SESSION V

TEACHING LABORATORIES IN EXPERIMENTAL PSYCHOLOGY

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Introduction to computer use: Curriculum development

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In this paper, we report on philosophical and practical elements that have been collected or developed, and on their influence on a project: a minicurriculum and supporting materials aimed at providing a rapid and effective introduction to computers. A videotape now under development may be the key to this heretofore difficult task.

Several factors would seem to motivate an interest in the development of support materials for an introductory computer minicurriculum to be used in association with psychology courses.

In most instances where computers are presently, or could potentially, be used, the computers are not themselves a primary object of study, but essentially a tool. The instructors who use them thus in existing courses are reluctant to devote much time to the development of students' computer skills, and consequently, there tends to be a cookbook, key-by-key approach to instructing the students. Although this approach does indeed lead most of the students through the required process step by step, it involves little more than parroting on their parts. The computer is in this case merely a presentation medium, like a special workbook or an overhead projector, though perhaps a little more dynamic.

In other courses where computers could be employed to advantage, the lack of student preparation is sufficient reason not to adopt a computer-based approach. The instructors may have in mind actual software that would complement the course, but they realize that the students are insufficiently prepared to use it. Individually, their courses cannot provide this preparation without the course content's being jeopardized.

Within departments, there is a lack of agreement on how or when to offer a preparatory course, and "awkward" questions such as whether it is the business of a psychol-

ogy department to be developing "general" computer-preparation courses (as opposed to traditionally safe computer-related courses, such as statistics). This has helped preserve a somewhat chicken-and-egg situation, in which low computer use contributes to a low profile for computer use, and vice versa.

Finally, then, we have reached a point at which there is enough pressure to engage computer-based tools so that a more active role in preparing the students is becoming increasingly desirable. However, there is still the problem of how to accomplish this end, in terms of both class time and the availability of knowledgeable instructors. In essence, we would like to have a course minimodule that could be used in conjunction with existing courses, thereby avoiding the necessity to introduce a new course with attendant upheaval in the course schedule and the list of prerequisites.

The module would need to accomplish some ambitious instructional goals. We are convinced that students need to be able to work with a computer's operating system to perform file-management tasks, and to use an editor successfully. We cannot expect to acquire or develop only canned software that avoids the use of these skills. This foundation of skills needs to be presented in a manner that can be readily transferred among the various computers that the students might be expected to use in an assortment of courses. The ultimate goal is to make the students self-sufficient in the way they use computer tools on a daily basis, equipped to solve problems and to learn how to work with new software and computers. The module needs to work for instructors who are not specialists with respect to computers. In addition, the module must

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impose a minimum of overhead in class time. This might involve some independent study, which would still need to be manageably short. On top of all this, we want the introductory experience to be pleasant and to inspire enthusiasm.

The primary reason for thinking that there must be a "better way" is that we have observed a huge contrast between the customary slow and frustrating attempts to introduce computers to new users en masse and the pleasant, rapid learning experiences that seem to occur in the one-on-one or small group sessions with which we have been involved. A distinguishing feature of the small-group sessions was the opportunity for the instructor to feed the new users with insights at just the right moments. It was noted that these insights were often attitudes and concepts that then allowed for the speedy formation of general principles, with respect to either computer operations, or the larger computer culture. In our work, we have tried to distill the elements that make the difference, and to devise a way in which to supply them to a larger group.

PROJECT COMPONENTS

We found it convenient to focus the project along the following lines:

Content. Obviously the primary concern is exactly what subject material to present. Our content could potentially run from miniscule details to sweeping concepts and attitudes.

Means. What techniques can be used to convey the contents? This is of particular concern when one is dealing with concepts and attitudes that traditionally have been left to the process of experience, or have been built upon giant pyramids of technical details. We think, for example, that a much greater use of analogies drawn from everyday life can convey attitudes and concepts at a much earlier stage in the new user's computer experience.

Media. What personnel and materials are involved in the presentation?

Support. A concern of any such endeavor is how to win support and funds for the project. Fortunately, the resources needed to produce a pilot version of the materials are modest. We will be able to use this to demonstrate the ideas with a view to obtaining support for a more elaborate effort.

Although the choice of media depends on the content and means components, we will discuss media first because it helps one to visualize these contents and means.

Media

The materials we are developing consist of a videotape and a guidebook. The instructor we have in mind need not be a computer expert, but should be knowledgeable about the computer-based tools within his or her subject area.

The videotape presents most of the attitude and concept content. The tape is our major focus; we believe it will be the key to the success of this project. If done well,

it can enable: a "show-and-tell" approach to exposing aspects of computer behavior; the communication of attitudes through showing analogous situations, and through the expression and tone of voice of the participants; a personal and immediate quality that may be especially important for nonscience students; and, a presentation of convincing and memorable messages about using computers from a position of experience that the instructor may not currently have attained.

The guidebook reiterates and reinforces the points made on the tape, and backs up the concepts with a detailed survival-kit-phraseguide applicable to each of the computers and main software packages that the student users are expected to be able to handle.

Content

In the content, we are endeavoring to cover many generally applicable computer concepts, along with a selection of attitudes about computers and the computer culture, which seem to help new users to orient rapidly. We think that several points should be covered:

There should be a brief introductory overview of what computers look like, and what working with computers looks like.

One should introduce the idea that the use of computers is really the use of computer-based tools. One should discuss some common examples, such as word processing.

The promotion of programming should specifically be avoided as a starting point, but it should be pointed out that the importance of programming is that one uses it to provide tools for users at large. This is not to say that the new user should not program, but that the new user should not have to learn programming at the time he or she is initially learning about computers.

Learning to use a computer is not like learning to use any other machine. A user who thinks about the computer as a machine will actually be handicapped. The process of using a computer entails a relatively complex interplay between user and computer, and it is much more like conversing with another person.

The use of a computer has some elements that are analogous to other familiar experiences, such as driving a car, backpacking, visiting a foreign country, working with an assistant, studying literature, or studying literature with an assistant while backpacking through a foreign country by car.

Students must be made aware that learning to use computers requires learning some general concepts about how computers are used to accomplish some specific task, as well as some attitudes about how to approach a computer when one is doing something that one hasn't tried before. Students need to learn, for example, how to use a computer to find things out by testing possibilities, and they need to know what to do in order not to lose work while trying things out. They also need to learn the importance of verifying that what they have asked for has really happened. Other points to be learned about include: some attitudes about the books and people that, inevitably, will

be encountered and consulted when one is involved with computers; some specific details about how to make computers behave; and how to approach new programs with confidence, and pick up their concepts quickly (that is, the computer user expects to keep consuming new products as they get better and more powerful).

While the user is working with a computer tool, what the user is permitted to do is determined by what an author wrote. Computer science is not (and should not be) helpful here, so a user shouldn't worry about a lack of background in it. The successful strategy is to determine what the author had in mind. The author should make this clear by the way the program communicates. Some additional understanding may be gained from reading the manual. In poor cases, the author has not been clear, so that devious second-guessing will be necessary to discover what to do. Such a perspective promotes the idea that the proper role of the program author is really more that of an "architect" in creating a pleasing and communicative environment for users. For this, the program author needs to understand people, and to communicate with them in a manner not dissimilar to that required of a television- or movie-script writer. Clearly, this is a lot to expect from a group we characterize and satirize as social outcasts. This being the state of affairs, users should be far less afraid that their personal worth is at stake if they encounter any difficulties comprehending how to perform some function with a computer!

Armed with this idea of software as an environment created by an author, users can consciously employ a couple of different strategies to understand a new package, depending on how good the author was. If the package is well written, it will have a clear and coherent "plot." The author's conceptual model can be readily adopted and used to perform the desired tasks. If the package is poorly written (but at least doesn't crash), then users will have trouble determining the author's model (if indeed there is one), and they may need to rely on a deeper knowledge of the computer culture (such as Control-C to quit) or even computer science (complicated command sequences with esoteric syntax). In this case, the user should feel bold enough to reject the package as not ready for human consumption.

Beyond this, one needs to introduce the concept of an operating system (useful analogies can be made here with the record player and the jukebox). One should present the idea of programs as tools, and work-files as workpieces (here the analogy to sculpture may be made). Directories can be presented as a means of organizing files, and file-management activities must be covered. Examples of different dialogue styles should be presented, and file-management operations on an icon-based, as opposed to a command-based, machine should be compared and contrasted. One should give examples of menus and commands.

Finally, we think it important to outline a "survival kit" of knowledge and skills that allow the user to become self-sufficient and move readily between systems and pro-

grams. This point encompasses the preceding items and establishes them as a "kit," for which there are specific commands or activities for any particular computer system. Add to this some ability to use an editor (in our case, coming soon) and the user will have a kit that is complete. This survival kit itself is an example of the useful technique of reducing the amount of information carried in one's head to some few key essentials. When completed, ours will include instruction on using an editor, with a graphic example of a model, thereby also showing what is meant by the term "model."

Means

Although the information could be presented in many ways, we have chosen videotape, with the supporting guidebook, as the most effective. Videotape permits us to use several methods of presentation in a powerful way. These methods follow, with a brief note about each one.

Show and tell. We have noticed that some aspects of learning to use a computer are highly dependent on the user's ability to see (visually) how something works. This ability is hindered when the user is forced to rely upon wordy descriptions. An obvious example would be the difference between describing and showing how a mouse operates. In fact, a major downfall of descriptive texts is that they are cluttered with descriptions such as "after you push F6 then a screen appears which looks like so-and-so . . .," which the user would see immediately if seated at the computer, or if watching a videotape.

Analogy and metaphor. A problem with the computer is that it is not very analogous to anything we have experienced before. This leads some writers and instructors to base all explanations on a very technical foundation, which is highly distracting and unpalatable to most. Although an all-illuminating analogy eludes us, less ambitious analogies and metaphors can often be found to shed light upon important component concepts. Of course, we are constrained not to stretch analogies too far, yet this fact can be turned to advantage by means of an analogy for examination of both similarities and contrasts. We wish to give a bit of the flavor of how we pursued analogies by giving one detailed example here. Several points we want to make center on the idea that while using a computer the user is interacting with an environment that is a fiction created by a person.

For the analogy, we chose an extreme example of a fantasy environment, a computer game called Shadowgate. This Macintosh-based game involves the exploration of a castle in search of some mystery objects while one attempts to avoid various life-threatening hazards such as dragons and broken bridges. Along the way, the user can make many choices, such as which route to take or which objects to pick up (for example, torches, swords, or other trinkets), the user must employ objects as tools (for example, keys in a door), and the user must even "speak" incantations to objects (by typing in phrases). Seeing this game in action, the new user is quickly tricked into accepting the "realities" of this imaginary environment, and un-

derstanding how to “operate” it. This is the moment at which it becomes clear that the environment has little to do with computer science (since the user sees how to operate the environment without any knowledge of computer science). It is apparent that within any particular computer environment, to a great extent what the user is required to know is an obligation imposed by the environment’s author. The knowledge needed for working with computer-based tools is not some fundamental technical science, but rather an understanding of what an author has constructed.

Animated discussion. A lively discussion between two knowledgeable computer users who may have similar or differing opinions can be used to examine some issues. This technique conveys a personal element that many users need.

Humor. This can be a powerful tool to defuse the reverence that can make new users timid in playing with computers.

CONCLUSION

In this paper, we have described our current efforts to develop materials for a minicurriculum that will introduce computers, as well as the philosophical and practical elements that we selected to guide the project. When our pilot tape and preliminary guidebook are completed, they will be implemented in selected psychology courses that presently require some use of computers. Progress will have been made if and when we find that the materials we are developing actually have the desired effects.