ROBERT H. BLISSMER

INSTRUCTOR'S MANUAL TO ACCOMPANY

INTRODUCING COMPUTERS

1988-1989 COMPUTER ANNUAL

PREPARED BY ELEONORE HAMMONDS
SALLY WESTALL

Instructor's Manual

With Transparency Masters

To Accompany

Introducing Computers

Concepts, Systems, Applications

1988-1989 COMPUTER ANNUAL

Robert H. Blissmer

Prepared by
Eleonore Hammonds
Sally Westall
Mark Isham

JOHN WILEY & SONS

New York Chichester Brisbane Toronto Singapore

ISBN 0-471-60162-4

Printed in the United States of America

10 9 8 7 6 5 4 3 2 1

Table of Contents

How to Use the Manual

Your responsibilities for teaching only begin when you receive your copy of the text. You now must begin to plan the course.

Planning involves several tasks:

- Formulate objectives
- Select and sequence the content you will teach
- Select and design learning experiences and activities
- Plan lectures
- Plan assignments
- Prepare tests
- Decide on grading policies and procedures.

Part One of the manual is foundational in nature. It provides assumptions about good teaching and some teaching strategies that we have found to be effective.

Part Two of the manual will be used in conjunction with your day-to-day teaching. Suggestions for teaching activities have been integrated with chapter content notes. You will find:

- Suggested discussion questions
- Ideas for using small group learning activities
- Narrative material

Special learning experiences have also been integrated into the content outline. Consult this information regularly as you plan your lessons.

The Purposes of the Manual

The purpose of this manual is to provide you with suggestions that will promote:

- Effective teaching on your part
- High levels of learning among your students.

To fulfill this aim, we provide information on different teaching models. It is important to attend to the differences among your students and to describe some of the ways students differ.

There is no one best way to teach. Good teachers vary their teaching strategies to match the nature of the material and the learning styles of their students. In some instances, lecture may be the most appropriate teaching strategy. In classes where you want to promote problem solving skills, discussion is probably the most effective technique. Many of the differences among teachers stem from their personalities and personal preferences.

Yet, while teachers teach differently, we also believe that all good teachers follow certain principles, one of the most important is that good teachers provide for individual differences of their students by using a variety of teaching strategies—some independent activities, some small group activities, and some large group activities—interspersed throughout the term of the course.

The major purpose of part two of this manual is to save you some time and to alleviate some of the stress that accompanies daily lesson planning. Again, our suggestions are only suggestions. We realize that sometimes teachers simply run out of ideas for presenting material or activities or projects; we provide ideas that are designed to help you vary the types of learning experiences you provide your students.

Some Principles of Effective Teaching

Students differ. They differ in the experiences they bring to the learning situation; they differ in what they prefer to learn; they differ in ways in which they prefer to learn; they differ in what they hope to accomplish through their schooling. Effective teaching accounts for these differences. To ignore these differences ignores the realities of teaching and learning and usually results in less than effective teaching. Effective teaching responds to individual differences. By individualizing instruction, you provide each student with independent learning activities, small group activities, and large group activities.

To assist you in varying your teaching strategies we provide specific information on three basic models of teaching—lecturing, leading discussions, and using small groups. Our experience in preparing teachers and working with instructors in computer science is that most teachers teach as they were taught: via lecture. While lecturing is important , teaching and learning are enhanced when greater variety is provided.

In addition to meeting the individual differences of learners, providing a variety of learning experiences makes possible the attainment of different types of objectives. Learning is multidimensional. Several objectives are met simultaneously. Traditional lecture approaches to instructional planning and

teaching, regrettably, focus primarily or exclusively on the acquisition of information and exclude other important types of objectives.

Using computers involves problem solving; the ability to solve problems becomes a worthwhile objective that teachers should promote.

Other thinking processes, such as thinking logically, interpreting information, and applying principles are related to problem solving.

General academic skills, such as note taking, writing, researching, and reading critically, and computer-specific academic skills, such as keyboarding, understanding documentation, vocabulary development, are equally important to assure success in the course and in one's occupation.

Finally, but no less important, are the social or group skills that professionals in computer science will need to succeed at whatever task they perform once they enter the world of work. Such social skills include working cooperatively in small groups, demonstrating leadership skills, resolving interpersonal conflicts, and developing and sharing ideas through discussion.

These three categories of objectives (thinking processes, academic skills, and social skills) cannot be met within the confines of lecture. The suggestions for lecturing, leading discussions, and using small groups are based on several years of research, will provide greater variety and will help you individualize your teaching. We emphasize that our suggestions are only suggestions. In order for you to develop fully as a teacher, we do not expect you to adopt our suggestions blindly and without thought. In order to make these suggestions your own, you must modify them to suit your particular personality and your particular students' characteristics. We do encourage you to experiment with our suggestions, as only through experimentation will you continue to develop as a teacher. Another aim of this manual, then, is to help you develop a broader repertoire of teaching styles.

Lecturing

Of the three teaching models, lecturing is the most effective model for conveying information. It is not as effective as discussion in promoting thinking processes nor as effective as small group projects in developing social and interpersonal skills.

In planning your lectures, consider the fundamental concepts or ideas that you will explore during the course. Determine how many lectures you intend to offer, and then chart the relationships among the material covered in the lectures. This planning should be done while you develop your syllabus.

We have provided some examples of course syllabuses and course schedules on page 20.

Pointing out relationships to your students is crucial for productive teaching and effective learning. In order that students find meaning in facts and interpretations, they must see the interconnections between concepts, skills, and facts.

As you plan individual lectures, decide how much you can cover during one class period. For each class plan some time for questions and discussion. The text provides a great deal of information. Do not feel that you have to cover it all. Beginning instructors usually plan to cover too much material. When you are forced to interrupt a lecture, you are usually unable to bring the lecture to a smooth conclusion.

The lecture should begin by establishing set. One way to do this is to pose a question that you will address during the lecture. Another way is to pose a problem at the beginning of class and propose a solution throughout the remainder of class. A third way is to state your objectives by telling students what you expect them to learn during the lesson. The fourth way is to relate the new material to previously learned material. A simple device is "Remember that last time we ... " followed by a summary of the previous material. This technique helps students frame the new material and allows you to show how new material builds upon previous knowledge.

Some other considerations when lecturing are:

- The lecture should be well organized and logical.
- Feel free to rearrange some of the material in the text to meet demands of time or to take advantage of students' interests.
- Do not be bound by the structure and sequence of the text. Another important point in regard to structure and sequence is that most students expect you to follow the sequence of readings and topics that you provided in your syllabus. Too much deviation from either the sequence or the schedule causes many students to become uncomfortable or confused.
- Try not to fall too far behind your original schedule or if you deviate greatly from your sequence, tell students the reasons for doing so.

Lectures allow you to control the pace of learning and the sequence of information. During a lecture, it is always better to speak slowly so that students

have time to take notes. You can adjust your delivery speed if you sense that you are moving too slowly. It's usually easier to speed up than it is to slow down, however. To help organize your lectures and as an organizational aid to note taking, we have provided several overhead transparency masters. These will help point out the more important information.

The success of a lecture depends upon delivery. And the most important ingredient in a good delivery is enthusiasm. The enthusiasm of a teacher is infectious; if students think the material is exciting, most will be excited about learning. If students see that reading assignments and exercises are interesting, they will show interest in them. The converse is also true. If students get the impression that the material is boring, it will be. To paraphrase a friend of ours, "If you enjoy class, chances are your students do too."

The lecture is most effective (1) at the beginning of a new unit of instruction, (2) when introducing a new concept, (3) at the conclusion of a unit of instruction, (4) and when demonstrating a process or procedure.

A lecture at the beginning of a unit or when introducing a new concept allows you to present an overview that will help students organize specific information that will follow. It alerts students to which ideas and concepts are important. It can serve to motive in the way a preview to a movie motivates viewers. You can highlight the important points and show why they are important and how the information is related to other information in the course.

The lecture at the conclusion of a unit is effective when major points are summarized, connections between ideas are clarified and reviewed, and closure is achieved. The lecture in which you present a skill or procedure is effective when steps are clearly and logically presented and you check for understanding every step of the way.

Leading Discussions

Developing thinking processes requires interaction between you and your students and among students. Like any other process, thinking must be practiced, and it can be practiced during discussion. Research has identified three discussion strategies that promote different types of thinking processes. Three fundamental thinking processes are:

- Concept formation
- Interpreting information
- Application of principles

This section will define each of these thinking processes and provide a sequence of questions that promote each process. The strategies described here were developed by Hilda Taba *(Teacher's Handbook for Elementary Social Studies* Addison-Wesley, 1966, pages 39-42, revised 1971).

Concept Formation Strategy

Concept formation refers to the cognitive processes of classifying and categorizing information. Concept formation consists of three fundamental activities:

- List or enumerate
- Group
- Label and categorize

The following chart depicts the observable activity, the covert mental activity, and the questions that elicit these processes. The eliciting questions are general questions the teacher asks to stimulate thinking. These questions would be modified to suit the nature of the content being discussed. For example, if you wanted to use this strategy after students read a chapter in the text, the first eliciting questions would be, "What major ideas were presented in the chapter?" The covert mental activity is the thought process that is prompted by the eliciting question. The overt activity is the observable activity of the student in response to the eliciting questions. The overt activity provides evidence that the covert activities are occurring.

Overt Activity	Covert Activity	Eliciting Question
Enumeration	Differentiate items	What did you notice? See
Grouping	Identify common properties that justify the justify the the grouping	Which of these items belong together? What are your criteria for grouping?
Labeling and categorizing	Determine the hierarchy of items	What terms would you use to refer to each group?

Interpretation of Data

The next strategy, interpretation of data, is an inductive process of developing one's own ideas and interpretations. This strategy involves three activities. The first activity, identification, is similar to the first activity in the concept formation strategy in that it requires students to identify relevant information from irrelevant information. The second activity requires students to explain or justify certain events or to relate pieces of information with each other to detect relationships between or among events or bits of information.

Overt Activity	Covert Activity	Eliciting Question
Identify points	Differentiate and distinguish relevant information	What did you notice?
Explain identified terms	Relate points to each other each other. Establish relationships	Why did so and so hap pen? Why is such and such true?
Make inferences and generalizations	Go beyond the information given. Find the implications	What does this relation mean? Based on this, what do you conclude about X?

Application of Principles

The third teaching strategy, application of principles, promotes the ability to apply known principles to explain new situations or new phenomena, to predict consequences of a series of events, or to hypothesize about causes and effects. This strategy also involves three activities. In the first step, students make predictions or formulate hypotheses relevant to a problem. The second activity requires students to explain and to support their predictions by identifying the links between the problem and their prediction or hypothesis. The final step involves logical reasoning in verifying the predictions or hypotheses.

Overt Activity	Covert Activity	Eliciting Question
Predict consequences: explain the unfamiliar	Analyze the nature of a problem or condition	What do you think would hapen if...?
Explain and support the predictions	Determine the relationships that lead to prediction	Why do you think this would happen?
Verify the prediction or hypothesis	Use logical reasoning to determine the conditions and limitations.	What would it take for such and such to happen? Would this be true in all cases? At all times?

Cooperative learning Groups

The third model of teaching—cooperative learning groups—is the most productive in promoting the development of communication skills, leadership skills, and problem-solving skills.

A growing body of research indicates that cooperative learning groups become more productive as the nature of the learning task becomes more complex (e.g., problem-solving, interpersonal conflict resolution, evaluation, and development of attitudes).

We have included this section of group work because the trend in data processing occupations is moving more and more to team approaches to solving problems and implementing solutions.

Cooperative learning groups promote interdependence such that the success of each member is dependent on the efforts of the group and the success of the group is dependent on the efforts and cooperation of each and every member. Members of cooperative learning groups assume responsibility to help each other succeed so that the group will succeed. Some of this material has been adapted from Johnson, D.W. and R.T. Johnson, *Learning Together and Alone: Cooperative, Competitive, and Individualistic Learning, 2nd edition,* Prentice-Hall, 1987.

In using cooperative learning groups effectively, you should formulate two types of learning objectives—academic objectives and collaborative, or social, objectives.

Johnson and Johnson recommend the following guidelines when using small groups:

1. Assign roles to ensure interdependence. Unless you assign roles and when students have not worked much in cooperative groups, some students usually do most of the work while other students sit idly by watching. Some roles that can be assigned include the group leader who coordinates the tasks of other members and who sets the pace and keeps the group on-task; a recorder who keeps a record of the contributions of the various members of the group; a summarizer who makes sure everyone in the group understands what is being learned, and an observer who keeps track of how well the members of the group collaborate.

2. Provide clear and detailed instructions on the nature of the task that is to be performed and a description of the expected product of the effort. Before making an assignment, be sure everyone understands the concepts or procedures.

3. Make it clear to students that (1) they are engaging in a collaborative effort—that they will all succeed or fail together and (2) each student is responsible for ensuring that all other members of the group learn the material and contribute to the effort of the group.

4. Establish a system to evaluate both individual effort and the group's product. Some suggestions for evaluating individual effort are randomly selecting a student to explain an answer, occasional testing, and randomly selecting a student's paper or project to grade. The most effective way to evaluate the groups' efforts is to carefully observe groups in operation and record how often students contribute ideas and suggestions and offer help. Its important that you frequently take some time during class to discuss how well different groups function and how groups might function more effectively.

Small group tasks can promote both high achievement and social skills. If you have not used small groups in the past, you may feel uncomfortable and apprehensive about their potential. If you have little experience with small groups, you should probably move slowly by starting with simple assignments and pairs or trios of students. Once you become more comfortable with small groups you may feel more confident in increasing the size of the groups.

Integrating Computers into your Classes

Integrating computers into your class is crucial to balanced understanding of computers. Integration can occur through demonstrations in class and through laboratory exercises that provide "hands-on" experience with computers. In-class demonstrations with a personal computer:

- Enhance a lecture by giving students something concrete and tangible to which they can relate
- Animate the lecture
- Provide a means for drawing out more questions from students

The most effective means of utilizing computers to teach computer concepts and procedures is to demonstrate the concepts or processes to the entire class before allowing them to work individually on a computer. As you demonstrate, students should not be sitting in front of a computer. In this case, students would be distracted, their attention would be focused on their computers and keyboards and not on what you say, and they would tend to work ahead of instruction. If you use one computer to demonstrate concepts and processes, you will have more of your students' attention.

In preparing for a class in which you plan to demonstrate a concept or process, try to have available some type of computer projection system that will cast an image on the wall or a screen. The image must be large enough for all in your class to see. The costs of these systems are decreasing. An effective device that was recently developed will fit over an overhead projector. Your computer may need color capabilities and a composite video output jack to work with one of these devices.

An alternative to these systems is to use a large-screen monitor on a stand. This device is large enough to enable you class to see the screen while you view the computer's monitor.

As an educational tool, the use of in-class demonstrations with a personal computer follow a slightly different educational process and serve different educational purposes. The following guidelines might help you with such a method.

The purpose of in-class demonstrations is not to teach facts and features, but to illustrate concepts and processes of problem-solving, communicating with computers, and to develop the concept of computer literacy in the sense of

developing awareness of the relationship between what is put into a computer and what comes out of a computer. In formulating learning objectives, emphasis is placed on discovery, exploration, and overcoming fear of using computers.

Always test the equipment before class begins. Don't rely on your audio-visual or computer staff; often times they will only set up the equipment and leave the testing to you. When using an overhead projector, make certain that you have a spare bulb in case the one in the machine burns out during class. You should also be familiar with the hardware and software so that you can anticipate any potential problems and make an effort to avert them.

You do not have to spend time developing software to give in-class demonstrations. One can easily find many available software packages already on the market. In addition to applications software, many companies provide demonstration programs and tutorials which are subsets of packages. This software, which is sometimes available at surprisingly low cost, provides an ideal means for teaching a practical approach to personal computer competence and literacy. Also, less can go wrong when using this type of software for demonstrations. For example, Lotus offers a 1-2-3 tutorial with its package that is easier to demonstrate than the program.

Before demonstrating any software (the following principles apply also to using movies for instructional purposes) you should give students preliminary or background information and alert them to what they should attend to, such as the pertinent hardware (disk drives, components of the keyboard, printer) and the disk operating system.

The first time you demonstrate software or assign your first software exercise, show students how and where to place the disks in the disk drives and how and where to turn the machine on. While this is unnecessary for experienced students, the inexperienced students will have more confidence when they must do this on their own.

When you demonstrate software, make no assumptions about what students should know or understand. Always explain each step or component thoroughly and move from the simple to the complex. When explaining a procedure that involves a series of steps, be sure that each student understands each step before explaining the next step.

A student's ability to perform a procedure depends on understanding all steps; misunderstanding of one step may result in failure to perform the entire task. It is also helpful to list each step on the chalkboard or overhead transparency. Listing the steps will provide a structured method of notetaking. If several

steps are involved, its also helpful to rely on a poster or a handout that pictures the keyboard so students can see the keys you refer to.

When introducing a software package, students will be better prepared for what you tell them if you assign some reading prior to your introduction. Magazine articles and possibly some advertisements about the software will give students an idea of what the software is intended to do, the kinds of computers that will run the software, and its approximate cost. After reading magazine articles and after listening to your presentation, students should read pertinent information from the text about the particular software or be assigned pertinent sections from the reference manual.

In planning laboratory exercises and software assignments, try to anticipate problems students might have and common errors that they might commit when they use the software. This knowledge will increase as you continue to teach the course. If you are teaching this course for the first time, you should work your assignments and note potential trouble spots.

The first laboratory experience should be with a tutorial, if it is available, that accompanies the software. Especially important if you are teaching a computer literacy course or if most of your students have little experience with computers, is the simplicity and clarity of your first few hands-on assignments. That is, these assignments should require only a few steps to follow and be focused on fundamental processes and skills. Each successive assignment should expand upon these fundamental skills and procedures.

To reinforce computer concepts that are presented in the book, use a combination of demonstration and hands-on experiences. Require students to take notes when demonstrating. The demonstration/notetaking should take place in the classroom rather than in a computer lab; the classroom environment helps focus students' attention. The classroom demonstration should be followed with a lab period in which students repeat and expand upon the demonstrated procedure. The first few lab periods should be arranged so that you can be present for the first portion of the period to answer questions or address concerns.

It is important that students have some open time when no instructor is present in order for them to learn to rely on their notes, reference manuals, and the textbook to complete their assignments. Open times will help students develop their skills in following directions and solving problems.

Suggestions for Using the Software Exercises

At the end of each chapter you will find a suggested software exercise. These exercises are designed to fulfill two purposes. First, the exercises provide hands-on experience with different computer applications. As such, they will add some variation to the ways students learn some of the fundamental concepts of computers. Second, most of the exercises require that the students write a report. The exercises can be seen not only as a means of reinforcing concept learning but also as a way of enhancing a basic academic skill—writing.

Many of the exercises can be completed without using a computer. The first exercise, for example, asks students to survey the department, college, or university to learn about computer resources and facilities. Depending on the time and resources available to you and your students, you may choose not to require that each exercise be completed on a computer.

Some of the exercises assume a certain level of knowledge and skill on the part of your students. It's important that you become familiar with each of the exercises and the demands they will place on students before assigning them. You may find that some exercises need more introduction and that some will require that you instruct you students in certain procedures before students will be able to proceed. We suggest that you work through a particular exercise before assigning it so that you will be aware of any potential pitfalls or likely trouble spots and that you address them as you make the assignment.

Some of the exercises will take a considerable time to complete, so we suggest that you carefully select which of the exercises you will assign as you plan your syllabus. Following the Chapter Outline and Notes you will find a suggested solution to each chapter's software exercise. These solutions indicate approximate times required to complete the exercises. You may wish to consult this information as you plan you syllabus. The suggested solutions also provide you with general guidelines to follow when assigning the exercises as well as points to emphasize in your description of the exercise.

Using these exercises effectively will require some preparation and effort on your part, but will provide worthwhile experiences to your students. They will invigorate and help make more concrete what can become an abstract subject with its varied concepts and technical vocabulary. The activities required in these exercises will enhance and reinforce learning as students apply procedures and concepts learned in a classroom situation.