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ABSTRACT

A series of three courses developed by the Northwest Regional Educational Laboratory is illustrative of materials designed to meet the needs of teachers and administrators for pre- and in-service computer science education. These courses can employ experienced outside consultants, stress the use of conversational language, and provide hands-on experience with the computer; they were created by the Laboratory's Relevant Educational Applications for Computer Technology (REACT) Program. The first course is aimed at both teachers and administrators and covers basic computer concepts and uses, along with their social impact. The second unit in the series is for teachers and deals primarily with the instructional functions of computers, while the final course is intended for administrators and examines a variety of fundamental administrative data processing applications. (PB)

THE TRAINING OF TEACHERS IN THE USE OF COMPUTERS IN THE CLASSROOM

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Harcourt Brace Jovanovich, Inc.

Since the use of computers is becoming increasingly common in school administrative and instructional programs, teachers and administrator training is of utmost importance. Traditional college and university courses in computer programming or data processing have not been suitable for the special needs of teachers and administrators. The typical offering is a course in FORTRAN programming with no exploration into the why or the how of computers, no discussion of appropriate teaching methods and materials and no impetus in using the computer to exte instruction.

Teachers and administrators are being increasingly called upon to make important and costly decisions regarding curriculum contents, machinery, languages, materials, as well as the administrative side regarding scheduling, locker assignment, grade reporting, etc. Too often these teachers and administrators have had little or no appropriate preparation for this responsibility. Part of the reason for lack of college level courses for teachers and administrators is that there has been in the past very little demand for such courses. Now, pressure is being applied on teacher preparatory institutions from two directions. Students entering college have had an introduction to computers in high school and are pressing for further education and high school teachers are demanding in-service classes. (1, pp. 1-2)

It would appear that the mathematics staff are best equipped to deal with computer related materials. However, it is not essential and indeed it is undesirable that a general course on the application be the sole domain of math teachers. It is hoped that the general course would demonstrate the broad relevance of computing to diverse human activities and hence involve the social impact of the computer.

We must look to ways of equipping all teachers and administrators with the knowledge and materials they need. We have the problem of experienced teachers confronted with new topics and the problem of new elements in methods courses of potential teachers.

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It has been suggested that the introduction of computing to teachers be similar to the manner in which they may present materials to their own pupils. It is most important, however, to deal in more detail in the subject than the teachers wish to do with their pupils. (2)

It is very easy to complicate the teaching of computing. However, only logical thinking is required. Important recent developments -- interactive terminals, mark sense card readers and conversational languages -- have made instructional uses of computers easy to use in the school environment. Conversational languages - BASIC - have really made the biggest impact on our approach to computing to school and, therefore, to teacher training. It is now not necessary to teach a complex high-level language which will take some days to master. A conversational language can be used interactively after an hour or two study. Therefore, the computer is used as a tool enriching curriculum versus a curriculum all of its own.

To return to the implementation of these ideas in teacher and administrator training, we have two distinct areas to training: initial training in the universities and colleges and in-service training. Again, the initial training should not be limited just to mathematics teachers. It should include all areas of study. With regard to the training of established teachers or administrators, the approach of the material needs to be slightly different. These teachers have an intensive knowledge of the school situation and are generally much more critical of the innovation of computing. To run a course aimed at being an education course, rather than a computer programming course can be a harrowing experience -- properly run, it need not be. Once the teachers have grasped the basic ideas of computing, critical and worthwhile discussions arise into what we are trying to do and why. This is valuable in this new field where objective evaluation studies are difficult and have rarely been attempted. Personally, I find these discussions in this area stimulating and consider it essential for anyone in the area of curriculum change or enrichment.

One of the main differences of the approach presented here vs. the usual university course is that it might be best taught by a team of outside consultants with expertise. Besides their specialized training, it often works out to be the least costly in the long run. Over the past few years the United States government has funded several research studies in the use of computers in education. There have been many material studies but very little of it readily available for the administrator or teacher. Instructional courses developed by the Northwest Regional Educational Laboratory called Program REACT - Relevant Educational Applications for Computer Technology were developed under the direction of the Office of Education and emphasize computer applications and provides "hands-on" use of computers. They have established three computer-related education courses. Through several years of development and also experimently giving the courses, they have developed three training courses for teachers and administrators. The series of courses demonstrate ways the computer can be used in school instruction and administration. As a result, school personnel increase their understanding of the problems and potentials of using computers. Intelligent selection can then be made from the growing number of possible uses of the computer in education. These training courses are organized in separate modules for school administrators and teachers.

Course I (Teachers and Administrators) - Computers in Education: A Survey - provides administrators, teachers, curriculum specialists, and undergraduate and graduate educational majors an introductory familiarization with computers. Through the study of elementary computer concepts and the role of the computer, the educational uses of computers are presented in a broad context. The teachers and administrators develop an understanding of:

Concepts of computer components, input-output storage and differences in computer types, generations, sizes and speeds.

How man communicates his problems to the computer for solution through different types and levels of programming.

The concepts of mini-computers and time-sharing. The use of the teletypes for on-line introduction and elementary BASIC programming.

The potential impact of the computer on society, separating the realities from the myths.

Teachers and administrators are introduced to the fields of educational computing and prepared for intensive study of classroom uses of administrative use of the computer through presentation of the over-view of the field. Understanding is developed for the potential of computer use in classroom solving, vocational training, computer-assisted instruction, simulation, library management, guidance and training, curriculum management, and integrated data management systems. This course is presented in a classroom situation with hands-in experience as well as individualized instruction.

REACT's Course II (Teachers) - Instructional Computer-Oriented Curriculum is specifically designed for all teachers. The course offers a complete description of application units available in Social Studies, English, Business, Science, and Mathematics. This includes a comprehensive review of the resource materials currently available. Materials augument present course outline; that is, the program supplements and enriches existing learning and teaching methods. It requires no change in curriculum. Curriculum is extended because of increased efficiency and capabilities inherent in computer use. Each applicant unit from the various subject areas include:

A description of the computer program.
A rationale for the unit.
Suggestions for several ways the unit could be integrated with the on-going curriculum.
Objectives describing the desired student performance after each unit.
Required preparation for students planning to use the units.
Directions for further study and exploration of the concept.
A complete computer program run.

Emphasis is also given to student-oriented materials, laboratory and demonstration techniques, and inter-disciplinary approaches. In addition, the course includes a continuation of the elementary BASIC instruction offered in Course I. Instruction has to be completely individualized and is tailored to meet the specific requirements of each participating teacher or staff member. Again this is a workshop environment.

Course II (Administrators) - Computer Applications for Administrators utilized a demonstration data management system in "hands-on" environment to explore a variety of fundamental administrative data processing concepts. A system is constructed for a model school in order to examine major application areas. The applications range from the routine preparation of report cards to the imaginative of programming planning budgeting system. General topics of study include:

Recognition of an effective computer application.
Traditional educational administrative applications as implemented on a computer.
The computer is a decision making and planning tool for the school administrators.
Basic computer functions as applied to educational applications.
Opportunities and problems presented by computer.
State of the art.

The administrator will have a broad picture of the types of tasks within a school district that are best suited to a computer and an appreciation for what is involved in implementation. Implications from a management standpoint are discussed. Specific areas of interests of individual participants are addressed as time allows. The course takes a classroom approach as well as a workshop environment.

Each of the classes just described utilizes a series of manuals developed by the REACT program. The manuals are also available individually or in course sets for use as texts in university education curriculum or for individuals who wish to use them in a self-study setting.

One further point that may be worth mentioning. At a time of general curriculum reform, more and more teachers are becoming involved in various curriculum development. These developments are now invariably evaluated even if the teachers themselves are not personally involved in the evaluation studies, though many are. The computer approach to these studies is of great practical importance to him. An ability to perform simple systems analysis of problems enables him to conduct an evaluation study with the aid of a computer.

Computing is not difficult. It is easy to learn in spite of what some authorities claim. However, it is difficult to examine by written paper.

Initiative and enthusiasm are the only prerequisites for being involved in computers in education. Obviously, I think that all teachers and administrators must be involved with the computer as soon as possible. This imposes a tremendous challenge on our educational training system and it is one which we must tackle with all resources.

Information about the REACT program is available from:

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