

A COMPUTER WORKSHOP
FOR ELEMENTARY AND
SECONDARY TEACHERS

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INTRODUCTION

Although computers have been used by secondary teachers for a long time, only recently has the microcomputer made it economically feasible for the elementary teacher to use the computer in the classroom. In addition, new technological developments have made it possible for secondary teachers outside the fields of mathematics and science to use the computer as a classroom tool. Recent reports and recommendations (1,2) have emphasized these facts and indicated the need to make teachers aware of the potential the computer possesses as a tool in the classroom.

This paper describes a two-week workshop which was offered by the authors in the summer of 1979 to provide teachers with knowledge of computers as they are applicable to the teachers' classes.

ORIGIN AND OBJECTIVES OF THE WORKSHOP

Through working with students and teachers at both the elementary and secondary level, the authors became convinced that the computer is a valuable educational tool. But it was apparent that the computer could be used effectively only if the classroom teacher was aware of its potential. We believed that once the teacher learned to use the computer, he or she would be able to use it in creative and innovative ways in the classroom. The biggest step was overcoming the teachers' fear and awe so that they could implement their own classroom computer applications or adapt those of others to their own needs.

With this in mind, we designed a two-week workshop with the following objectives:

- 1) The teacher will be sufficiently familiar with the operation of a computer to instruct others in its use.
- 2) The teacher will know where to find

resources for ideas, activities, and programs related to the classroom use of computers.

- 3) The teacher will know the BASIC language well enough to write simple programs, to introduce the language to students, and to read any BASIC program and make minor modifications to it.

- 4) The teacher will have sufficient understanding of the way a computer works to explain it to students.

- 5) The teacher will know the techniques and approaches most frequently used in instructional computer applications and have experience in their use.

- 6) The teacher will have designed and implemented at least one computer activity for his or her classroom and be capable of developing others.

- 7) The teacher will know the types of computer equipment available for classroom use and be aware of advantages and disadvantages of each.

The workshop was intended for teachers who had no previous experience with computers and who wished to explore ways in which they could improve their teaching by use of the computer.

WORKSHOP FORMAT

The workshop was divided into two parts, a laboratory and a lecture, each of which met for one hour and fifteen minutes every day for two weeks. Upon completion of the course, the teachers received two hours of college credit.

The BASIC language was taught in the laboratory portion of the course. Actually, two laboratory sessions were held each day, one before and one after the lecture, half of the participants attending each session. Ten Radio Shack Level II 16K TRS-80 computer systems, loaned to the college by Radio Shack, were set up in the laboratory and each participant was seated in front of a unit. The textbook, "Using

BASIC" by Julien Hennefeld (3), was chosen because it contains many sample BASIC programs to illustrate concepts. A set of these programs was placed on cassettes for each laboratory; then during the laboratory each participant would load a program from cassette. Next, the instructor would talk about the concept illustrated, have the participants run the program, and usually ask them to make modifications to see the effect. The topics covered in the laboratory during the first week were as follows:

- Day 1 - How to use the computer
LET statements
PRINT statements
- Day 2 - GO TO statements
IF-THEN statements
- Day 3 - INPUT statements
FOR-NEXT statements
- Day 4 - Subscripted variables
Graphics
- Day 5 - String variables
PRINT@ statements

During the second week the laboratory time was used for each participant to design and implement a useful classroom computer activity. The instructors assisted the participants in the design and programming of the activities. Additional features of the BASIC language and advanced programming techniques were covered as they were needed. On the final day of the workshop each of the participants presented the results of his or her project to the entire group.

In the lecture portion of the workshop, the participants were divided into elementary and secondary educators. The topics of the lectures for each group follow:

- Day 1 - How Computers Work
- Day 2 - Techniques and Approaches in the Classroom
- Day 3 - Elementary - More techniques and approaches
Secondary - Survey of Resources
- Day 4 - Elementary - Survey of Resources
Secondary - Problem Solving Principals
- Day 5 - Computer Literacy
- Day 6 - Design Considerations for Instructional Hardware
- Day 7 - Experience with Instructional Software
- Day 8 - Survey of Computer Equipment
- Day 9 - Elementary - More experience with instructional software
Secondary - How to Teach Computing
- Day 10 - Presentation of Projects

Both laboratories and the lecture were held in the morning. The room containing the computers was also left open in the afternoons so the participants could return and work on their projects. Although this afternoon work was not required, many teachers did take advantage of this opportunity. In addition, several had TRS-80 systems at home or at their schools which they used in the afternoons or evenings.

RESULTS

Twenty educators from three local school districts attended the workshop. Of these, twelve were secondary teachers, four were elementary teachers, and four were administrators. All four administrators attended the first week only. Also, some of the teachers who had previous computer experience took the second week only.

A brief description of the projects developed by the teachers is found in the Appendix. Both the instructors and the participants were amazed at what had been accomplished in a two-week period. An enthusiasm for computer use was generated by the workshop so that participants went back to their schools and pushed for the purchase of a computer for their classroom.

A further indication of the success of the workshop is the demand for it to be repeated this summer. This demand is coming from teachers who saw the effect the workshop had on last year's participants. As a result, the same workshop will be offered twice this summer as well as once during the academic year. Hope College has now established its own microcomputer laboratory, so the computers will not be borrowed systems.

The only modification to the workshop which we plan is not to allow participants to register for just one week. Those who took only the first week missed the important experience of putting together their own software. It was also difficult to adjust the workshop to those who came in during the second week. As a result, the workshop will not serve the needs of those teachers with some previous computer experience.

Interest has been expressed in a workshop specifically for teachers who are already using computers. We are considering offering such a workshop, which would cover advanced programming and software design techniques. In this workshop we would invite each teacher to bring along a student so that they could participate as a teacher-student team. From our observations, much of the software developed is actually done by such teacher-student teams with the teacher doing the design

and the student the programming.

REFERENCES

- 1) Milner, S. "An Analysis of Computer Education Needs for K-12 Teachers." National Educational Computing Conference Proceedings, Iowa City, 1979.
- 2) Taylor, R., Poirot, J., Powell, J., and Hamblen, J. "Computing Competencies for School Teachers: A Preliminary Projection for All but the Teacher of Computing." National Educational Computing Conference Proceedings, Iowa City, 1979.
- 3) Hennefeld, J. Using BASIC: An Introduction to Computer Programming. Prindle, Weber & Schmidt, Inc., 1978.

APPENDIX. PROJECTS COMPLETED BY PARTICIPANTS IN THE COMPUTER WORKSHOP

Physics experiment simulation - A falling body experiment is simulated by the computer. The student is asked to provide the appropriate formulas to calculate expected results.

Geometry drill - A drill and practice exercise is conducted using geometric terminology.

Spanish drill - A drill and practice on Spanish grammar and vocabulary is conducted entirely in the Spanish language.

Ordering - This program is intended for use at the elementary level. The student takes a list of items and places them in a described order. Three implemented orderings are alphabetical, fractions, and decimals.

Parts of Speech - The student is given a word list and after picking a word from this list, leads the computer to identifying the word by answering the computer's questions about its part of speech.

Word house - This program is intended for students learning English as a second language. The student is required to place each of a list of words into its proper category and word house.

Presidential drill - This program drills students on presidents and their terms of office.

Golf statistics - This data collection and analysis program simplifies the paper work of the golf coach.

Career counseling aid - A student interested in a career in accounting can sit down with this program and find out what

options exist in this field and the education necessary for pursuing each option.

Test generator - This test generation program simplifies the high school math teacher's job of creating examinations by randomly choosing problems which have parameters that may also be randomly selected.

Carrying drill - This program drills the student on carrying skills in multiplication by presenting randomly generated problems. If the student responds incorrectly the program carries out the multiplication, carefully specifying each carry value along the way.

Mortgage payoff - The student can use this program to examine the effects of varying the parameters on mortgage payoffs.