Agricultural Education and Extension Facing a New Rural Milieu: Challenges for Brazilian Colleges of Agricultural Sciences

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Abstract

Remarkable transformations in the Brazilian agriculture and rural milieu are requiring a new kind of professional to face the emerging demands of a diverse, innovative, technological, and integrative agriculture and rural milieu. Colleges of Agricultural Sciences, as institutions devoted to prepare people to work in agricultural education, agricultural research, and rural extension, are challenged to redesign their practice and lead a movement to foster strong partnerships between themselves, agricultural schools, agricultural research and extension institutions. The emergence of the National Forum of Extension’s Vice-Chancellors of Brazilian Public Universities in 1987 heralded a new era to foster changes from the universities stand point. Such a Forum put extension in a prominent position into Brazilian public universities, as well as enforced the university’s tripartite mission - teaching, research, and extension. The new characteristics emerging in the Brazilian rural milieu and Boyer’s (1990) concept of scholarship are the background used in this study to build a conceptual model linking agricultural education, agricultural research, and rural extension.
Introduction

Transformations undergoing in Brazil since early 1980s are bringing meaningful changes in the country’s rural environment, demographics, economics, and social relations, as indicated by Carneiro (n.d.), Graziano da Silva (1997), Caporal (1998), Schneider (2000), and Gordon (2001). Agricultural education and extension are required to play a new role to address the emerging demands of a diverse, integrative, and innovative rural milieu.

Agricultural education started in Brazil in 1875 and is supported by federal legislation as formal education programs until the secondary level, usually delivered in agricultural schools, devoted to prepare people to work in agriculture. Agricultural schools are typically residential schools located in rural areas with some farmland in its structure (Sobral, 1998; Leite, 1999). A total of 339 agricultural education programs at the secondary level are delivered in 256 agricultural schools in Brazil, with 54,809 students registered (National Institute of Educational Studies and Research - INEP, 2000).

Extension in Brazil started in 1948, is called “rural extension” and typically delivered by state-sponsored agencies. There is no federal legislation supporting rural extension. Current literature (Caporal, 1998; Sobral, 1998; Lima, 2001) indicates that rural extension is devoted to non-formal education and technical assistance programs mostly linked with agricultural production and productivity and social welfare of rural families. Each of the 26 states plus the Federal District has its own Rural Extension Agency, and many of them are also responsible for agricultural research at the state level.

Brazilian universities do not see the delivery of rural extension as their role. They deliver “university extension,” which can include rural extension programs but with the primary function of providing practical experience to the students. University extension is defined as “the educative, cultural, and scientific process that articulates teaching and research in a strong way, and makes feasible the transforming relationship between university and society” (Nogueira, 2000, p. 11).

Brazilian Colleges of Agricultural Sciences seldom feel themselves as an active partner in a network of agricultural education and rural extension, since higher education in agriculture is not considered to be part of agricultural education and rural extension. In spite of this, some universities and colleges have in their structures agricultural schools. Brazil has, nowadays, 276 higher education programs in agriculture with a total of 63,260 students registered (INEP, 2001).

The task of creating the knowledge base in agriculture is, in most cases, performed by public agencies other than universities, even though some colleges are internationally recognized as centers of excellence in agricultural research. A federal agency – EMBRAPA – is the major institution conducting agricultural research in Brazil. EMBRAPA, which in the Portuguese language stands for Brazilian Agricultural Research Corporation, operates a network of 40 research units distributed throughout the country. EMBRAPA also coordinates the National Agricultural Research System with cooperated institutions, among them universities and colleges of Agricultural Sciences (EMBRAPA, 2001). Figure 1 provides a visual summary of the current state of the art in the Brazilian agricultural education, extension, and research.

There are productive partnerships between Brazilian Colleges of Agricultural Sciences and agricultural research institutions. Also, such partnerships occur very often
between rural extension agencies and agricultural research institutions. However, effective partnerships between Colleges of Agricultural Sciences and agricultural schools, as well as between agricultural schools, agricultural research institutions and/or rural extension agencies are often not as strong as they could be. Strengthening the links between these four leading conglomerates of institutions could result in tremendous benefit to the Brazilian agricultural knowledge and service. Also, the country can be better prepared to face the environmental, economic, demographic, and social challenges demanded by a new rural milieu. Colleges of Agricultural Sciences, as institutions devoted to prepare people to work in agricultural education, research, and extension, congregate privileged conditions to lead this process.

### Higher Education in Agriculture
- Delivered through universities and colleges of Agricultural Sciences (CAS).

### Agricultural Education
- Delivered through agricultural schools, below college level (AGS).

### Agricultural Research
- Delivered through agricultural research institutions (RES), led by EMBRAPA.

### Rural Extension
- Delivered through state-sponsored rural extension agencies (REA).

- 276 programs
- 63,260 students

- 339 programs
- 54,809 students

- 40 research units (EMBRAPA)
- Cooperated research institutions.

- 27 units (26 states + federal district).

*Figure 1. Highlights of the Brazilian Agricultural Knowledge and Service System.*

### Purpose of the Paper

This philosophical paper proposes a new role for Brazilian Colleges of Agricultural Sciences in leading the process to strengthen the ties among themselves, agricultural schools, agricultural research institutions, and rural extension agencies. A conceptual model (see Figure 2) linking agricultural education, agricultural research, and extension education is developed and their functions identified. Such a model helps to recognize strategic partnerships to develop programs linking the three areas towards a sustainable and integrated rural development. The new characteristics emerging in the Brazilian rural milieu and Boyer’s (1990) concept of scholarship are the background on which the conceptual model is built.

### Theoretical/Philosophical Themes

Agriculture has changed dramatically since the massive introduction of new technologies in the production process, commonly known as green revolution. Agriculture is now defined beyond the merely productive aspect, as a broad industry engaged in the production of plants and animals for food and fiber, the provision of agricultural supplies and services, and the processing, marketing, and distribution of agricultural products (Herren & Donahue, 1991). The advancements in input, process, and knowledge technologies have impacted the rural milieu in four major areas: the production process, the economy of farming, the rural social structure, and the environment (Solbrig, 2001).
The impact of these technologies has created a new face in the Brazilian rural milieu since mid 1980s. Graziano da Silva & Del Grossi (1999) indicate that three groups of economic activities are dominating the new Brazilian rural space: 1) a highly technological agriculture based on commodities and closely linked with agro industries, 2) a set of nonfarm activities such as the provision of services (personal services, rural tourism, etc.), commerce, industrial activities, and 3) a set of new agricultural activities (fishing, hunting lodges, production of ornamental plants and animals, horticulture, fruit farming, etc.) transformed into important sources of employment and income for rural families. They found that rural residents not only limit their activities to agriculture, but also undertake nonfarm activities, as the nonfarm income of Brazilian rural residents surpassed the income generated by farm activities in 1998. Rural families in Brazil are shifting from being farm families to being pluriactive families. The emergence of part-time farmers, the plurality of economic activities, and the use of new technologies are the main characteristics of the new agriculture and rural milieu (Carneiro, n.d.; Graziano da Silva, 1997; Schneider, 2000). Such new characteristics impact all, agricultural education, agricultural research, and rural extension.

Brazilian rural extension system has been criticized for the development of an imbalanced agricultural model. Brazilian extension model was initiated with a purpose of educating the people to assimilate technical progress in agriculture and, as a result, increase agricultural production and productivity (Caporal, 1998; Lima, 2001). Extension was closely tied with technical assistance and supervised credit, which constituted its basic tools. Early extension agents were focused on transforming peasants into modern farmers, in order to foster an increase in agricultural production and productivity. Lima (2001), based on empirical data of the São Paulo state extension service, acknowledges that extension agents have not changed very much. According to him, their practice remains highly based on the productive aspect of agriculture and is characterized by the belief on technology transfer as the major (if not the exclusive) path to the development.

Caporal (1998) indicates that Brazilian rural extension is currently facing an identity crisis that requires a new extension model. Abramovay (1997) asserts that extension faces the challenge to bridge the gap between a restricted and fragmented educational preparation of extension agents and the need that the extension agent be an agent of development, part of a wide process of social mobilization. Colleges of Agricultural Sciences and agricultural schools are not giving their graduates the tools to face new social and economic realities.

The 1937 reform of Brazilian higher education conceived university primarily as a conglomerate of professional schools mostly devoted to professional preparation of people with little commitment to research and service (Mendonça, 2000). Such a conception affects Brazilian higher education in some degree until today, and helps clarify why research had a secondary role in Brazilian public universities. We can understand, from this perspective, the emergence of a federal agricultural research network outside universities with the establishment of EMBRAPA in 1973. It is important to detach at this point that some colleges and universities that were not supported by the federal government did not follow the 1937 model. Most of these colleges and universities are the ones currently playing major roles in agricultural research and extension.

However, the concept of a tripartite mission comprising teaching, research, and extension, has now been emphasized in Brazil with the establishment of the National Forum of Extension’s Vice-Chancellors of Brazilian Public Universities, in 1987. The forum, a
permanent organization, has been put extension in a prominent position, as well as stressed the importance of research as part of the public university mission. University extension is seen as a path to universities meeting its social role through integrating teaching and research (Nogueira, 2000). The forum also highlights the question of integrating cutting-edge research on teaching. Such an issue can be found in the American literature as well (Boyer, 1990; Lincoln, 1999), recognized as a form of scholarship that should be rewarded.

Subsequent to the reformulation of higher education in 1937 and in the midst of the country’s industrial expansion and democratization right after the World War II, agricultural education was legally separated from higher education in agriculture. Since 1946 agricultural education should deal only with professional preparation of people below college level to work directly in agricultural production and/or to assist people holding higher education degree in agriculture. The expectation was to speed up workforce preparation to face the rapid technological changes in agricultural production. This vision was enforced in the Agricultural Education Development Plan of 1973 to the extent it considered the role of the agricultural technician as eminently technical, in which the content of its preparation is ultimately defined taking a job position simultaneously as starting point and goal (Franco, 1987). Recent professional education reform (Decreto No. 2208, 1997) reinforced this vision when determines that agricultural education (until the secondary level) should be delivered independently from general education.

Accurate revision in the Brazilian literature (Franco, 1987; Abramovay, 1997; Graziano da Silva, 1997; Caporal, 1998; Sobral, 1998; Carneiro, 1999, Carneiro, n.d.; Graziano da Silva & Del Grossi, 1999; Leite, 1999; Nogueira, 2000; Lima, 2001;) suggests that extension, agricultural education, and higher education in agriculture should give priority to six major areas: community development, economic plurality, leadership and life skills development, social welfare, environment and sustainability, and family agriculture.

Conclusions and Recommendations

A new cadre of agricultural education and extension professionals is needed to face the innovative characteristics of Brazilian agriculture and rural milieu. Current prominence of extension in Brazilian universities, brought about by the Forum of Extension’s Vice-Chancellors, set up the stage to colleges of Agricultural Sciences take charge of a movement to foster generation of new agricultural knowledge through research, synthesis, practice, and teaching. Such a movement will impact the colleges itself, agricultural schools, research and extension institutions, since colleges of Agricultural Sciences are the ultimate responsible in prepare people to work in these areas.

Research efforts within the colleges of Agricultural Sciences should be strengthened under the concept of scholarship of discovery, in order to contribute to the stock of human knowledge and the intellectual climate of the college or university (Boyer, 1990). Basic and applied research in agriculture and related areas should be harmoniously divided between colleges and research institutions in order to avoid overlapping of tasks and expenditures. This requires close partnership and integration between institutions. Colleges of Agricultural Sciences should consider research outside agricultural production as part of its priorities. Research in political economy is highly recommended. Political economy is the concept that includes the social, cultural, economic, political, and demographic dimensions of a society.

The criticisms about the fragmented preparation of extension professionals
(Abramovay, 1997) and the highly production agriculture-based curriculum (Lima, 2001) indicates the need to a more holistic preparation of agricultural professionals at both, higher education and secondary level. A balanced blend of agriculture, science, and political economy in the curriculum could provide the basis for bringing new insights and meaning to agricultural knowledge and service. Moreover, Colleges of Agricultural Sciences and agricultural schools are expected to prepare its graduates not only for agricultural careers, but also for careers outside agriculture. Boyer (1990) proposes the scholarship of integration, through doing research at the boundaries where fields converge in order to make connections across disciplines. Such integration presupposes strict convergence between all partners involved.

Colleges of Agricultural Sciences should use extension (both inside and outside) as a powerful tool to the application of knowledge. Strengthening partnerships with agricultural schools and rural extension institutions is highly desirable. According to Boyer (1990), knowledge is not first discovered and then applied. Rather, new intellectual understandings can arise out of the very act of application in a process he called scholarship of application. Agricultural schools should provide tools to the application of knowledge, preparing its graduates with more intellectual understanding and lessening its ties with immediate job positions.

Colleges of Agricultural Sciences, at its best, should pursue the scholarship of teaching as an activity that both educates and entices future scholars, through transmitting, transforming, and extending knowledge (Boyer, 1990). A study to describe how colleges, agricultural schools, agricultural research and extension institutions administrators perceive the mission of the institutions and the possibilities of integration is highly recommended. Also, agricultural education, agricultural research, and rural extension should revise and redirect its focus to comprise the six priority areas as indicated in the literature. Figure 2 depicts graphically the proposed model.

Figure 2. Proposed model for integrating Colleges of Agricultural Sciences (CAS), Rural Extension Agencies (REA), Agricultural Research Institutions (RES), and Agricultural Schools (AGS) in delivering Agricultural Education and Extension Programs.
**Educational Importance**

Teacher preparation programs and in-service education needs of extension agents should be identified. A needs assessment profile should be developed to identify specific programming areas that can be developed and delivered into the six priority areas as indicated in the literature. Also, empirical data about the appropriateness of those priority areas should be obtained. The major challenges brought by the proposed model are to bring the available resources together and to identify major areas of integration. Colleges of Agricultural Sciences are required to redesign their teaching and research functions, as well as to put extension as their primary function to meet the demands of the new Brazilian rural milieu.

Colleges of Agricultural Sciences in Brazil should take a lead role in the integration of agricultural knowledge and service systems. Education and communication play a critical role to the development of agricultural and extension institutions. Therefore, the need for changing the preparation of agricultural and extension personnel becomes imperative. Such an effort will help focus areas outside agricultural production and thereby contributing not only with agricultural production and productivity, but also with the integration between rural and urban milieus in an equitable basis.

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