Origins of the Land Grant philosophy and its influence on agronomic education

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ABSTRACT

Agronomic education today reflects an evolution in educational philosophy at the college level that was developing as early as the late 1700's. This was, in effect, a belief that practical people who engaged in mechanical and/or agricultural occupations would profit from advanced learning in science, technology, and cultural subjects. This view was not broadly implemented until the passing of the Morrill Act in 1862. The number of agricultural colleges grew steadily following the Civil War. Agronomy as a discipline became a part of this development. In this century agronomic education has reflected the steady advances in agronomic science, and a parallel advance in educational methods, particularly the audiotutorial approach. The changes in national interests and the falling proportion of farm families in the population are having an effect on agronomic education. Many persons are studying agronomic subjects because of their interest in the environment and women and urban students are electing phases of agronomy as careers.

Additional index words: Government support of research, Historical development of agricultural education, Women in agronomy.

AGRICULTURE as a way of life, occupation, and science now has great respect. Thanks are due to the many capable people of conviction, pride, and courage who have led us to this favorable position. Now that a view of the earth from the moon has prodded us into even keener awareness of the finite limits of earth and its resources, many of our academic colleagues who formerly disdained agriculture are now professing great interest. They are finding in agriculture a vehicle for attention to problems of food production, the environment, and resource conservation and management. Our current prestigous position has evolved in the face of strong opposition and has won its present place through vigorous espousal of ideas which were not readily accepted by the early traditional academicians.

The view that farmers and "mechanics" would benefit from "advanced" education did not originate with the Land Grant Act of 1862. For many years the case of education for people in practical pursuits was treated in this country and in Europe with meager success. However, the continuing debate did result in a gradual winning of acceptance of the worthiness of such educational programs.

Advocacy of agricultural education began with the simple argument that American schools discriminated against the interests of farmers, resulting in harmful affects (Marti, 1971). An example of the growing support for this view was the publication of a pamphlet in 1819 by Simeon DeWitt, Surveyor General of New York, in which he recommended that the state establish an agricultural college. He wrote that the existing colleges equip people for "only three professions, law, physics, and divinity, the only professions recognized as 'learned'". He claimed that young men were channeled into these occupations and led to believe that other callings were not "reputable" and that farming in particular was "unprofitable".

Natural sciences were offered at Harvard, Princeton, Dartmouth, and Union College prior to 1800 and at least eight other eastern universities before 1820.

In those days such courses were taught largely by lectures. An exception was Rensselaer Institute, of Troy, New York, which as early as 1824 successfully pioneered the use of observations and experimental methods in support of classroom teaching.

The addition of science to curricula which previously had been predominantly devoted to literature, history, philosophy, and divinity, helped the cause of agricultural education, which continued to gain many supporters but not much in the way of tangible financial support until the passage of the Morrill Act.

In the early 1800's college-level, agricultural education was attempted in several states, particularly Maine, Massachusetts, Michigan, New York, Vermont, Connecticut, and Pennsylvania. The progress toward the Land Grant Program in New York, which led eventually to Cornell University, is worth attention because it in many ways epito-

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mizes the struggle that went on in other states. Jesse Buell, of New York State, an editor of "The Cultivator", was typical of the many influential people who sought support for agricultural education. In 1837 he condemned discrimination against agriculture and criticized those persons who were educated to "live without work—above work".

Peoples colleges such as Troy, the forerunner of Rensselaer, and "manual labor" schools such as Oneida Academy, in New York State, were founded but many did not get off the ground for lack of either private or public funding. As pressure for such schools grew during the first half of the 19th century, debates centered on such questions as whether the training should be coupled with practical experience (strictly vocational as favored by Buell) or whether both liberal arts and physical sciences should be available to everyone. This latter view was favored by Mark Hopkins, President of Williams College, in an 1858 dedicatory address at Peoples College in New York. Hopkins believed people needed a cultural background but also enough of the physical sciences to help them deal in practical problems. He favored "educational democracy" to give students an opportunity to "deal with things as well as words". Peoples College took advantage of the Morrill Act in 1863, but lingering financial troubles resulted in the New York land grant support being transferred in 1865 to Cornell College through provisions of an act sponsored by two members of the legislature, Ezra Cornell and Andrew White, the latter becoming the first president of Cornell.

In Michigan we find an example of the intense rivalry, which frequently developed in the formative years of the land grant colleges between the state universities and the new land grant colleges, and which plagued many of the states for many years. Article X of the Constitution of 1835 creating the state of Michigan directed the legislature to "encourage by all civil means the promotion of intellectual and scientific and agricultural improvements", including a common schools system and a perpetual fund for a university from the proceeds of land grants from the United States (True, 1949). The University of Michigan, established in 1837, was to be divided into three divisions: a) literature, science, and arts, including "practical farming and agriculture", b) law, and c) medicine. But it was not until after 1845 that agriculture was taught and then only meagerly. All this resulted in a drive by agricultural interests for a separate agricultural college, which was won in 1855 against bitter opposition that continued for many years. The law established the Agricultural College in the state of Michigan and located it at East Lansing. In arguments for separating the agricultural college from the state university, it was pointed out that similar action had been taken in other states such as New York, Massachusetts, Pennsylvania, and Ohio. None of these actions, however, were accomplished without a fight.

Little financial support became available for college-level agricultural education until after 1850. In the 1850's tangible efforts of state legislatures to establish agricultural education began to appear in such places as Ohio and Georgia in 1804, Wisconsin in 1855, Maryland in 1858, and Pennsylvania, Michigan, and Iowa in 1859. Agricultural education at the college level was greatly slowed by the Civil War. Passage of the Morrill Act in 1862, plus the ground work which had been laid, resulted in successful implementation of the early ideas regarding education in agricultural and mechanical arts in the years following the war. In time these ideas became known as the land grant philosophy.

Early agricultural faculties usually were very small, sometimes only one or two men. There was little specialization at first. The division of the agricultural programs of the various colleges and departments began usually with the separation of horticulture from general agriculture. Then came departments of animal husbandry, dairying, and agronomy. During the last years of the 19th century and early in the 20th century great emphasis was placed on agricultural production. Matters relating to agricultural engineering or economics were usually handled within the departments of agriculture or agronomy. According to True (1929) by 1901 specialization within agricultural curricula had progressed the farthest in Illinois. At that time the technical portion of the courses leading to graduation in agriculture at Illinois occupied about half the time. There were 20 instructors in technical subjects of whom 16 gave entire time to agriculture. In agronomy there were 6 instructors, in animal husbandry 3, in dairy husbandry 3, in horticulture 5. Under agronomy there were 18 courses including soils, farm crops, drainage, irrigation, farm buildings, machinery, roads, farm management, and history of agriculture.

Departments of agronomy in many cases included subjects within the fields of agricultural engineering or agricultural economics. They gradually sponsored the formation of such departments, preferring to concentrate on crops and/or soils, sometimes as one department and sometimes as two. The syllabus of a course in agronomy reported to the Agricultural College Association in 1898 de-

fined agronomy as including the "theory and practice of the production of farm crops".

The leadership of Cyril C. Hopkins of the Illinois Agronomy Department was truly dynamic. This articulate, logical, and imaginative man won respect for agricultural universities from farmers, the general public, and academic people. The influence of Hopkins and his colleagues at Illinois was spread by the movement of Illinois-trained agronomists to the leadership of the newly formed agronomy and soils departments in the West. W. H. Stevenson took charge of agronomy at Iowa State College in 1905 and W. L. Powers became Head of the Soil Department at Oregon Agricultural College in 1913. I knew both of them intimately enough to know their views were highly conditioned by Hopkins's philosophy.

By the time of the founding of the American Society of Agronomy (ASA) in 1907, a beginning had been made in securing field plot data on soil management and crop production. The Morrow plots at Urbana, Illinois, started in 1876, were 31 years old, the Pennsylvania plots initiated in 1881 had existed for 26 years. In 1901 Thorne reported results of Ohio plots established in 1893.

The early meetings of ASA, although in its early days primarily emphasizing research, did offer a gathering center for teachers and informal communication among them. In the 1917 meeting, H. O. Buckman (1920) stated that the possibilities for teaching of soils as a recognized college course were as yet only partially realized because of its newness in baccalaureate curricula. He said, "As with all new subjects, soil science is going through a definite evolution and will continue to evolute (sic.) until it is placed on as sound a theoretical and pedologic basis as its subject matter will permit". He believed soil science lacked both theoretical data and arrangement. He believed the lack of data forced teachers into applied considerations rather than fundamentals and into teaching techniques based largely on lectures and demonstrations. He also pointed out that the college level soils teachers were not closely in touch and hence not benefiting from each other. The total result was laboratory exercises not pertinent to soils and so simple as to be "almost an insult to students who had been exposed to a good course in physical properties".

At the same meeting R. S. Smith (1919) of Illinois also gave a paper on introductory courses in soils. R. E. Karraker (1919) of Kentucky joined in the discussions. He felt soils laboratories should either be improved or dropped. The criticism resulted in an ASA committee to develop a standardized course in soils. M. F. Miller, as Chairman, reported progress in soils but more difficulty in crops because of the great variation of climate in the USA (1921).

American universities and colleges were influenced from 1929 to 1945 by the Great Depression and by World War II and for several years following the war by the large number of veterans in the classes. During the Depression years, classes were usually smaller except where faculty was reduced to meet budget constrictions. There was very little turnover in faculty because there were few opportunities to move to other jobs. Quality of agricultural courses improved generally through the era, and so did the quality of supporting courses. The New Deal had an impact on the agricultural colleges in several ways. The creation of the Soil Erosion Service in 1933, which later became the Soil Conservation Service, provided jobs for agricultural graduates and stimulated interest in conservation of the natural resources, particularly of soils. Many students were attracted into agronomy soils courses by this program. The first formal college level course in soil conservation was approved by Iowa State University in 1935. College trainee programs by the Soil Conservation Service for undergraduates and a National Youth Administration provided jobs which helped keep students in school.

Everything came rapidly to a standstill after Pearl Harbor. After the war the returning veterans were found almost to a person to be serious, hard-working, dedicated young people. Course loads grew to unwieldy proportions, but the high level of the economy and the federal support of education for veterans resulted in good financial support for higher education. The successful research underpinning the production of the atomic bomb convinced the public that fundamental research was worthwhile, even though its application might not be immediately apparent. Funding became more available for graduate programs and, with the interest in basic research, major professors in agronomy emphasized fundamental thesis problems in such areas as biochemistry, molecular genetics, and the physical chemistry of soils with special attention to the nature and properties of clay minerals, soil sesquioxides, the mechanism of nutrient uptake, the mechanics of water movement, etc.

The large enrollments justified increases in teaching staffs which were filled largely by the young, newly-trained G.I.'s as they completed their advanced training. These young staff members, who had come through programs in which rigorous science and mathematics were emphasized, capitalized

on their scientific background in their teaching. More than ever practice was tied to theory, the "how" and the "why".

Questions arose in this changing scene about the role of teaching in a university. With the initiation of federal grant programs in support of individual professors, such as those sponsored by the National Science Foundation and the National Institute of Health and with the emphasis in those times on basic research, prestige flowed quickly to young scientists who could win such grants. Granting agencies favored a rigorous and fundamental approach. The rigorously trained, young scientists in agricultural faculties were ready to capitalize on the opportunities for winning funding for such research. This capability to win grants became a principal criterion in staff promotions. A tendency developed to look upon undergraduate teaching as routine and mundane. Salary differentials began to develop in favor of the research worker. Certain prestigous universities began bidding for the services of award-winning scientists, particularly as the federal grant and/or contract system provided for awarding contracts to individual professors, independent of their administration except for approval of time, facilities, and space. Since the awards brought funds and prestige, it was a rare department head or dean who deemed it wise to refuse the grants. In this arrangement award-winning professors in many cases could take this grant support with them as they transferred to a more highly bidding university.

This glamorous ascension into fame and money by those who concentrated on research, particularly basic research, rather than on undergraduate teaching and applied research, was viewed wistfully by the teaching community and those agronomists who were involved in practical research programs.

To combat this trend in undergraduate teaching, Purdue began hiring bright young scientists with a strong desire to teach, on a 75% teaching, 25% research basis. Graduate assistants were assigned to each instructor in order to provide him with research support. The teachers were then encouraged to concentrate on undergraduate teaching as a major effort and also to delve deeply into some fundamental phase of research in the area of his specialty. As an additional measure, this group was organized as an undergraduate teaching committee to plan, direct, and guide the department's undergraduate program. The results were rewarding.

However, equal salaries for teachers and research workers took extra effort until the period of student unrest in the 1960's. The troubles at the University of California, Berkeley, had a special effect on university attitudes since, rightly or wrongly, the student dissension was blamed on concentration on research at the expense of teaching. Administrations began making concentrated efforts to insure that good teachers were promoted and rewarded financially as well as good research men. It became easier to receive salary increments for teaching more in line with those given for research. Teaching continued to improve in this era, reflecting the good training provided in the postwar years, the renewed interest in good teaching, the administration support, and the viability and enthusiasm of the many young professors who were committed to working with young people.

Table 1. Characteristics of beginning freshmen in the School of Agriculture, Purdue University, 1963-1975 (abridged)

Year	Enrollment	Sex		Home background		Scholastic Aptitude Test	
		Male	Female	Farm	Non-farm	Verbal	Math
		%				mean	
1963-64	280	93.2	6.8	60.0	40.0	423	497
1975-76	885	69.9	30.1	29.9	70.1	446	508

In 1961 one of the most significant modern techniques in teaching, the audiotutorial approach to learning, was developed by Dr. S. N. Postlethwait, of Purdue University (Postlethwait et al., 1971). As Postlethwait perfected his method, agronomy teachers were quick to adopt and adapt it for both soils and crops courses. Postlethwait's interest was aroused by the problem he faced of handling farm youths in the same class with urban young people, two groups of students with different backgrounds. He had found many of the first generation of college students to be "perfectly intelligent but not up to academic work. They needed help." He believed something better than the conventional delivery system was needed. Starting with combining audio tapes with visual materials and later with experiments which could be conducted by students from audiovisual instructions, he gradually developed his highly successful and much-copied system.

An indication of the changing characteristics of agricultural student bodies is reflected in statistics supplied by Purdue University. Comparisons between the 1963-64 and the 1975-76 academic years are shown in Table 1.

The increase in proportion of women to men and of non-farm students to farm students together with the large increase in enrollment is having profound influence on agronomic teaching, as those who teach where these trends are taking place are so aware.

In summary the viewpoint described as the land grant philosophy originated many years prior to the Morrill Act. The Act did give emphasis to the growth of land grant universities through providing funds. Departments dealing with soils and/or crops began to be identified late in the 1800's but their numbers were small until early in this century. Agronomic education through the years became more rigorous, based more deeply on science. There has also been a tendency to provide a broader cultural base for students. Audiotutorial techniques have been utilized successfully in many agronomic educational programs. There has been a change in composition of agronomy student bodies. There has been a shift from predominantly farm-reared to predominantly city-reared students, and to a higher proportion of women. Changes in agronomic curricula are being made to accommodate the growing interest in the environment and resource management. Such trends can be expected to continue.

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