Implications

Mathematics ability appears to be one of the prime indicators of achievement in computer skills. Since agriculture is already involved with computers and is likely to become more so in the future, agricultural programs, including vocational agriculture, should place more emphasis on mathematics-oriented skills. At the same time, these programs should introduce their students to the rigors of computer skills and help them overcome the fear and intimidation of the computer. This would improve their attitude toward the computer and computer use.

Students in agriculture need to develop typing skills to use the computer efficiently.

Advisors, teachers, parents, and others need to impress upon students the advantage of possessing computer skills to improve student motivation to enroll in computer classes rather than having the student take the class to fill a program of study.

Teachers in agriculture adopting the computer as a teaching aid will need to develop or procure the software to meet their needs. At the same time, the computer should not be viewed as a tool to replace the teacher, but rather to supplement and enhance the lesson material, allowing the teacher more time for individualized instruction or other classroom activities.

Prerequisite mathematics courses or specific levels of mathematics achievement will allow students to maximize their potential upon enrolling in post-secondary computer classes.

Because computer-assisted instruction has been proven to be at least as effective a teaching method as conventional lecture, course structure can be changed to accommodate this new teaching aid.

References

Borg, Walter R., and Meredith D. Gall. 1983. **Educational Research: An Introduction.** Fourth Edition. New York: Longman, Inc.

Broh, C. Anthony. 1975. Achievement and attitude with computer related instruction: A field experiment. Paper presented at Annual Meeting of the American Political Science Association, San Francisco, Calif.

Fiske, Edward. 1983. Computer Education: Update '83. **Popular Computing** 3(7):86-147.

Friesen, Vernon Eugene. 1976. The relationship of affective and cognitive variables to achievement and attitude under lecture-discussion and computer-assisted instruction. Ph.D. dissertation. Kansas State University, Manhattan.

Kockler, Lois H., and Anton J. Netusil. 1974. CAI: Overcoming Attitude Barriers.

Legacy, James, Tom Stitt, and Fred Reneau. 1984. **Microcomputing in Agriculture.** Reston, Va.: Reston Publishing Company, Inc.

Rice, Billie Ann Perrin. 1973. A Comparison of Computer-Assisted Instruction, Programmed Instruction, and Lecture in Teaching Fundamental Concepts of Calculus. Georgia State University, Atlanta.

Rota, Danie Regis. 1981. Computer-Assisted Instruction, Lecture Instruction, and Combined Computer-Assisted/Lecture Instruction: A Comparative Experiment. University of Pittsburgh, Pittsburgh, Pennsylvania.

Rushinek, Avi, Sara F. Rushinek, and Joel Stutz. 1981. The Effects of Computer Assisted Instruction Upon Computer Facility and Instructor Ratings. **Journal of Computer-Based Instruction** 8(2):43-46.

Russell, Donn H. 1984. An evaluation of farm management microcomputer assisted instruction in Iowa vocational agriculture program. M.S. thesis. Iowa State University, Ames.

SPSSX User's Guide. 1983. Chicago, Ill.: SPSS Inc.

Tsai, San-Yon, and Norval F. Pohl. 1983. Student Achievement in Computer Programming: Lecture vs Computer-Aided Instruction **Journal of Experimental Education** 46(2):66-70.

Utilizing A Microcomputer Grade Recordkeeping Program To Forecast Course Score

Richard J. Patterson
and Fred W. Reneau

Despite an instructor's effort to explain the basis for course grades on the first day of class, many students do not entirely comprehend at that time the effect those future assignments will have on their grades. And as the semester slips by, with the accumulation of quiz, homework, and exam scores, students may lose sight of the amount of course work remaining and the effect that their level of achievement on that work will have on their course scores and letter grades. Students are often surprised to learn too late that the letter grade they had anticipated is beyond realization or differs from what the instructor's gradebook indicates. With the help of the microcomputer and by applying the concept of course-score forecasting, the authors attempted to generate information that would help keep students informed as to scores received on completed work, course work remaining, and the impact that various levels of achievement on the remaining work would have on their final course scores.

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Described in this paper is a computer program written in the BASIC language, which combines the forecasting of student course scores with student assignment score recordkeeping. Students' potential course scores are forecast based upon their performance on past assignments. From the standpoint of recordkeeping, this program can create, maintain, and manipulate file records of scores, compute the students' current course scores, compute the mean course score for the entire class, and compute final course scores to which course letter grades may be assigned.

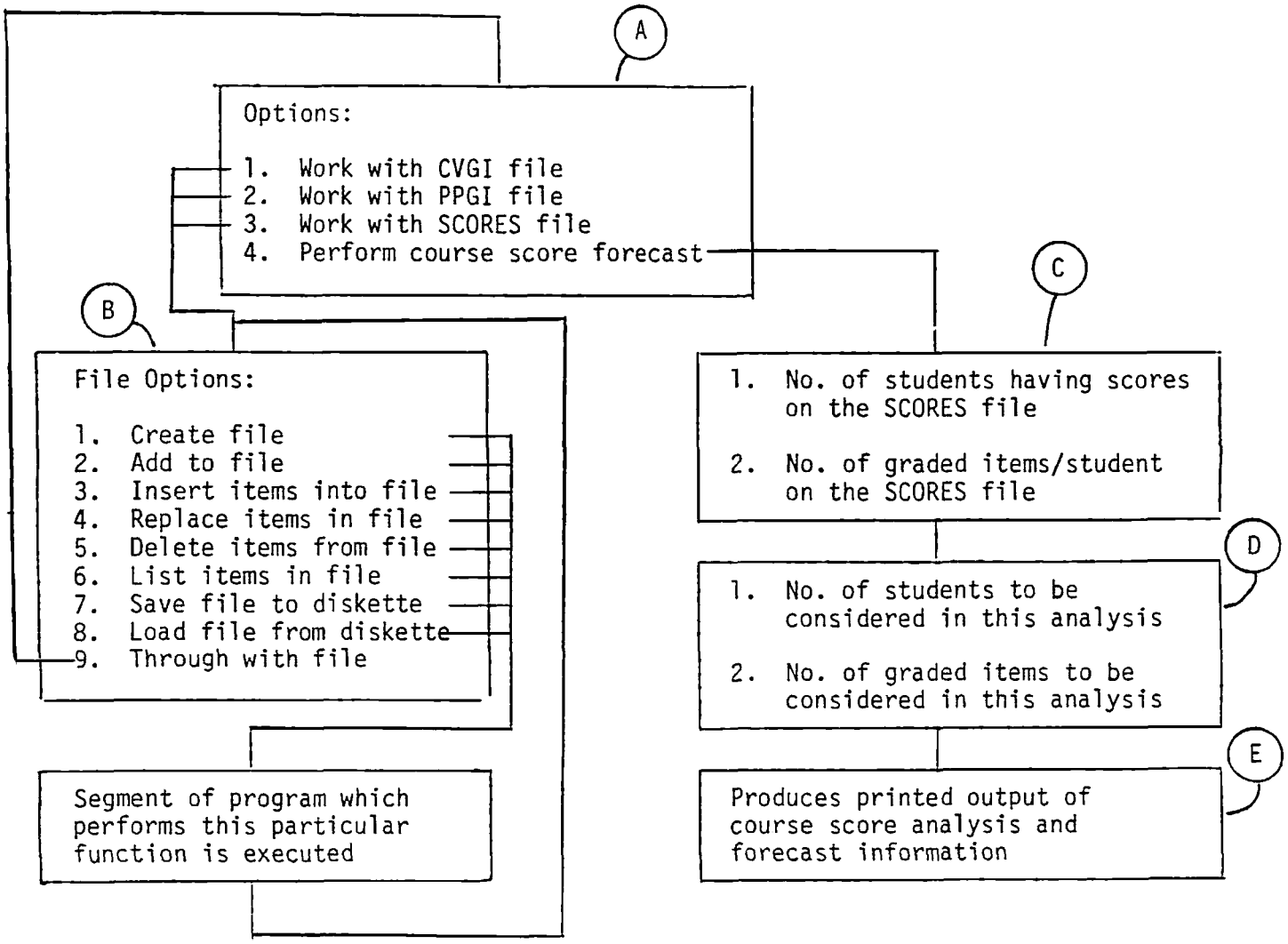
Program Function and Options

The options and sequence of functions of the analysis and forecast program are diagrammed in Figure 1. Upon loading the program and initiating a run, the user is presented with four options (Figure 1, A). Three of the options pertain to files needed for the program and the fourth to the actual course score forecast. If it is the first run of the program for a course, three files will have to be created prior to carrying out a forecast of course scores. These three files are: (1) the course value per graded item (CVGI), (2) the possible points per graded item (PPGI), and (3) the students' scores received on each graded item (SCORES).

Regardless of the file selected, the user is presented with a menu of nine options (Figure 1, B), which may be performed on any file. The initial program run is used to create each file and save it on a diskette for retrieval during subsequent runs. Having completed work on a particular file, the user is presented again with the four initial options. At this time the user may select another file to work on or may select the analysis and forecast option, assuming all three files have been previously established.

When the grade analysis and forecast option is selected, the user is prompted to enter information to insure the proper loading of the scores files (Figure 1, C). When all files are available to the microprocessor (loaded), a prompt requests information pertaining to the scope of the desired analysis and forecast (Figure 1,

Figure 1. Options and sequence of functions of the course score analysis and forecast computer program.



D). Having this information the program produces the analysis and forecast output (Figure 1, E).

Development of the CVGI, PPGI, and SCORES Files

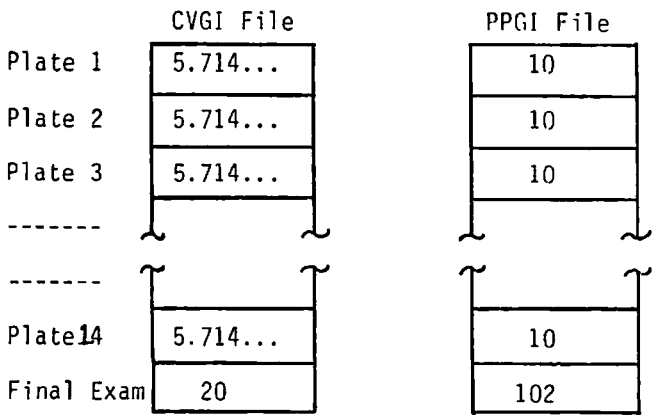
All student score analysis and forecasts are based on information retrieved from the three data files: CVGI, PPGI, and SCORES. The development of each file is described separately.

The CVGI file consists of values representing the percent contribution of each of the graded items that make up the total (100%) course work. For example, assume among other assignments that five quizzes will be given and that each quiz represents 4 percent of the total course work. When the CVGI file is developed for such a course, the number 4 is entered into the CVGI file for each of the five quizzes. Likewise, the percentage contribution of other assignments are entered into the CVGI file. During a run of the analysis and forecast option, these values are retrieved and used to represent the percent contribution of each quiz or assignment toward the total course work. When completed, a CVGI file contains percent values for all graded items making up the course; therefore, these numbers must total 100.

Numbers that represent the points possible for each graded items are entered into the PPGI file. A quiz having a total possible point value of 20 would have the number 20 entered into the PPGI file. The number 25 might be the value entered into the PPGI file to represent the possible points for another quiz. The PPGI values for each quiz may vary, even if both quizzes represent equal percentage contributions (CVGI File) toward the total course score. It is the CVGI value that determines the maximum potential percentage contribution that a particular graded item makes toward the total course score.

Since the microcomputer performs all calculations, the instructor has flexibility in assigning possible point values to the various course assignments, quizzes, and exams. Possible point values do not have to be assigned to facilitate manual grade calculations, and, unlike the CVGI file, the possible point values in the PPGI file do not have to total 100. When developing the CVGI and PPGI files, make certain that the sequence of entering information is the same for both files, so that the values entered correspond to the respective graded items.

Figure 2. Representation of the CVGI and PPGI file resulting from the graphics course illustrations.



The SCORES file contains the actual numerical scores that each student received on each of the graded items. The sequence of entering this information into the SCORES file is such that the scores for one particular graded item are entered for all students in the class. This order of entry allows the scores file to be updated as assignments are graded and returned to students.

Illustration of Program Use

The use of the program is illustrated by applying it to an introductory graphics course. Information for only three students is included in this illustration; however, the number of students for which the program may be used is limited only by the memory capacity of the microcomputer. For the graphics course the letter grade is based upon scores received on 14 plates (individual drawing assignments) and a final exam, 15 graded items in all. The 14 plates account for 80 percent of the course grade, and the final exam counts for 20.

The course score forecasting program for the graphics class is set up as follows. The CVGI file is created by entering the percent course value of each of the graded items. In this case each of the 14 plates contributed equally (5.174%) toward the course grade. Therefore, this value is entered into the CVGI file for each of the plates. The remaining graded item is the final exam; since its value is 20 percent of the course grade, 20 is entered, thus completing the CVGI file, which now totals 100 percent. A representation of this file is shown in Figure 2.

Since the 14 plates were graded equally on the basis of 10 possible points each, the value 10 is entered into the PPGI file for each of the plate assignments. In this illustration the final exam carried a possible point value of 102. Upon entering this value the PPGI file is complete, as shown in Figure 2. Possible points for each graded item may be determined prior to the beginning of the course or may be decided as the course proceeds and each assignment is given. The PPGI file (or any file) may be updated at any time. It is important that the student understands that the course value of a particular graded item will not change and that the possible points assigned by the instructor to a graded item will not affect the percentage of the graded item as far as the course score is concerned.

As soon as scores become availabe from graded assignments, the SCORES file is created. For purposes of this illustration, it is assumed that five assignments

have been graded for the class of three students. The scores received on these assignments were:

Figure 3. Representation of the SCORES file resulting from the graphics course illustration.

SCORES FILE

	Plate 1	Plate 2	Plate 3	Plate 4	Plate 5
Marty	10	9.5	9.5	10	8
Paul	10	10	9.5	10	9
Joan	10	9	9	10	8.5

These scores would be entered into the SCORES file in the following sequence: 10, 10, 10, 9.5, 10, 9, 9.5, 9.5, 9, 10, 10, 10, 8, 9, 8.5, resulting in a file represented by Figure 3. As additional assignments are graded, they are added to the SCORES file. When the SCORES file contains scores for at least one graded item, a course score analysis and forecast can be performed.

To perform a course score analysis and forecast, option 4 (Figure 1) is selected. At this time the user is prompted for the number of students having grades in the SCORES file and the number of graded items for which student scores have been entered into the SCORES file. For this illustration, with three students each having five graded assignments, the response would be 3 and 5, respectively. This information is needed to facilitate the correct retrieval of the SCORES file. Correct loading of the information on the SCORES file is essential to prevent the production of grade forecasts based on incorrect or incomplete information. Should an inconsistency be detected, indicated by an error message, the user should review the files to find the source of the discrepency.

Assuming the loading of files proceeds without error, the user is asked to enter the number of students and the number of graded items to be considered in this analysis and forecast. Assuming all students and all graded items are to be considered the response would be 3 and 5, respectively. Having responded with this information, the program produces output that presents the analysis and forecast information for the student.

A typical analysis and forecast program output is shown in Figure 4. This information may be provided to the student as frequently as the student or the instructor desires. Experience has shown that an output every two to three assignments and before major exams is received with interest.

Item A in Figure 4 is a number assigned to each student for the purpose of identifying their course score information. No names are used in this system to preserve confidentiality.

Item B is a sequential list from left to right of the scores received on each of the assignments that have been considered in this particular analysis and forecast. Students have requested to verify these scores with those reported on returned assignments and to report any discrepancy to the instructor immediately. The authors have found that this prevents "end of the semester" misunderstanding concerning scores contributing toward the course grade.

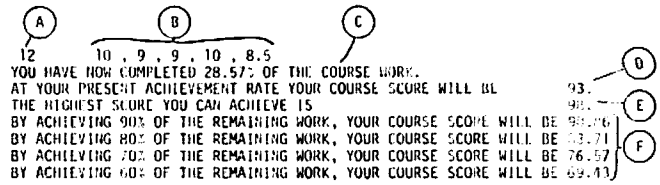
The second line of information, item C, provides the student with the percentage of the value of the course work that has been completed. This gives the student a sense of progress of the course with respect to assignment worth rather than with respect to calendar time.

The information represented by Item D is the forecast of the course score the student will receive if he/she continues to achieve at the same level as he/she has on the graded items considered in the current analysis. It reflects achievement level thus far in the course.

Probably the information of most immediate concern to the student is that indicated by Item E, which represents a forecast of the final score if the remaining course work is completed at a 100% achievement level. When students are first informed that course score forecast information will be made available throughout the course, each item of the printout information is explained. The meaning of Item E is explained very thoroughly. Students learn the first day of class the basis for their course letter grade. When the meaning of Item E is discussed, students are made aware that any assignment score received that is less than perfect means that 100 percent achievement of the total possible course score is impossible. Thus, as the semester progresses and less than perfect assignment scores are received, this is reflected in that the highest possible course score will be less than 100 percent. Having this forecast information available to students at relatively frequent and regular intervals prevents cases of "grade shock" and illusions of "if I do well on this next statement, I'll get an A." Students are encouraged to do their best on all remaining course work to maintain their course score at the highest possible level. However, there is a limit as to the highest possible course score attainable, and Item E keeps students informed as to what it is.

Information indicated by Item F includes the forecasts of course scores if the remaining course work is achieved at levels of 90, 80, 70 and 60 percent, respectively. Students may use this information to decide what level of achievement they need on a particular graded item in order to arrive at a certain course score. Students may also see that if they score well on the remaining assignments they can improve

Figure 4. Typical output information produced by the course score analysis and forecast computer program.



their course score enough to improve their letter grade by one letter. Situations may also arise in which students see that going into an assignment (the final exam, for example) that their achievement level on the upcoming work can be low and still not affect their course score enough to result in the lowering of their course letter grade. Their study time can then be managed accordingly.

Near the beginning of a course the range of forecast course scores (highest possible score to 60 percent level of achievement) is quite large. This is due to only a small percentage of the course work having been completed. The relatively large amount of remaining work presents an opportunity for a wide variation in possible course scores. As the amount of remaining course work decreases, the range in possible course scores narrows. Depending on the course value of the remaining graded items, the range in possible course scores forecast may narrow to within a letter grade spread.

When all the course work has been completed and scores entered into the SCORES file, the course score analysis and forecast program produces a modified output. Figure 5 represents the final output for the three students of our graphics course. This output provides a sequential listing of scores received on all graded items and the students' final course scores. The instructor may assign a letter grade to these course scores.

Figure 5. Output from the course score analysis and forecast program when all course work has been completed.

```
8       10, 10, 9.5, 10, 9, 9, 9, 8.5, 9, 9.5, 9.5, 10, 9.5, 96

YOU HAVE NOW COMPLETED 100% OF THE COURSE WORK.
YOUR ACHIEVEMENT RATE HAS RESULTED IN A COURSE SCORE OF 93.97.
2       10, 9.5, 9.5, 10, 8, 8.5, 8.5, 7.5, 7, 8, 9, 0, 0, 0, 87
YOU HAVE NOW COMPLETED 100% OF THE COURSE WORK
YOUR ACHIEVEMENT RATE HAS RESULTED IN A COURSE SCORE OF 71.63.
12      10, 9, 9, 10, 8.5, 9, 9.5, 7.5, 7.5, 8.5, 8, 8.5, 7.5, 8.5, 85
YOU HAVE NOW COMPLETED 100% OF THE COURSE WORK.
YOUR ACHIEVEMENT RATE HAS RESULTED IN A COURSE SCORE OF 85.81.
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Conclusion

The course score analysis and forecast computer program has been in use one and one-half years to provide analysis and forecast information to approximately 250 students in various courses. The use of this program appears to the authors to have the following benefits.

- Enhances the student-teacher relationship with respect to course scores and grading practices.
- Keeps the student aware of past, present, and projected course scores information.
- Minimizes situations involving grade misunderstandings and errors in recordkeeping.
- Saves instructor's time in computations of final course score.

A Computerized Interactive Gradebook

Greg Baker and
Bob Creel

Introduction

The use of a computer to assist in storage and calculation of student grades can greatly simplify the process. Several types of computer programs have been written to accomplish this task. The Computerized Interactive Gradebook[1] (CIG) was written to incorporate the best features of these programs and to introduce features which allow student interaction with the computer.

Types of Computer Gradebooks

The first type of program is the batch type program such as the Purdue Student Grade Report (SGR) (Downey and Taylor). This program requires the use of formatted data stored on cards or card images to be submitted as input with the gradebook program to a batch processing computer. Other than computing weighted averages, the SGR allows the instructor to drop the lowest score(s) of a student in a category. The program also generates a host of statistics for use by the instructor in determining the final grade.

The interactive program such as that written by Tice is for use on a microcomputer. An interactive program prompts the user with messages when input is needed. Thus, very little knowledge of the computer is needed.

The third type of program utilizes one of the many spreadsheet software packages now available, such as Visicalc or Lotus 1-2-3 (Burton). This type of program has the potential for widespread use because of the availability of spreadsheet software. However, it is difficult to conduct much data manipulation or generate statistics other than weighted averages without a more extensive program.

CIG is an interactive program which can be run on a microcomputer or mainframe computer. In addition to complete flexibility as to the number of categories,

[1]Information concerning the CIG may be obtained by writing Greg Baker, Department of Agricultural Economics and Agricultural Business, Box 3169, New Mexico State University, Las Cruces, New Mexico 88003. Both Baker and Creel are New Mexico State staff.