Using Microcomputers to Teach Coordinated Financial Statements

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This article is a report on efforts at Southern Illinois University at Carbondale (SIUC) to provide students in Agribusiness Economics (ABE) 351 — Financial Management in Agriculture — with the opportunity to apply recent advances in business management technology to problems in agricultural financial management. Specifically, the work reported in the following pages examines the teaching of *Coordinated Financial Statements for Agriculture* (CFS)[1] using commercially available microcomputer software.

Coordinated Financial Statements for Agriculture were developed in 1978 for *AgriFinance* magazine by Drs. Thomas Frey and Danny Klinefelter to provide a practical means for generating accurate financial statements compatible with existing farm record keeping systems. Coordinated Financial Statements in its original or manual form is now used by lenders, accountants, farm management specialists, government agencies, farmers, and is taught to agriculture students at universities, colleges, and technical institutes. In September of 1984 through the combined efforts of *AgriFinance* and Farm Business Software (FBS) Systems Incorporated of Aledo, Illinois, a computer version of CFS — *Coordinated Financial Statement Software Series* — was released.

The approach taken to introduce students in ABE 351 to computerized CFS is by means of a term project. The term project also introduces students to the microcomputer and demonstrates application of computer technology to what students have learned in class, namely financial statement preparation. Students spend the first six weeks learning manual preparation and interpretation of CFS. Implementation of the computerized term project begins the class session immediately following the first hourly exam which evaluates students' knowledge of manual CFS.

Utilizing a case study, the term project requires completion of a set of computer generated historical financial statements using the *Coordinated Financial Statements Software Series* and an analysis of the financial performance of the case study farm. It is designed to be completed outside of the classroom on a self-study basis to avoid further use of class time.

The CFS system of financial statements is a comprehensive, interrelated set of agricultural financial statements including a balance sheet, an

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income statement, a statement of owner equity, a statement of change in financial position and a cash flow statement. In addition, there is also a system of 34 supporting schedules and worksheets.

CFS utilizes both a modified cost and a current market basis valuation of assets on the balance sheet. The cost and market values result in a net worth on both a cost and current value basis; the cost values also facilitate the preparation of an accrual income statement.

Data from the balance sheet and income statement provide the information necessary to complete the statement of owner equity, which provides a framework for reconciling the change in net worth on both a cost and current market valuation basis.

The concept of coordinated statements extends to the statement of change in financial position, which can be generated after completion of the balance sheet and income statement. It evaluates how the various asset and liability accounts have changed during the accounting period.

To manually complete CFS, financial data is first recorded and summarized on supporting schedules, with totals transferred to the appropriate financial statement. Further transfer of some data is required, moving data from one financial statement to supporting schedules for another statement. In this way the entire set of statements and schedules becomes a coordinated set of financial statements.

As described thus far CFS offers an analysis of past financial performance. The cash flow statement permits forward planning and incorporates projections of all cash inflows and outflows for the planning period. It too is coordinated with the other financial statements. After the cash flow is completed, it is possible to generate a pro forma balance sheet utilizing information from the previous accounting period's end-of-period balance sheet and the cash flow statement for the current period. A projected income statement can then be created after generation of the pro forma balance sheet.

Coordinated Financial Statement Software Series

Farm Business Software System's software version of CFS was created from the original copyright version of *Coordinated Financial Statements for Agriculture*. It transforms the manual worksheets and statements into computer-generated screens and reports. Output includes the same financial statements and supporting schedules as manual CFS, but adds 21 additional supporting schedules and worksheets.

The software version contains two program disks and an installation disk. Program disk one contains the balance sheet, income statement, statement of owner equity, statement of change in financial position, and a utilities menu. The primary function of the utilities menu is to allow the user to change files without leaving the program. Program disk two contains the cash flow statement, cash flow monitoring worksheet, historical comparison, ratio reports, and pro forma statements. The historical comparison and financial ratio reports can compare up to five years of actual or pro forma statements and performance ratios. The installation disk is used to prepare a blank data disk prior to generating financial statements and is also used to prepare a data disk which uses "Jim Profit" case farm data.[2]

Another feature of the computer version of CFS is its electronic "spreadsheet" for forward planning. This "what if" capability is a feature built into the cash flow statement program. It allows users to generate multi-year pro forma statements that utilize built-in crop and livestock production "models" in combination with actual historical data. It can automatically regenerate all financial statements and schedules as planning assumptions change.

Users can update financial statements and schedules using two different methods: menus or statement generators. To use the menu method, which is a screen displaying a list of options, such as balance sheet schedules 1-22, the user completes all the schedules in the order that they appear on the menu screen. The menu method is the fastest way to prepare statements, but requires that the user be familiar with the computer program so that worksheets are completed in the correct order.

The statement generator method displays only a portion of a statement on the computer monitor at one time, for example, the current assets section of the balance sheet. As the operator moves down the screen he or she can make entries directly on the statement screen for line items that do not come from supporting schedules. Lines "fed" by supporting schedules will take the user directly to the appropriate supporting schedule. Once data have been entered on the schedule the program automatically returns the user to the next line of the statement being generated.

Benefits of the computer version over the manual version include the capability to automatically make computations (for example, calculating accrued interest and contingent tax liability) and the capability to automatically transfer data between schedules and statements. For example, the beginning period balance sheet helps create the end of period balance sheet, with both needed to generate the income statement. All three statements automatically produce the statement of change in financial position. Similarly, a projected cash flow is the basis for preparing a pro forma balance sheet and income statements.

In order to operate correctly, computers running the *Coordinated Financial Statement Software Series* must be IBM compatible and have the following capabilities:

1. 80 column monitor,

2. a printer capable of 132 column reports (either by using 13 inch wide paper or through "condensed" print),

3. two floppy disk drives or one floppy and one hard disk drive,

4. 64K RAM and the CP/M operating system or 128K RAM and the MS-DOS operating system, and

5. Ryan-McFarland COBOL routine. *(Software User's Guide, p. 8)*

A *Coordinated Financial Statements for Agriculture Software User's Guide* provides complete instructions on how to operate the computer program. It parallels the text and reproduces the "Jim Profit" case found in the *Coordinated Financial Statements for Agriculture* manual.

The Computerized Term Project

The term project accommodates students without previous experience with microcomputers or exposure to computerized CFS.[3] The computer part of the project extends over five weeks beginning immediately after the first hourly exam and ending three weeks before final exams. Students spend the last three weeks of the semester writing their analyses of the case farm.

The project is designed to keep costs as low as possible. Each student purchases an educational version of FBS Systems' Computerized Coordinated Financial Statements for Agriculture. The educational version is slightly modified from FBS Systems' regular commercial version in that students' software has a limited life of 25 boots. That is, students are able to start up and run their software 25 different times; after that, their software is inaccessible.[4] In all other aspects the two computer versions are alike. Students are also required to purchase at least one blank disk to be used as a data disk. Seven *Software User's Guides* were purchased by the Agribusiness Economics Department and are available for students to use.

To start the project students receive the necessary case farm data to complete two consecutive year balance sheets, an accrual income statement, a statement of owner equity, and a statement of change in financial position. Data for the case study are modified from the "Fred H. America" case created by Dr. Tom Frey.[5] Students also receive an orientation pamphlet that provides them with instructions on how to operate a microcomputer and how to interact with the CFS software.

A CFS microcomputer orientation seminar is held for students the evening following assignment of the term project. The one and a half hour seminar gives students hands-on exposure to the microcomputer and its basic operation. Students learn how to create a data disk and how to call up and run the CFS program.

Table 1. Due Dates for Computer Generated Financial Statements and Completed Term Project

Financial Statement	Due Date[1]
Balance Sheet (second year)[2]	3
Income Statement, Statement of Owner Equity, and Ratio Report	4
Statement of Change in Financial Position	5
Completed Project with Written Analysis	8

[1]Number of weeks after the term project material is handed out.

[2]The first year balance sheet is not required for the preliminary analysis. It is required and scored in the completed project.

The number of students attending a particular orientation session is limited by the number of microcomputers available. The ideal situation is one student per computer, with a maximum of two students per computer. Prior to the orientation seminars students are divided into two groups based on their experience with microcomputers. Grouping students in this manner makes the orientation seminars more effective by reducing the disparity among participants with regard to prior knowledge of microcomputers.

Twice a week for five weeks ABE 351 students have exclusive use of the agriculture computer lab, its 15 microcomputers, and a technical consultant familiar with manual and computerized CFS.[6] Each lab period lasts three hours. On specified dates during those five weeks computer generated financial statements are due (see table 1). Specific due dates help students make systematic progress on their projects.

Students use the last three weeks of the semester to prepare their written analyses of the case study farm. Two class periods before the end of the semester students hand in their complete projects.

The term project is given a value of 100 points, which is equal to 13 percent of the total points in the course. Each correctly prepared statement is worth 10 points. In total, financial statements account for 60 project points. The written analysis accounts for the remaining 40 points.

The Term Project as a Teaching Aid

Completion of the term project accomplishes several things. Students indicate that it increases their understanding of how microcomputers can be used as a management tool. Students previously unfamiliar with microcomputers benefit by learning how to interact with microcomputers. Another benefit is that students gain experience in using computerized CFS. Although there is some indication that computerized CFS increases students' basic understanding of CFS, more often students simply report an increased understanding of CFS due to completing the financial statements a second time, that is, from doing the statements manually and then later by computer. Students develop an increased acceptance of the usefulness and value of CFS, no matter what version, manual or computer, because of doing the term project. Responses from students also show that as their familiarity with the computer increases during the semester they develop a preference for using com-

puterized CFS over manual CFS in preparing financial statements. Students strongly recommend, however, that manual CFS be taught before introducing them to computerized CFS.

Conclusions

Several benefits are gained by including the computerized term project in the course content of Financial Management for Agriculture. These benefits are:

1. improving students' understanding of how to prepare and interpret *Coordinated Financial Statements for Agriculture,*
2. providing students with an applied, hands-on, and realistic learning experience with pays-offs to the students in terms of increased microcomputer and financial management skills and the application of those skills to financial data, and
3. providing the teacher with an instruction medium that is easy to use, easily integrates with and enhances course content, and requires a minimum of in-class and out-of-class instructional time, thereby minimizing competition with other teaching, research, and service activities.

Students have suggested that the term project be expanded to include pro forma statements, that is, a projected cash flow statement and projected balance sheet and income statement. Case farm data is currently being developed toward this goal. I envision the pro forma statements being added to the term project as bonus points; that is, as an addition to the historical statements and associated financial analysis that are already required.

An alternative term project would be for the students to begin by generating a cash flow statement. Following generation of a cash flow budget, pro forma balance sheets and income statements could be generated, and then a ratio report. Once ratios were computed from the pro forma balance sheet and income statement, students could do written analyses of the financial performance of the farm plan reflected in the cash flow statement. This term project design would eliminate the generation of historical statements while exposing students to generating all the kinds of financial statements that make up CFS.

Due to the initial success with the computerized term project it will continue to be a part of the course content in Financial Management in Agriculture. Its application at other universities and colleges depends upon technical expertise in manual and computerized CFS or some other financial management microcomputer software, availability of microcomputer facilities, and adequate case farm financial data. For those agricultural and technical colleges unable to offer courses which apply microcomputers to agricultural problems, a computer assisted term project is a viable and cost-effective way to provide students with hands-on computer experience.

Notes

[2]CFS Software includes demonstration data that uses the "Jim Profit" case farm example that is contained in the Coordinated Financial Statements for Agriculture manual. The case farm data are used to illustrate the preparation of the financial statements.

[3]In reality, only about 20 percent of the students in ABE 351 have never used a microcomputer. About 20 percent of the students have manually completed some or all of the financial statements before enrolling in ABE 351, while less than 10 percent have worked with the computerized version of CFS.

[4]Through trial and error 25 boots have proven to be an adequate number of access opportunities for students to complete the term project. In fact, most students use no more than 10 boots. If students do use up their boots, they are provided with another 25 boot version at no cost.

[5]The "Fred H. America" case farm data can be found in the instructor's material for "Your Financial Condition" workshops sponsored by the Cooperative Extension Service, Department of Agricultural Economics, College of Agriculture, University of Illinois, Urbana, November 1985.

[6]The College of Agriculture has a microcomputer lab consisting of 15 IMB PC microcomputers and eight Epson printers. The lab is open to students approximately 35 hours per week with a lab assistant available for consultation during this time.

References

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LINEAR AND QUADRATIC MODELS
Feed Formulation Software For Instruction

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Introduction

A number of commercial feed formulation programs are available to the feed mixing industry. Commercial programs are often used in instruction even though their design and degree of sophistication makes their use somewhat difficult to learn. Classroom time must be spent teaching the use of the program that could be spent teaching the principles of economics, feed formulation and nutrition.

We designed and directed coding of two feed formulation programs specifically for use in instruction that could be used in our microcomputer laboratories. The code is designed around a simplex algorithm by Lee (1975). The laboratories have IBM Personal Computers and Texas Instruments Professional Computers with 256K of random access memory, the MS-DOS operating system, and IBM or Epson dot matrix printers capable of printing 132 characters per line.

Theoretical Bases

The two programs appear to be very similar. Indeed, they use the same editor for entering and altering data. However, the actual feed formulation is based on two entirely different concepts.

The linear program is called "User-Friendly Feed Formulation" or "UFFF" (pronounced oof). It solves a cost minimization problem and answers the question: "What combination of available feedstuffs meets a set of nutritional requirements for the least cost of a unit of feed?" This program is similar to commercial feed formulation software (Dent and Casey, 1967).

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Specifications for minimum and maximum levels of all nutrients and ingredients have to be entered into the program. The solution is least cost with respect to the particular specifications entered. It does not follow that the least cost pound of feed will result in the most efficient growth or least cost of a pound of broiler. The latter question is answered using quadratic programming.

The quadratic program is called "User-Friendly Broiler Quadratic Programming" or "BQP." It solves a growth maximization problem and answers the question: "If there are limited funds that can be spent on feed for each bird, what combination of feedstuffs gives the heaviest bird?" The principles of this program and its application to the commercial broiler industry have been detailed by Miller et al (1986) and Pesti et al. (1986). Essentially, it considers that as the energy level of the diet increases, body weight at any time is increased and carcass fat is increased; as the protein level of the diet increases, body weight is increased and carcass fat is decreased.

Specifications for the minimum and maximum levels of all ingredients and nutrients except protein and energy are entered into the program; in addition, a quadratic equation relating the broiler's total weight response to protein and energy intakes, and a linear relationship between time and protein and energy intakes must be entered. Restrictions on carcass fat can be entered.

BQP maximizes cost per pound of broiler produced assuming that the firm has limited resources to spend on feed. The solution is likely not the one that maximizes technical feed efficiency (g gained/g feed), but that the desired weight should minimize cost per unit of gain ($/g gained). The BQP solution is a list of the amount of each feed ingredient to be mixed