

## **Trends and challenges of eLearning in national and international agricultural development**

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### **ABSTRACT**

Compared to other business and management fields, elearning in agriculture-related fields is still in the early phases of adoption. Early pioneers, primarily American and Australian agribusinesses and colleges of agriculture, are now utilizing elearning methods as a major part of both their education and strategic management programs. There are plenty of challenges, involving the faculty and trainers, students and farmers, technology, finances, and other complications, but agricultural instructors absolutely must find ways to overcome these hindrances and aspire toward the plethora of opportunities that elearning presents for the field of agriculture. eLearning is dramatically improving how agricultural education is done. It is allowing greater access to more students and farmers, more efficiently, with better information. The evaluation results of the first international elearning projects in agriculture show that much good can be done toward ensuring food security in the world if developed countries assist developing countries to implement elearning methods. This paper explains the major trends in elearning in agriculture and the challenges of elearning in agriculture. It describes the major developments and uses of elearning in the field of agriculture and investigates the international opportunities with elearning in agriculture.

**Keywords:** *elearning; classrooms applications of technology; agricultural education; .*

### **INTRODUCTION**

The need for improved agricultural education throughout the world has never been greater. Agricultural technologies that can increase food security in the developing world while developing income-generating activities and conserving environmental resources do exist. Many of these technologies have existed for decades, yet famine, hunger, desertification, deforestation and droughts continue to plague the world's developing countries, which are least prepared to deal with these devastating problems. In developed countries, farmers are facing a changing atmosphere in which organic foods, new methods in raising animals, disease outbreaks, agribusiness, crop insurance, and banking all continually present new challenges. Hundreds of thousands of small farms throughout North America, Europe and Australia have been forced to close in recent years. All of these problems do have workable solutions, yet the global difficulty is getting the appropriate information to farmers. eLearning can benefit every agricultural community around the world, from research scientists in American universities to the poor subsistence farmers of developing countries. It can benefit persons of all ages, all locations, and bridge the gaps created by mountains, deserts, oceans, wars, and political boundaries. eLearning in agriculture can assemble resources and knowledge from distant places that may otherwise be unobtainable. It can connect farmers with far away researchers and experts. It can also dramatically increase the numbers of farmers who can be reached by single training programs. Despite its potential omnipresence, there is a significant rift between high-quality and low-quality agricultural elearning programs.

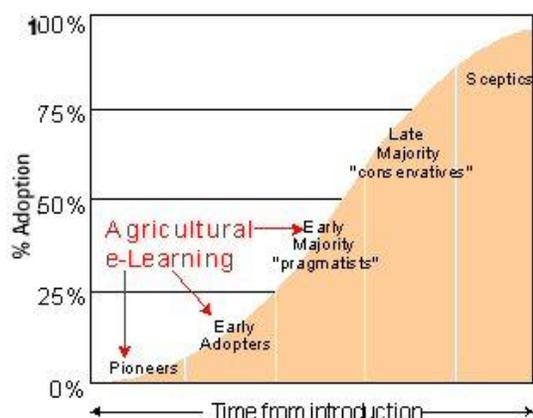
Most elearning programs in agriculture currently being undertaken in the world are in the pioneering phase. These efforts are attempting to use low-risk, low-cost elearning technologies.

Services tend to be free and are studies, pilot projects, and other initiatives supported by grants. Many of these projects are not sustainable; after a limited number of training sessions they end when the funding ends, perhaps with a research report published on the Internet and an expectation that individuals can find it, fully accept it, and integrate the findings into training curricula. At the same time, universities, businesses, and some well-funded international development organizations are producing and utilizing high-quality elearning programs backed by trained personnel and resources.

## MAJOR TRENDS – A GLOBAL PERSPECTIVE

Adoption curves show that diffusion of innovations is slow during the initial efforts and later widely accepted into the main stream. The early pioneers and adopters struggle to establish elearning but eventually begin to pick up momentum. After having proven their effectiveness in helping groups to achieve a competitive advantage, pragmatists and conservatives join the elearning 'bandwagon' and the elearning adoption curve rises significantly as elearning methods become widely utilized.

Training delivered via elearning is rising quickly in nearly every field of work. Throughout North America, Australia and Europe, elearning in non-agricultural sectors is becoming widely used. Though no sector has reached 100% adoption, a vast majority has adopted elearning in their training programs. eLearning in Canadian, European, American, and Australian agriculture falls significantly behind the current adoption rates seen in non-agricultural sectors. Though the Australian agricultural sector had an earlier start, just ahead of the Americans in elearning during the mid-1990's, Americans and Europeans quickly caught up (AAC 2003). With regard to elearning, the Canadian agriculture sector currently lags behind the other countries just mentioned. Still, because of its massive stretches of land among extension agents and farms, Canada's Agricultural Policy Framework is investing in major increases in elearning throughout the country. Each of these developed countries are linking learning to marketable skills and selling e-training programs for specific agricultural training purposes. This is seen in the recent increase in Masters programs for agriculturally-related topics, including agriculture, agronomy, agribusiness, and management. The rest of the world, including Latin America, the Caribbean, Africa and much of Asia, are quickly adopting elearning with the help of international partners.



*Figure 1: Adoption curve for elearning in agricultural sectors (AAC 2005)*

## MAJOR CHALLENGES

The major challenges identified by researchers inhibiting the expansion of elearning in agriculture are very similar to the barriers that keep other fields from developing strong elearning programs:

- Gaps between Trainers and Designers
- Challenges Faced by Trainers/Instructors
- Challenges Faced by Students/Farmers

### Gaps between Trainers and Designers

Major problems lie in educators' inability to bridge the technical divide. Not only must they identify the knowledge and skills needed by the students and farmers, but they must figure out how to present the material in an appropriate, user-friendly design so that elearners can translate that information into applicable solutions on the farm. "Many extension agents and faculty lack the instructional design competencies to develop courses and programs using distance education delivery strategies" (Raulerson et al. 2004, p. 1005). Teachers and trainers are forced to learn on-the-job how to present their material using elearning. They need on-going support, as well as training, administrative support, and incentives, with few of these currently available to the average agricultural trainer or extension agent.

### Challenges Faced by Trainers/Instructors

Instructors in agriculture are faced with similar challenges as those experienced by persons working in other fields. These issues include:

- lack of time and skills needed in adopting new technologies
- lack of both formalized reward system and technical support
- a concern about the loss of the teacher-student relationship
- marketing for programs
- financial rewards
- maximizing returns on their investment in time and money
- major increases in administrative work

Researchers (Murphy & Terry, 1998) vocalized these problems during the 1990's and yet these same problems persist to the present day despite the drop in costs and the gradual improvement of connectivity and design facilities. Agricultural educators should understand that elearning is a major investment in their ability to maximize teaching efficiency and effectiveness in the future. Research has clearly shown that electronic communication, information, and imaging technologies offer delivery methods much more convenient than traditional teaching methods once they surpass the initial load of administrative and skills training in the pioneer phase (Fritz et al. 2002; Murphy & Terry 1998).

Converting previously written documents and lectures into an online teaching is not terribly difficult. The problem is the time and precision that must be applied toward creating an online course while taking advantage of the many benefits offered by electronic resources. Special attention must be paid toward developing the links, review questions, connections to data sources, images, glossaries, and case studies of active learning (Edwards & Eggers 2004). This often presents enormous costs and administrative difficulties.

One cannot simply create a web page or portal including training modules and expect students to come. *If you build it, they may not come.* Marketing is also terribly important for any elearning

program. Marketing through radio, meetings, links, international conventions, trade shows, and a variety of other methods is absolutely necessary for an elearning program to become sustainable.

### **Challenges Faced by Students/Farmers**

Because it is an effective, very flexible delivery method and it brings the added benefit of being able to have experts and specialists from different regions and states in the same class without transportation and lodging costs, many types of students are receptive to using the Internet and elearning (Lippert & Plank 1999). This is particularly pertinent to agricultural training because of the tendency for farmers and experts to be separated by long distances. Yet it is the nature of the material that presents the greatest difficulty from the point of view of the students, who in this case, may be extension agents, farmers, trainers, or agricultural teachers; an important challenge for elearning and distance education in agriculture is the need for a hands-on component (Reid 2001). The root of the question lies in the suitability of elearning delivery systems. Communication media, regardless of whether it is radio, songs, or new elearning methods, "may not be sufficient for farmers to truly learn and fully understand new knowledge, particularly the ecological dimensions of farming practices that are the basis of sustainable agricultural technology," and they also "do not guarantee sustained changes in more strongly held farming attitudes and practices" (Jamias, 2002). Whether using new techniques or new technology, farmers must be provided working examples so they can see them in action with their own eyes. This hands-on component is a major limitation of elearning in agricultural training that must be addressed by local extension agents. Many of the farmers throughout the world are illiterate subsistence farmers. Despite this challenge, elearning programs for developing countries are either targeting the literate and educated extension agents, or they are integrating plenty of audio, pictures, and videos into elearning materials so that literacy is not a barrier. Farmers in the United States present additional challenges because though they are literate, they are often behind on the adoption of technology and use of computers. Recent training by the North Carolina Agricultural and Technical State University intended to train farmers in farm management software soon realized that many farmers needed to begin with training in basic computer use. Despite these challenges, several studies, including one by Lippert and Plank (1999) ultimately proved, with strong support of all of the participating students, that "the Internet can be an effective way to implement an in-service training within the U.S. Cooperative Extension Service." There is little doubt as to elearning's efficacy for training extension agents, the challenge for the future will be to design and market elearning directly for the farmers.

### **NEW USES OF ELEARNING IN AGRICULTURE**

Following are some relatively new cases of elearning in agriculture.

#### **Agricultural Management**

Iowa State University and the University of Nebraska-Lincoln created the Agricultural Management e-School (AMES) in 2002 to extend agricultural management education to producers, educators, and service providers. With the assistance of university professors, the program created courses for financial decision-making, farmland ownership and leasing agreements, machinery economics, swine marketing and other topics. Each topic contained a module with similar instructional elements, such as outline, content, summary, review questions, exercises, case studies, links to outside resources, and threaded discussions. Because of the technical and knowledge support from many university professors and technicians, this program grew into a large, asynchronous e-School that taught 338 students in its first three years. Through a well-written article in the *American Journal of Agricultural Economics*, Edwards and Eggers

(2004) presented many useful recommendations derived from the development and implementation of the AMES. The AMES has received strong feedback from a growing number of students. The challenge now is to fully exploit electronic media, maximizing its usefulness and the realm of possible resources to improve elearning in agricultural management.

### **Agribusiness**

*“Not only is agriculture a business, but programs change, whether with the bank or the government that agriculture depends on. You have to have skills where you’re able to make rapid changes in your decision, you have to be able to read a profit loss statement and put one together and interpret with your banker. Farming is like any other career these days and it changes so rapidly that if you’re doing the same thing you did five years ago, you’re not going to make it.”*

*Ricky Gray, Deputy Commissioner for Mississippi Department of Agriculture (Kirkland 2002).*

In today’s economic environment, agribusiness is growing in importance. It integrates a variety of disciplines, including economics, trade, finance, production, and banking, with opportunities in both the public and private sectors. There is a growing trend to create online agribusiness programs; there are already at least three (3) distance education masters programs in the United States for agribusiness, including Iowa State and Kansas State universities and the University of Florida. Australia has a similar program at the University of Melbourne. Students who have taken online courses are showing that both their satisfaction with and performance in online agribusiness courses match that of students who take standard classes in-person (Wachenheim 2004).

The private sector has also developed strong usage of elearning and distance education in agribusiness. Many agribusiness firms are currently utilizing elearning as a major component of their education and management strategy. This has created a rift in online agribusiness education, where the major firms are utilizing high quality executive agribusiness programs and other organizations and schools are using lower cost distance education programs that do not come close to using the repertoire of resources made available through elearning (Parton 2001).

Pioneer, Inc., for example, one of the US’s leading distributors of agricultural inputs, has abandoned week-long public education programs for e-courses that educate more students and teachers, more efficiently, while greatly improving awareness of their products. Pioneer is using elearning not only to sensitize the Midwest communities about genetically modified crops but also in the training programs for sales agents and young executives.

### **Agro-Terror Awareness / Pests and Disease Management**

The benefits of elearning are making it a major vehicle for agro-terror awareness and disease management. There are numerous opportunities through milk, meat, fruit, vegetable, and grain production and distribution in which terrorists could attack a population. In the United States, biological attacks are of great interest to the Departments of Homeland Security (DHS) and Agriculture (USDA). US supermarkets are filled with food that comes from across the nation and around the world. Aside from prevention, the nation’s food producers and distributors must be ready to respond if an attack does occur. At the same time, the world is coping with potential outbreaks of new, rapidly spreading diseases such as the Avian Flu, and to a much lesser extent, Mad Cow Disease. Whether terrorism or diseases, elearning is quickly becoming a major method for prevention and disaster management training.

There are many examples showing the responses to these challenges. The USDA is currently working with the University of Kentucky to produce online agro-terrorism education courses for both responders and industry users (Emergency 2005). Similarly, the USDA's Animal & Plant Health Inspection Service (APHIS) began a project in 2003 that is spending \$11 million dollars over five years to improve APHIS' elearning and knowledge management capabilities (EDP 2003). The FAO and other organizations have created online tutorials for animal-to-animal and animal-to-human infections. The benefits of elearning in these programs are obvious: the ability to reach so many concerned and involved individuals throughout the United States and around the world with minimal cost.

## **INTERNATIONAL POTENTIAL: SELECTED CASE STUDIES**

In 1996, when agricultural e-learning programs were just beginning in the United States and Australia, only 11 African countries had Internet access. Four years later, all of Africa's 53 countries had become connected to the world wide web, even though access was limited to the capitals and other major cities (Adomi 2005). These trends are similar to those of developing countries through Asia and Latin America. The global boom in cybercafés, as opposed to connectivity in households as seen in the United States, has made this expansion possible. Despite this slow start and current overall lack of facilities and resources, elearning in agriculture is blossoming due to the recent advances in computers use and connectivity in rural areas.

### **Canada-Barbados**

Professors at McGill University in Québec, Canada, are currently delivering a farm management course to students in the Barbados. Because of its proximity to North America and the high level of connectivity, this program is similar to many of the agriculture-related distance classes and masters programs facilitated inside the US. The major differences are that students are all from the same town, they meet at a local resource center, and they have an on-site learning facilitator to aid in the classes. Otherwise, this Canada-Barbados Farm management course is just like any other web-based distance class (Grenier, 2005).

### **Pakistan**

Neighboring India, another country with strong potential for widespread elearning programs, Pakistan's 75 million farmers presents a great opportunity for elearning in agriculture. Though the average person earns less than \$500 per year, Pakistan's telecommunication sector has exploded in recent years. Agriculture is the primary source of income for about half of the country's 150 million inhabitants, and these farmers are spread over 300,000 square miles. Seen as an effective method for poverty alleviation, international NGOs and Pakistan's government are beginning to establish Internet access throughout the rural areas of the country. Surprisingly enough, there are around 3 million Internet users already in Pakistan, aided by the recent surge in numbers of cybercafés. There is an absolute lack of an organized public library system, and therefore the recent effort by Allama Iqbal Open University to establish over 1,400 study centers throughout the country for distance education creates an opportunity for education, increasing the literacy rate in rural areas, and helping the current reconstruction and food security initiatives following the recent earthquake (Mahmood 2005).

### **Sub-Saharan Africa**

eLearning projects in Sub-Saharan Africa have grown significantly since 2001, largely with the help of international development organizations. Nearly all countries in Africa are rapidly increasing the adoption and utilization rates of computers and the Internet. Senegal, Ghana,

Uganda, Cameroon, Kenya, Tanzania, Malawi, Zambia, Botswana, Gabon, and Zimbabwe, among others, all contain populations with growing dependence on the Internet and pose great potential – and even several recent successes – in using elearning for agricultural extension. Examples include Trees for the Future Inc.'s video agro forestry training in Senegal, and the Danish Agricultural Advisory Service's efforts to build a support service linking farmers in Tanzania, Uganda, and Kenya with advisors via e-mail and Internet (Zachmann, n.d.).

Another project made possible through the collaboration of the Commonwealth of Learning (COL), the University of Zambia, and other groups implemented a distance learning program from 2001 to 2003 that focused on the extension of soybean and cowpea production techniques. After training extension agents from Tanzania, Uganda, Zambia, and Namibia in extension, production, and use of distance learning materials, this project supported the extension of this knowledge to rural farming communities. The results of this project were that distance education programs are ready to be fully implemented. Local informational infrastructures, access to the Internet, and overall reliability and feasibility of elearning in these countries have reached the point where larger programs should be initiated.

Extension agents can also participate across country borders. Nigeria, for example, despite the fact that the country has not yet reached the threshold of connectivity due to such factors as fundamental problems with infrastructure, the lack of stable sources of electricity, and the overbearing cost of Internet through service providers, does have plenty of trained and willing extension agents capable of joining distance learning programs based in neighboring countries (Adomi 2005). Botswana also has a quickly growing Internet population in major cities. This is primarily students and businessmen, who are accessing Internet resources at a growing rate. Still, the agricultural sector could significantly benefit from the distribution of improved agricultural methods. Studies show that twenty-one percent of cybercafé users in Botswana's capital, Gaborone, are already involved in some aspect of elearning (Mutula & Sairosse, 2004).

## **CONCLUSIONS**

The first steps of elearning in agriculture are being taken in just about every country. The United States, Europe, and Australia are leading the adoption of elearning in agriculture, and they are also greatly assisting developing countries to do the same. While much of the available funding and interest has been geared toward specialized programs in agribusiness, agro-terrorism, and agricultural management, a large number of organizations have been producing agricultural elearning training of varying quality. The challenge is to fully exploit electronic media, maximizing its usefulness and the realm of possible resources; elearning must not be Power Point presentations modified into online modules, but rather well-designed training that draw on the best electronic resources available. The recent online programs developed and made available by the FAO and a few other organizations are instilling smaller organizations, which could otherwise not afford the time or money to develop them, with high-quality elearning training resources. An effect similar to the cell phone epidemic that swept across most of the developing world is helping to promote elearning. Many communities are skipping traditional training delivery methods and are going straight to using elearning. Extension agents will continue to play a critical role in agricultural extension, bridging the gap between elearning methods and implementation in the field.

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