

AGRICULTURAL EDUCATION RESEARCH CAPACITY IN NCA-24 INSTITUTIONS

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Abstract

This study was conducted to assess the research capacity of agricultural educators in NCA-24 institutions. Research capacity was defined as the collective capability of agricultural education faculty to conduct independent research or to contribute to interdisciplinary research. The purpose of this study was to identify factors that characterize research capacity in agricultural education. Agricultural education faculty from 12 land grant institutions represented on the NCA-24 Agricultural Education Research Committee provided data for this study. Respondents were asked to report information regarding their individual faculty appointment and their level of expertise in several research and disciplinary skill areas. Agricultural education faculty reported smaller research appointments than teaching appointments. Respondents also reported wide variations in grant funding, graduate degrees awarded, and research publications. Individual faculty responses varied widely for each of 12 research planning skill areas and 27 disciplinary skill areas. Research capacity should be assessed for the entire agricultural education profession. Increased emphasis should be placed on research activities through faculty appointments and graduate student preparation. Agricultural education faculty should identify and promote a core of research and disciplinary skills.

Introduction

Agricultural Education Research Capacity in NCA-24 Institutions

Agricultural education programs in the United States can be traced back to the development of land grant colleges, beginning with the Morrill Act of 1862. The Morrill Act ceded land to states in order to fund the creation of postsecondary educational institutions that focused on teaching agriculture and mechanical arts. These new institutions were created to provide educational opportunities for the 'common man' who had not been well served by Ivy League colleges and universities prior to that time.

Twenty-five years after the Morrill Act, the Hatch Act (1887) was passed by Congress, which established Agricultural Experiment Stations in conjunction with land grant universities. Agricultural Experiment Stations were envisioned to enable land grant university faculty to

conduct research, thereby generating new knowledge in agricultural disciplines. Although teaching had historically been viewed as the singular focus for faculty employed in land grant universities, many of the early land grant university faculty began to experiment with new ideas in their disciplines as the need to increase agricultural knowledge became evident as a result of increased demand for food and fiber products for a growing population.

The Smith-Lever Act (1914) provided additional funding to encourage land grant institutions to develop Cooperative Extension programs in order to extend the influence (i.e., benefits) of the institution beyond the college campus in order to assist farmers and homemakers in solving problems. Extension programs were envisioned as a major initiative to improve the quality of life for disadvantaged citizens by extending the resources and benefits of the land grant university to those who did

not have direct access to campus-based information sources.

Collectively, these three Acts prompted the creation of the modern day land grant university with combined missions involving teaching, research, and extension functions. These three primary functions provide a symbiotic infrastructure that enhances the efficiency and effectiveness of the land grant system in the United States.

In 1917, the Smith-Hughes Act provided funding to support the development of agricultural education programs in secondary schools. The Smith-Hughes Act specified that funds appropriated in support of the Act could be directed toward teacher salaries, supervision, and teacher preparation programs in land grant institutions. Thereafter, agricultural education faculty were employed by land grant colleges and universities to guide the preparation of students pursuing careers as secondary agricultural educators.

Over the years, most agricultural education faculty in land grant universities have devoted their primary effort toward the teaching function (Kotrlik, Bartlett, Higgins, & Williams, 2001). However, more recently, agricultural education faculty and administrators have recognized the need to direct more time and effort toward research (Warmbrod, 1986). The cultural and contextual transformation of a discipline devoted primarily to teaching into a discipline with greater emphasis on research was the primary focus of this study.

Research in agricultural education has a relatively short history compared to other agricultural disciplines. Although many land grant universities have employed agricultural education faculty since the early 1900s, it was not until 1974 that the discipline organized the first National Agricultural Education Research Conference. Faculty attending the conference received research reports primarily focused on problems experienced by secondary agriculture teachers. Since the first national research conference, the number and scope of research papers has increased (Bowen, Rollins, Baggett, & Miller, 1990); however, the primary focus continued to address problems facing

agricultural educators (Radhakrishna & Xu, 1997).

Land grant agriculture deans and research administrators have been critical (Buriak & Shinn, 1989; Silva-Guerreo & Sutphin, 1990) of what has been described as 'naval gazing' research conducted by agricultural educators. USDA research administrators (Jordan, 1993) have also suggested that agricultural education research needs to extend beyond the artificial boundaries of the discipline to address larger and more significant research issues (Warmbrod, 1993), such as environmental degradation, urban sprawl, food safety and security, animal welfare, and family farms, to name a few. USDA (2002) has acknowledged that the most challenging agricultural and rural social problems require solutions that can only be resolved through interdisciplinary efforts. Specifically, the Committee on Evaluation of the U.S. Department of Agriculture Natural Research Initiative Competitive Grants Program (2000) advocated the need for multidisciplinary research because the major problems facing the food, fiber, and natural resources system were so complex that they require multidisciplinary approaches and collaboration to achieve a solution.

These views suggest that the unique strengths and capabilities of several disciplines are needed to solve the complex problems of greatest importance in today's society (ESCOP Social Sciences Committee, 1994). Each discipline must, therefore, identify its unique contributions and capacity to 'add value' to interdisciplinary research. For the purpose of this study, research capacity was defined as the collective capability of the agricultural education discipline, vis-a-vis faculty, to conduct independent research or to contribute to an interdisciplinary research program. Research capacity not only relates to the potential for conducting research within the framework of the discipline, but also the potential for agricultural education faculty to contribute to developing solutions to the larger societal problems that transcend disciplinary boundaries.

"While most public issues and concerns involve people, the scientists who understand people have not been very effective in marketing the value of their skills to those who appropriate public research dollars, to colleagues in other scientific disciplines, and to numerous interest groups. The literature and individual experiences provide many examples. The challenge for social scientists is to enhance the perceived value of their skills and abilities." (Holder, 1998, p. 1).

Faculty in agricultural education are in a unique position to contribute to interdisciplinary research in order to create solutions to the major societal problems affecting agriculture and rural areas. However, agricultural education as a discipline must be able to accurately assess and effectively communicate the role and scope of its potential contributions. Other agricultural research colleagues, experiment station directors, and funding agency administrators need to recognize the potential added value that agricultural education researchers can contribute to interdisciplinary research efforts. In order to communicate the skills and abilities of agricultural education researchers, it is necessary to collectively identify and assess individual, institutional, and disciplinary research strengths.

Agricultural educators need to assume a more progressive and proactive role in promoting their capacity to function effectively as members of interdisciplinary research teams in the agricultural, food, and environmental sciences. Although there is a continuing need for focused research on technical and disciplinary problems, most of the complex social problems facing U.S. citizens will require input from multiple sources to generate appropriate solutions (Board on Agriculture, 1996; USDA, 2002).

MacKenzie (1997) outlined several reasons supporting the need for assessing research capacity. He acknowledged that

during periods of enormous change, there was a need for "... greater institutional accountability for public funding, dramatic changes in institutional responsibilities, and an on-going individual institutional efforts to document the social, economic, and environmental benefits of programs" (MacKenzie, 1997, p. 1).

Developing an understanding of research capacity is an important prerequisite to promoting interdisciplinary research involving agricultural educators. Research capacity is a broad concept with dimensions that extend from individual faculty, to agricultural education programs within institutions of higher education, and ultimately to the disciplinary level, which encompasses the entire profession (MacKenzie, 1997). Before agricultural educators are in a position to promote their potential for contributing to interdisciplinary research, they must first identify the skills and competencies they have to offer. Collectively, research capacity encompasses faculty FTEs, faculty appointments, faculty research skills, graduate student numbers, and research support infrastructure. Each of these components is important, but not individually sufficient to promote and advance the research capacity of agricultural education faculty.

Purpose and Objectives

This study was designed and conducted to collect, summarize, and report information regarding agricultural education research capacity. The intent was to synthesize information to serve as a basis for subsequent efforts to promote the involvement of agricultural education faculty in multidisciplinary research.

Specifically, this project was guided by the following three objectives:

1. To review indicators of research productivity in agricultural education.
2. To assess the human resources available in agricultural education to conduct research.
3. To identify research and disciplinary strengths of agricultural education faculty.

Methods and Procedures

Data for this study were collected in a two-stage process. Members attending the NCA-24 committee on Agricultural Education Research in February 2000 were asked to review and validate the data collection instrument. After extensive discussion, the NCA-24 committee members agreed to complete the data collection instrument, based on their individual perspectives and local programs. After completing the instruments, the NCA-24 committee members recommended that data collection instruments be distributed to each of their respective faculty in order to collect information from each faculty member in each department and to summarize the data for a more comprehensive analysis. NCA-24 members (primarily departmental administrators) were sent an e-mail file attachment of the data collection instrument and were asked to have each of their faculty members provide the information requested. Thereafter, each NCA-24 committee member collected completed instruments from the faculty at their respective institution and forwarded them to the authors.

The NCA-24 committee was comprised of agricultural education faculty representatives from land grant institutions in the North Central Region. The 12 states in the North Central Region include: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin. In addition, representatives from land grant institutions in Arkansas, Oklahoma, and Texas also participated in the committee.

The data collection instrument was comprised of two pages. One page requested information on the respondent's faculty appointment regarding: rank, length of appointment, workload assignment, and tenure status. Respondents were also asked to rate their level of expertise (response scale values of 1 = none to 5 = expert) with research skills needed for planning, managing, conducting, and reporting research. In addition, respondents were asked to identify the numbers of: graduate students advised, research manuscripts

authored, grants funded, and the amount of grant funding received during the five-year period from 1995-1999.

The second page of the data collection instrument asked respondents to rate their level of expertise (response scale values of 1 = none to 5 = expert) with agricultural education disciplinary skills in four categories labeled: Needs Assessment, Curriculum Development & Instructional Design, Information Transfer & Delivery, and Evaluation & Assessment.

The data were entered onto a personal computer and analyzed using SPSS 10.0. The data were summarized using descriptive statistics since the purpose of this project was to describe the overall characteristics of the agricultural education faculty members and disciplinary programs.

Results/Findings

Data collection instruments were received from 73 agricultural educators from land grant agricultural education programs in 11 states. Based on the population of 97 faculty in the NCA-24 institutions (Greiman & Birkenholz, 2000), the response rate was 75.25%. There was no follow-up of nonrespondents. The number of responses received per state ranged from one response each from North Dakota and Kansas to 21 responses from Texas. Faculty respondents included: five instructors (6.8%), 14 assistant professors (19.2%), 20 associate professors (27.4%), and 24 professors (32.9%). Most agricultural education faculty reported being employed on a twelve-month basis ($n = 50$, 68.5%). However, 13 respondents (17.8%) indicated they were employed on a nine-month basis, and nine respondents reported their faculty appointment was something other than a nine- or 12-month appointment.

Table 1 provides a composite of agricultural education faculty appointments in teaching, research, service, and administration. Agricultural education faculty respondents reported that slightly over half (52%) of their appointment was dedicated to teaching responsibilities. In addition, they reported 20% allocated to administration, 15% allocated to research, and 13% allocated to service activities. This

allocation of faculty time and effort revealed that agricultural education faculty were primarily oriented toward teaching, with lesser but nearly equal time devoted to administrative, research, and service activities. These findings were similar to the results reported in Kotrlik, et al.'s (2001) study of 114 agricultural educators.

Table 1 also presents the average number of graduate degree recipients advised by agricultural education faculty respondents during the 1995-1999 period. Three-fourths of the graduate degrees awarded were at the master's level ($n = 522$) and one-fourth ($n = 172$) were at the doctoral level. These data reflect a 3:1 ratio of master's to doctoral degrees awarded during the five-year period, with an average of approximately 8.08 master's and 2.69 doctoral graduates advised per faculty respondent.

Agricultural education faculty authorship of research manuscripts during

the 1995-1999 period is also reported in Table 1. Approximately two-thirds of the manuscripts authored by the respondents were refereed research papers and one-third were refereed journal articles. Each faculty member had authored or co-authored an average of over three journal articles (range from 0 to 28, $M = 3.46$) and six research papers (range from 0 to 41, $M = 6.19$) during the five-year period.

Regarding grants and grant funding, agricultural education faculty reported an average of five funded grants totaling \$377,780 over the 1995-1999 period. However, there was wide variability in the number and amount of grants received. Nine faculty indicated that they had not received any grant funding during the five-year period and one respondent had received 31 funded grants during that time period. The amount of funding also varied widely from zero to \$4.6 million during the five-year period.

Table 1
Indicators of Agricultural Education Faculty Research Capacity

Indicator	<i>M</i>	Range
Faculty Appointment		
Teaching	52%	0 – 100
Administration	20%	0 – 100
Research	15%	0 – 80
Service	13%	0 – 100
Graduate Degrees Awarded (1995-1999)		
Master's	8.08	0 – 43
Doctoral	2.69	0 – 15
Research Publications (1995-1999)		
Research Conference Papers	6.19	0 – 41
Journal Articles	3.46	0 – 28
Grant Funding (1995-1999)		
Number of Grants	5.06	0 – 31
Grant Funding Received	\$377,780	0 – \$4,600,000

Table 2 presents agricultural education faculty responses regarding their self-reported level of expertise in research skills needed for planning, managing,

conducting, and reporting research. The highest rated research skill was project management, which produced a mean rating of 3.37 on the 5.0-point scale. The lowest

rated skill was qualitative research, which produced a mean rating of 2.56. Each of the 12 research skills produced mean ratings

that clustered around the 3.0 level indicating some expertise in each of the research skill areas.

Table 2
Faculty Expertise With Research Planning Skills

Skill	<i>M</i>	<i>SD</i>	<i>Range</i>
Collaboration	3.42	.87	1 – 5
Project Management	3.37	.89	1 – 5
Research Application	3.29	.85	1 – 5
Research Reporting	3.26	.83	2 – 5
Descriptive Research	3.24	.92	1 – 5
Data Interpretation	3.22	.88	1 – 5
Research Design	3.16	.83	1 – 5
Grant Writing	3.08	.89	1 – 5
Data Analysis	3.01	.79	1 – 5
Relational Research	2.79	1.06	1 – 5
Experimental Research	2.59	1.00	1 – 5
Qualitative Research	2.56	.94	1 – 5

Disciplinary skills in agricultural education related to teaching and learning were also self-rated by the respondents and are reported in Table 3. Under the needs assessment category, four of the five items produced mean ratings above the 3.0 level. However, qualitative assessment produced a mean rating that was notably lower ($M = 2.75$) than the other items included in the category. Therefore, respondents revealed less expertise in qualitative assessment than with other disciplinary skills included in the needs assessment category.

Within the category of curriculum development and instructional design, respondents were asked to rate their level of expertise regarding six disciplinary skills. The highest rated skill was developing objectives ($M = 3.68$) and the lowest rated skill was assessing learning styles ($M = 2.86$). Each of the skills in the curriculum development and instructional design category (with the exception of assessing learning styles) produced mean ratings above 3.25.

Table 3
Faculty Expertise With Agricultural Education Disciplinary Skills

Skill	<i>M</i>	<i>SD</i>	<i>Range</i>
Needs Assessment			
Educational Program Planning	3.38	1.01	1 – 5
Survey Development	3.36	.94	1 – 5
Advisory Committee	3.35	1.09	1 – 5
Population and Sampling	3.11	.85	1 – 5
Qualitative Assessment	2.75	1.08	1 – 5
Curriculum Development & Instructional Design			
Developing Objectives	3.68	.93	1 – 5
Teaching Methods	3.54	.96	1 – 5
Experiential Learning	3.54	.96	1 – 5
Motivation	3.34	.91	1 – 5
Supervision of Learning	3.27	1.06	1 – 5
Assessing Learning Styles	2.86	1.05	1 – 5
Information Transfer & Delivery			
Pedagogy	3.54	1.02	1 – 5
Instructional Design	3.31	.88	1 – 5
Adult Education	3.10	1.06	1 – 5
Educational Technology	3.01	.97	1 – 5
Technology Adoption	3.00	1.02	1 – 5
Distance Learning	2.75	1.11	1 – 5
Evaluation & Assessment			
Program Evaluation	3.36	.98	1 – 5
Instrument Development	3.13	.95	1 – 5
Evaluation Models	2.94	.98	1 – 5
Validity & Reliability	2.92	.90	1 – 5
Follow-up Studies	2.92	.90	1 – 5
Program/Performance Standards	2.81	.88	1 – 5
Performance Indicators	2.79	.90	1 – 5
Tests and Testing	2.76	.88	1 – 5
Human Resource Measures	2.72	.84	1 – 5
Performance Reporting	2.69	1.00	1 – 5

Six skills were included in the information transfer and delivery category. The highest rated skill was pedagogy ($M = 3.54$) and the lowest rated skill was distance learning ($M = 2.75$). Again, each of the six skills produced mean ratings that clustered

around the 3.00 level indicating some expertise in information transfer and delivery.

Ten skills were included in the evaluation and assessment category. The highest rated skill in this category was

program evaluation ($M = 3.36$) and the lowest rated skill was performance reporting ($M = 2.69$). Again, each of the 10 skills in this category produced mean ratings that indicated respondents had some expertise in each of the skill areas.

Each of the 27 skills included in the four disciplinary skill categories produced individual responses ranging from 1 (no expertise) to 5 (expert). This finding revealed that among the agricultural education faculty respondents, there were some faculty who had no expertise, while other faculty considered themselves to be experts in each of the 27 disciplinary skill areas assessed.

Conclusions/Recommendations/ Implications

The respondents in this study did not constitute a representative sample of any population of agricultural education faculty. Therefore, the conclusions drawn from this study are limited only to those who responded. Further research is needed to collect the data necessary to generalize results to the population of all agricultural education faculty. However, the results of this study may provide an indication of the potential for agricultural education faculty in NCA-24 institutions to contribute to interdisciplinary research efforts in the future. This study should be viewed as a precursor to a more comprehensive effort to assess and promote agricultural education research capacity in the future.

Research productivity indicators examined in this study revealed wide variability among agricultural education faculty in NCA-24 institutions. Most notably, faculty FTE appointments reflected greater emphasis on the teaching function than the research function. Agricultural education faculty respondents revealed that over half of their appointment was devoted to teaching duties. Therefore, it should come as no surprise that agricultural education faculty members are more widely recognized for their teaching and advising efforts, rather than for their research productivity. Agricultural educators have frequently been recognized and rewarded and for being excellent teachers and

advisors, but generally command less respect among their institutional colleagues for their research.

Simply changing the appointment expectations of existing agricultural education faculty may not produce a proportional change in research productivity. Many agricultural education faculty have been acclimated to an academic culture that has consistently emphasized teaching rather than research. Through the combined forces of self-selection and acculturation, some agricultural education faculty may lack the preparation and/or the motivation to redirect their energies away from teaching toward research. Furthermore, increasing faculty appointments in research may result in a decline in teaching productivity. This scenario may eventually result in fewer students enrolled in fewer courses, producing fewer student credit hours, and lower departmental budgets. The potential reduction in program budgets is a fear that may be difficult to overcome in a climate where the competition for research support from agricultural experiment stations is compounded by historically limited funding available to support research in the social sciences.

In addition to higher teaching expectations, agricultural education faculty at NCA-24 institutions reported that approximately one-fifth of their appointment was devoted to administrative responsibilities. In fact, agricultural education faculty reported a larger percent of their appointment devoted to administration than to research. Persons and Kajer (1995) noted that most agricultural education programs were staffed by relatively few faculty, which may explain the relatively heavy administrative responsibilities. Regardless of the underlying reason, administrative expectations may be counterproductive to research involvement and productivity.

Other indicators of research capacity include research publications and grant funding. Again, there was wide variability in productivity reported by agricultural education faculty at NCA-24 institutions. Agricultural education faculty respondents authored about two research publications

(journal articles and research papers combined) and received about \$75,000 in grant funding each year. These measures suggest that agricultural education faculty are capable of securing grant funding and publishing the results of their scholarly efforts, both of which are viewed as positive indicators of research capacity.

Faculty involvement in research requires expertise in both research skills and disciplinary skills. Agricultural education faculty at NCA-24 institutions revealed a range of abilities in each of the skill areas examined in this study. For each skill area, some faculty indicated that they had 'no expertise' in the area, whereas other faculty rated themselves as 'experts.' This observation provided the basis for the conclusion that agricultural education, as an academic discipline may not be well-defined by a set of core disciplinary skills.

Based on the findings and conclusions derived from this study it is recommended that agricultural education faculty, administrators, and leaders in the profession develop a strategy to enhance research capacity within the discipline by:

1. Completing a comprehensive analysis of agricultural education faculty in the U.S. to assess research capacity from a disciplinary perspective. Whereas this study collected data from agricultural education faculty at NCA-24 institutions, there is a need to be able to generalize results to all agricultural education faculty and programs (e.g., the agricultural education discipline) throughout the United States. Such a comprehensive study would provide a more solid foundation to base future decisions and recommendations to enhance research in the discipline.
2. Increasing faculty appointments and expectations in research. Although this recommendation may have significant budget implications, there is a need to modify or increase the number of faculty FTEs in agricultural education devoted to research. Persons and Kajer (1995)

noted that agricultural education departments throughout the United States had relatively few faculty with agricultural experiment station appointments. This finding is based on the presumption that land grant faculty who do not have an experiment station appointment, have lower expectations related to research productivity (Kelly & Warmbrod, 1986). Therefore, one strategy for increasing research productivity among agricultural education faculty is to increase FTE appointments in agricultural experiment stations (Warmbrod, 1987). However, further research in this area is warranted in light of the fact that Kotrlik, et al. (2001) found that faculty research appointments were not predictive of research productivity.

3. Identifying opportunities to increase research manuscript authorship and grant funding among agricultural education faculty. Increasing agricultural education faculty appointments and expectations in research would produce a cultural shift in most programs. It would logically follow that agricultural education faculty would increase measures of their research productivity in the form of refereed journal articles, research papers, graduate degrees awarded, and grant funding.
4. Identifying and promoting core research and disciplinary skills that characterize agricultural education research and the potential for contributions to interdisciplinary research. As a profession, agricultural education should identify and define its niche in interdisciplinary research (Buriak & Shinn, 1991). Once identified, that niche should be clearly communicated to peer research colleagues and administrators. Networking and promoting research and disciplinary strengths in agricultural education are an important prerequisite to developing

collaborative relationships through interdisciplinary research initiatives. Colleagues in other departments need to know what and how agricultural educators can contribute to the development of solutions to complex research problems. Such a lack of understanding (Buriak & Shinn, 1989) within the agricultural research community has caused agricultural education to frequently be overlooked as a potential collaborator. Agricultural education programs and faculty have traditionally been viewed as emphasizing teaching, rather than research. One of the challenges that needs to be addressed over the next several years is to strengthen the image of agricultural education faculty as potential research partners without diminishing the emphasis on teaching.

5. Encouraging agricultural education doctoral students to engage in interdisciplinary projects to prepare them for future contributions as faculty members. The changing landscape of agricultural research suggests that faculty success in the future will be dependent on a different set of job performance skills than was required in the past (Warmbrod, 1987). Therefore, agricultural education doctoral programs that prepare future faculty members need to recognize and accommodate the changing expectations. Doctoral students should be encouraged (possibly even required) to engage in collaborative research projects (Williams, 1991b; Williams, 1997) with graduate student peers from other disciplines to experience the synergy that occurs when individuals from multiple disciplinary perspectives and research paradigms work together for a common purpose. These experiences may encourage students to break out of their disciplinary mode of operation and become acquainted with the strengths and capabilities of other disciplines.

Increasing the research productivity and contributions of agricultural education faculty will require a cultural renaissance. In order to prompt a long-term cultural shift, faculty preparation programs need to promote interdisciplinary efforts in graduate degree programs.

Agricultural education faculty hiring decisions (Williams, 1991a) should consider each candidate's record of accomplishments, plan for the future, and potential for contributing to research programs, both individually and as a member of multidisciplinary initiatives. Faculty members should be encouraged to develop a focused research program (Buriak & Shinn, 1993; Williams, 1991b) that is goal oriented and specifies measurable outcomes for comparison purposes. Such considerations are important, not only for improving the research capacity of agricultural education, but also to enhance the likelihood of the candidate being recommended for promotion and tenure in the future.

Research capacity is a somewhat nebulous concept, especially in the context of agricultural education programs. As a discipline, agricultural education has the potential to make significant contributions to complex research problems. In order to realize its full potential, agricultural educators need to be proactive and assertive to enhance research capacity within the profession. Since this study was conducted to provide baseline data for NCA-24 institutions, it is suggested that agricultural education faculty and administrators throughout the U.S. consider the potential implications of these findings and conclusions for their programs. Furthermore, leaders in the agricultural education profession should examine the insights revealed through this study, and move forward on a broader scale to assess the research capacity of all agricultural education faculty in order to facilitate generalization to the entire discipline.

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