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Agribusiness Industry Expectations of Computer Skills of Agricultural Economics and Agribusiness Students

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Abstract

The Agricultural Economics profession has been using computer technology in their research, extension and teaching program for over three decades. However, commonly accepted nomenclature for the types and levels of computer skills required of students by agribusiness employers has not been developed. This paper provides a framework for agricultural economics and agribusiness instructors to both plan and evaluate the type and levels of computer skills being taught to graduates of their program.

Keywords: Computer Education

The importance of computer skills for Agricultural Economics and Agribusiness graduates has been recognized for nearly three decades (Litzenberg). Major development of computer courses by Agricultural Economics departments and colleges of agriculture was initiated in the early 80's with the increased access to computer technology through microcomputers. Interest in identifying the required skills and measuring competencies in these areas has been shown (Curtis, Gardner and Litzenberg; Litzenberg and Schneider; Litzenberg and Schneider).

This paper will first briefly summarize the current state of these computer courses and then attempt to develop a taxonomy of computer skills required by agribusiness firms. These computer skill will not be uniform for all types of agribusinesses or even within a particular firm across all types of positions and job descriptions. For purposes of this discussion we will identify four types of computer skills. A profile of the skill levels demanded for success in agribusiness firms

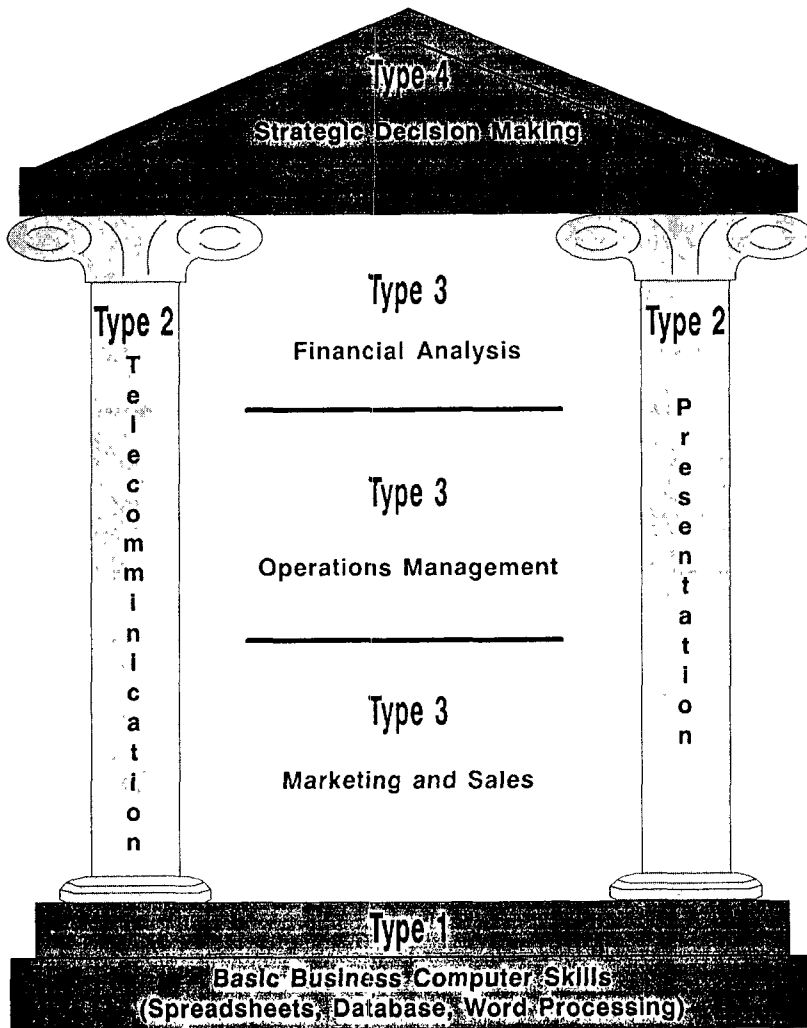
will be developed. These skills are too pervasive to be taught by a single course but must be integrated over a number of subject matter courses covering other topics. However, a basic skills course provides the requisite foundation for these higher level skills.

Computer Skills in Agricultural Economics and Agribusiness

Figure 1 shows the concept of an integrated model for computer skills of Agricultural Economics and Agribusiness students with four types of expertise. The foundation course for computer skills consists of word processing, spreadsheet and database software proficiency. Recent surveys of managers of agribusiness firms (1) ranked capabilities in computer programming quite low relative to other skills. However, the agribusiness industry appears to be quite interested in their needs for general business software expertise of our students.

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Figure 1. Types of computer technology in Agribusiness firms.



The second type of computer skills required of our graduates are telecommunications and presentation capabilities. The third type of skills required by industry are **problem solving applications** using computer software in: (1) marketing and sales, (2) financial analysis and (3) operations management. This component of computer skills requires a higher cognitive level of applications where operational decisions of the firm are analyzed.¹ The issue here is that agribusiness industry professionals are most interested in our graduates' **ability to exercise management control and solve operational problems** using computer technology. This need for problem solving expertise with computer software requires special considerations for teaching these computer skills in Agricultural Economics and Agribusiness courses.

These considerations will be specifically addressed in a separate section of the paper.

Finally, the highest cognitive level of computer skills are required to collect and analyze information important to the development and control of strategic issues for the agribusiness firm.

Type 1 - Basic Computer Skills Typical Agricultural Economics/Agribusiness Computer Course

Graduates from university programs in Agricultural Economics and Agribusiness are expected to possess expertise in basic computer skills. All graduates must be proficient users of word processing, spreadsheet and database software.

While many high school graduates possess substantial skills in these basic areas, university graduates are expected to be highly proficient. Although a few institutions continue to teach languages such as Basic, C or others, these efforts are primarily intended to provide intellectual practice in logical problem solving and better understanding of computer software processes.² The primary emphasis is on developing the basic skills in word processing, spreadsheet and database software.

In addition to these basic business computer skills, students should have experienced running applications software. These programs might be simple accounting packages such as Quicken or farm management software developed by Extension specialists. They should understand the process of inputting data into a software package and having the program complete the calculations and provide output.

Type 2 - Communication Computer Skills

Telecommunications

Effective communications are the backbone of many agribusiness firm level activities and are clearly desired characteristics of our graduates (Litzenberg and Schneider; Litzenberg and Schneider). Successful communication often requires the use of computer technology (although students must be able to write clearly and succinctly as the basis for these computerized communication skills, a point that is not taken lightly when evaluating the academic performance of current students). Students must be comfortable using electronic mail to communicate with others within the firm. Faculty should encourage students to correspond with them using e-mail and other computer networking systems in a professional matter to practice these skills. Use of business oriented networks such as Internet can be easily learned with currently available texts (See Ellsworth and Ellsworth for example). Students should be able to use word processing to quickly create business letters and memos using spelling and grammar checkers.

Students graduating from Agricultural Economics and Agribusiness programs should be quite comfortable accessing electronic data sources. Courses should be structured to force students to "find" data from electronic sources. Practice in downloading data sets to a student's microcomputer is mandatory. Sharing of large databases can be done effectively within a firm using appropriate computer technology. Students who have this experience as part of their undergraduate program will be able to operate with these data as part of their decision making capabilities.

Presentation skills

Effective presentation of analysis is often as important as the information being transmitted. Students who can develop effective presentations using computer graphics are likely to more quickly move up the organizational structure. The "best" computerized presentation package depends on a number of factors, some of which may be limiting in any particular computer network. However, it is absolutely imperative that students have developed numerous presentations using computer software such as PowerPoint or Harvard Graphics. Many academic programs incorporate "teamwork" development and presentation skills by requiring presentations developed by a 3-4 student team.³

The interaction between students and the computer technology can provide emphasis and instruction for both teamwork and computerized presentation. The basic skills needed to use this computer presentation technology are quite easy to learn. They may be incorporated into the basic computer skills course or taught in a special lab section (probably 1-2 hours long) of the applications courses. Institutions with computer support staff may offer seminars or learning sessions to get the students started using this technology. Most of the computer software is easy to use (especially for straight forward simple applications) and can often be learned while using the software. Here again, having the students work in teams may augment the use of this software. Most learners benefit from interaction with others in the initial use of a software package.

Type 3 Computer Skills Using the Computer for Operational Decision Making in Agribusiness Firms

Teaching higher level cognitive skills

The first two types of computer skills in this model are relatively objective regarding the demonstration of the skills involved. Mastery of the subject matter for basic knowledge of type 1 and 2 software can be measured by objective test questions. For example, an instructor could ask, "what function key would you use to edit or fix the contents of a previously specified cell", in a spreadsheet program and expect the student to understand the mechanics well enough to answer. However, using computer technology to make managerial decisions requires a "how do you solve this problem" approach.

Management information systems have a major role in these operational decision making situations (O'Brien). This paper will discuss three types of decision making, although other areas are also important. O'Brien identifies over a dozen situations where information systems augment good decision making.

Marketing and Sales

Computer software can aid tremendously in maintaining personal and business information for prospects and current customers. Order processing and status are also vitally important in servicing customers of agribusiness firms. Computerized technical information enables salespeople to answer customer questions efficiently and accurately. Many customers of agribusiness firms transmit inventory level information directly to suppliers and ordering can take place automatically when called for by stocking levels maintained in the computer system.

Financial Analysis

Computer software designed to analyze financial statements using ratio analysis and capital budgeting problems are an important tool for Agricultural Economics and Agribusiness students. Agribusiness firms require that their financial analysts use current computer models to consider risk and returns for potential capital investment. Coursework instructs students on the theory of

investment and risk management strategies for commodities or value added food and fiber products. Computer software makes these calculations easy to accomplish and encourages "what if" analysis. Computer software can easily project cash needs under various scenarios which are important to the survivability of most agribusiness firms.

Operations Management

The food and fiber sector uses an enormous system of processing and distribution technologies to provide products to the agriculture production system and to final consumers. Efficient use of inputs and processing resources requires careful monitoring of the highly technical processes used today. Computer technology collects and analyzes the data for these processes. Students are required to understand how the data are collected and utilized.

Highly trained students (level 3) should have experience with logistics planning software to plan optimal routing and distribution systems for food and agricultural products. Computerized transportation models are used regularly to provide optimal scheduling of rail, barge and truck transportation.

Optimal inventory control are important operational considerations in the grain and food systems of the agribusiness industry. Just in Time (JIT) and JITII systems require very careful inventory planning coupled with production scheduling models. Sophisticated planning systems of poultry production carefully balance all aspects of the system from egg production through feed ingredient procurement and processing to scheduling of processing facilities and even transportation system for final consumer goods. This coordination would not be possible without specially designed computer models. Agricultural Economics and Agribusiness students must be exposed to these types of systems.

Type 4 Computer Skills Using the Computer for Strategic Decision Making in Agribusiness Firms

Creating and sustaining competitive advantage in an agribusiness firm also makes

extensive use of computer skills. Porter identifies five competitive forces that shape the structure of competition in its industry. They are : (1) rivalry of competitors within its industry, (2) threats of new entrants, (3) threats of substitutes, (4) the bargaining power of current customers, and (5) the bargaining power of suppliers. Computer technology can be used to develop the information system for monitoring these competitive forces (Porter and Milar; Reid and Bullers). Students must learn how to use database systems to capture, categorize and analyze information about the business environment (environmental scanning) for each of these competitive forces. Sophisticated systems can be developed to estimate the impact of these competitive forces on strategic plans of the firm.

Porter presents competitive strategies to confront these forces of: cost advantage, differentiation, and innovation and identification of market niches. It is assumed that Agricultural Economics and Agribusiness students are exposed to these strategic managements issues and theory in upper level courses. Recent research has identified the strategic issues relevant to specific parts of the agribusiness industry (Westgren, Sonka, and Litzenberg). Managers in the agribusiness firm can use computer technology to communicate the strategic plans of the strategic business unit (SBU) throughout the firm. Sophisticated information systems can match operational and strategic data to monitor performance towards strategic goals. Sophisticated computer information systems can monitor the development of innovative products and processes within the firm and the industry. Capstone courses addressing strategic management must include the role of computer technology required (Westgren and Litzenberg).

Graduates from Agricultural Economics and Agribusiness programs find careers in many management-oriented positions within the food and fiber sector. Some students may want to specialize in computer-oriented positions. Selected students may want to develop computer software for a firm or on a general basis for an agricultural computer software firm. The typical curriculum in agricultural economics would not provide sufficient study in the technical aspects of computer systems. Students with this orientation would have to focus

elective courses or even take additional courses or degrees to specialize in professional computer software development.

However, a number of Agricultural Economics and Agribusiness graduates may be involved in the *design* of specialized computer software for their firm. Often teams of firm level managers and software specialists work together to develop this specialized software. Our students must be prepared with sufficient experience in running application software and with sufficient understanding of the design of computer programs to work efficiently in this situation.

Computer Expertise Planning Guide

Table 1 shows a schematic for evaluation and planning for computer skills for students in Agricultural Economics and Agribusiness programs. Administrators of teaching should list all courses taught in the department (and possibly supporting departments such as Computer Science or Business Analysis who might provide the basic computer skills through their courses). The *level* of computer skills are evaluated for each course for each of the four types of computer skills using a scale of 1-3, where: 1 means the computer information is taught at an *awareness level* measured by objective exam questions, 2 means the students *apply* this level of computer skill to *classroom oriented problems* and 3 means that students are required to identify and *solve complex problems* where they must select the correct computer technology (hardware and software) to use.

This completed table provides an inventory of the current type and level of computer skills taught in the academic program. The skills identified may be used to demonstrate the expectations of computer proficiency to agribusinesses employing graduates. This method of identifying computer skills can then be used as a planning guide. Administrators of teaching programs can approach the instructor for a given course and encourage them to include a particular type of computer experience or possibly increase the level of expertise generated in that course. Over time, the administrators of teaching programs in Agribusiness and Agricultural Economics can improve the overall level of computer skills taught

Table 1. Computer Expertise Planning Guide, including Type and Level of Competence, Department of Agricultural Economics, Texas A&M.

Courses	Type 1 Basic Computer Skills	Type 2 Communicati on Computer Skills	Type 3 Operations Decisions Computer Skills	Type 4 Strategic Decisions Computer Skills
AGEC 221 Computer Applications	3	2		
AGEC 314 Mktg. Ag. Prod.		1	1	
AGEC 315 Food & Ag. Sales		1		
AGEC 317 Quant. Analysis in Agriculture	3		1	
AGEC 325 Farm & Ranch Mgmt.			3	
AGEC 330 Financial Mgmt. in Agriculture		1	3	
AGEC 340 Environment of Agribusiness		2	2	
AGEC 414* Ag. Mktg. Analysis		2	3	2
AGEC 425 Adv. Farm & Ranch Mgmt.	3		3	
AGEC 429 Agricultural Policy		2		
AGEC 430 Macroeconomics of Agriculture			2	
AGEC 431* Cases in Agbu. Finance			3	2
AGEC 440 * Economics of Agribusiness		3		2
AGEC 447 Agricultural Prices			3	
AGEC 448 Ag. Commodity Futures		3	2	
AGEC 452 International Trade & Ag.		3		

* Capstone Agribusiness Courses

without duplicating the teaching effort in multiple courses. Some departments are experimenting with one hour elective seminars to provide students the opportunity to learn higher level skills in each of the areas of computer use.

Summary

Agribusiness industry expects graduates of Agricultural Economics and Agribusiness programs

to have considerable expertise in computer applications. This paper has identified four types of computer expertise: (1) general purpose business software; (2) communications and presentation software; (3) applications software for financial analysis, marketing and sales and operations management; and (4) strategic planning. Graduates should have high levels of expertise in types 1 and 2 (expertise level 3 in terms of the taxonomy suggested in this paper), at least a moderate level of

expertise in applications software (at least level 2, preferably level 3), and a working knowledge (level 1) of the strategic planning uses of computer technology. Students who plan to move quickly into management situations in agribusiness firms or plan to develop their own firm need to have a higher level of skill in type 3 and 4 applications.

Capabilities with computer technology are one of the most demonstrable skills Agricultural

Economics and Agribusiness students learn. Considerable attention should be given to the educational planning in a departmental academic program. Educational program planners are urged to use the computer expertise planning guide proposed in this paper to identify their "coverage" of these skills. While computer skills cannot make up for a lack of expertise in economics, finance, marketing etc., computer skills are a highly visible skill desired by agribusinesses.

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Endnotes

1. The comments regarding the higher level cognitive skills required in management of agribusiness firms is a result of discussions with Chris Whatley, instructor for the computer course in the Department of Agricultural Economics at Texas A&M University.

2. Some educational specialists argue that computer programming per se is a worthwhile requirement of Agricultural Economics and Agribusiness curricula, not because students will **write** computer programs but that the logical problem solving practice may not be covered anywhere else in the undergraduate program. To be sure, where better would a student learn the process of identifying the correct input variables (in the units most easily understood by the user); error checking to be sure the value of those variables is within reason; applying the appropriate mathematical process; and formatting the output in the most usable way? Goodness knows there may still be a few Agricultural Economists out there who remember how to write a FORTRAN format statement.

3. For example, the three capstone courses in the Agribusiness program at Texas A&M (finance, marketing and strategic management) each require a term project from a group of students (3-4) where they must create computer-generated graphics as a team to present an answer to a substantial term project problem.