore research on graduate education and public scholarship across more colleges of agriculture could better reveal general trends about graduate student understanding of and contribution to public scholarship. The development of a more comprehensive, longitudinal survey instrument would also be beneficial in measuring graduate student engagement. In addition, future studies could examine if differences in graduate student knowledge of and involvement in the promotion of the land-grant mission of extension and outreach exist among different demographic groups.

Changes in the socioeconomic and political context of higher education suggest that the future of public higher education institutions increasingly will depend on strong institutional commitment to engagement with the community. The role of graduate students as future faculty should not be overlooked in public scholarship research. Changes in the global food system make it imperative that graduate students in colleges of agriculture be socialized to consider their possible contributions to the research missions of their universities and colleges.

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