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AUTHOR	Savage, Ernest N.
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ABSTRACT

Ohio's Model Industrial Technology Systems (MITS) project was initiated in 1987 to achieve the following: identify good activities in the areas of physical, communication, and bio-related technology; standardize the activities' format; and provide a coding system for their eventual use in a hypermedia system. To date, 220 activities have been modified by MITS, which was initially based on the Hypercard system provided with Macintosh computers. Activities in the MITS can be organized by grade level/concentration and/or referenced to outcomes and goals. The MITS system breaks outcomes first into their respective performance indicators and enabling outcomes. The system produces index cards for all activities identified during searches. Once selected, activities can be called up in Microsoft Word or Works. Each activity includes basic information about its objectives, presentation, development, and content, as well as a student activity pack. The Hypercard's two main limitations--that it is not cross-platform and not in color--have been solved by using the Macromedia-developed program Authorware, which can run on Windows/DOS or Macintosh computers, and by using the program called Oracle Media Products, which appears to have all the characteristics of Hypercard with color. (Sample screens from the MITS are included.) (MN)

A HYPERMEDIA MODEL FOR TEACHING TECHNOLOGY

by

Ernest N. Savage
Associate Dean and
Director of Graduate Studies
College of Technology
Bowling Green State University

presented to the

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of the
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Introduction

The ability to teach technology using technology is good marketing as well as a sound curriculum process as we accelerate toward the beginning of a new century. The process of developing a computerized curriculum system has been a dream in Ohio since 1987 when the Model Industrial Technology Systems (MITS) project was funded through the Ohio Department of Education. Through the years, with various funding crises and a name change that dropped "industrial" from the project's title, it was always a goal to seek out good activities in the areas of physical technology, communication technology and bio-related technology, place them in a standardized format, and provide a coding system for their eventual use in a hypermedia system. This paper represents a report on the progress of that process and offers some software suggestions for the development of such a system.

A Hypermedia System

Hypermedia is "a style of building systems for information representation and management around a network of multimedia nodes connected together by typed links. ...The bodies of materials can include text, static and animated graphics, voice, sound and music all contained in one delivery system. Well designed systems allow learners to link information, create their own paths through the material, annotate, and literally construct webs of information" (Gay, Trumbull. and Mazur, 1991). Operationally, hypermedia can be thought of as a system that, through direct interaction with information, permits the rapid and efficient access to further information (Hutchings, Hall, and Thorogood, 1994). Confusion often exist concerning various "hyper" and "media" terms. Without belaboring the point, Tolhurst (1995) graphically represents the differences and similarities between multimedia, hypermedia and hypertext in Figure 1.

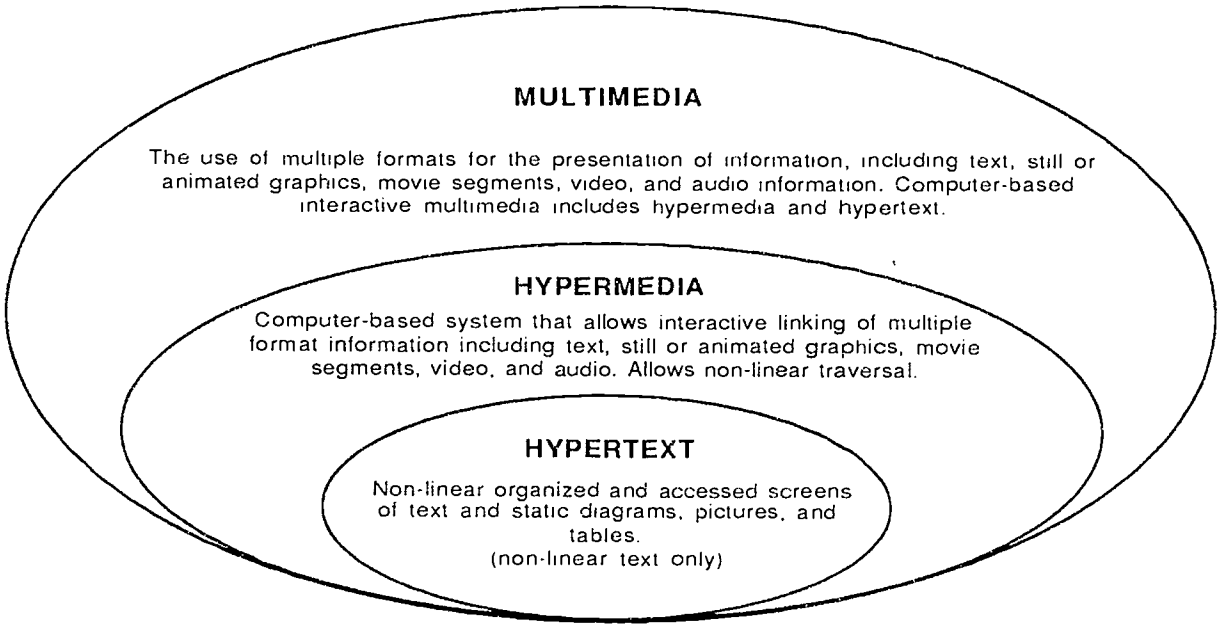

Figure 1.

The earliest universally accepted example of this system was provided with every Macintosh computer and was called Hypercard. Hypercard allows multiple stacks in variable sizes to be opened using multiple fonts within a field; allowing the programmer to construct individual menus, with special transition effects. Hypercard proved a valuable tool for classifying activities for the MITS project because it allowed for sorting using a variety of criteria. For example, all of the 220 activities modified by MITS could be organized according to their grade level and concentration. The instructor could sort the remaining activities to show all high school communication activities. Figure 2 shows a typical screen from this Hypercard system.

This system could also be used to organize activities in an accountable fashion to outcomes or goals. For example, if a certain goal was to be addressed in a specific class, the instructor or curriculum specialist could search for all of those activities that met that specific outcome. However, the reality of outcome development is that at least two more levels must be reached before accountability can be assured. Therefore, the system first breaks outcomes into their respective performance indicators and then into their enabling outcomes. Figure 3 presents the screen that demonstrates this.

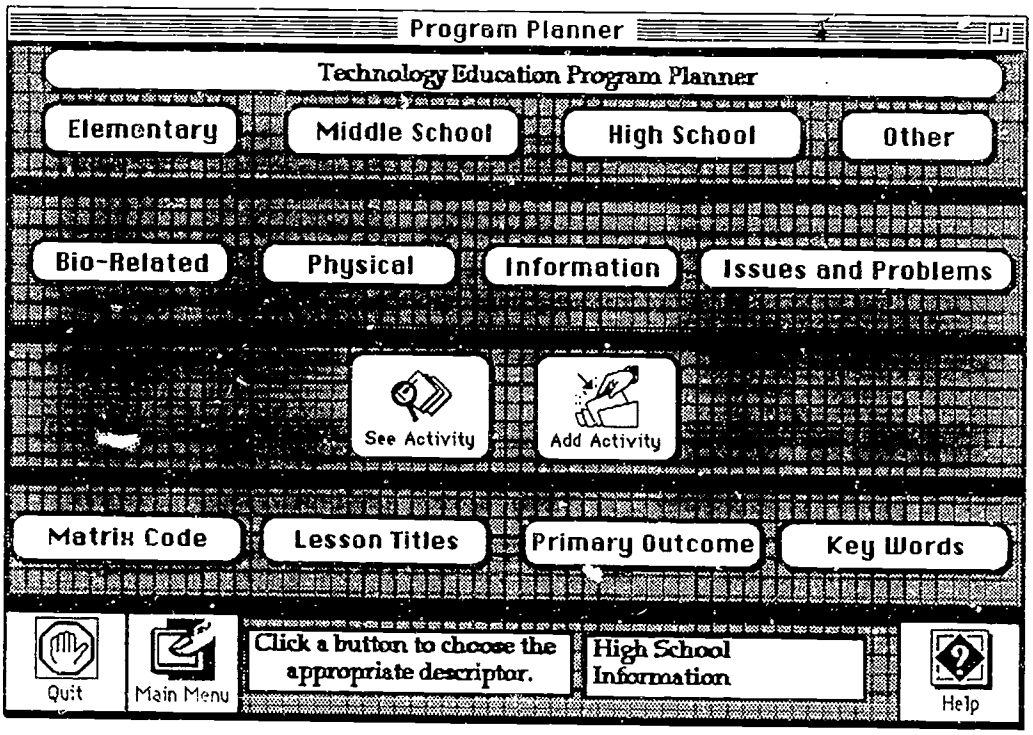

Figure 2.

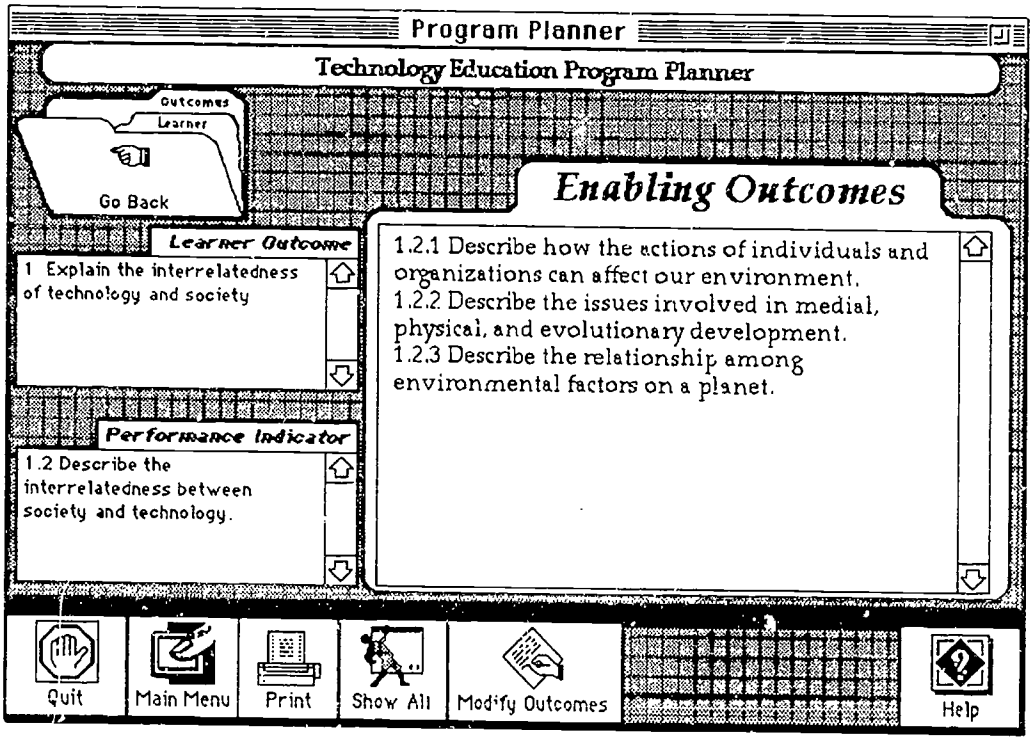

Figure 3.

Regardless of the search technique selected, the system eventually produces an index card, as shown in Figure 4, that provides all pertinent information on the activity including an abstract. The system can print the card out to allow the instructor or curriculum specialist the opportunity to sort through the "first cut" of the activities to determine their grouping and scheduling logistics.

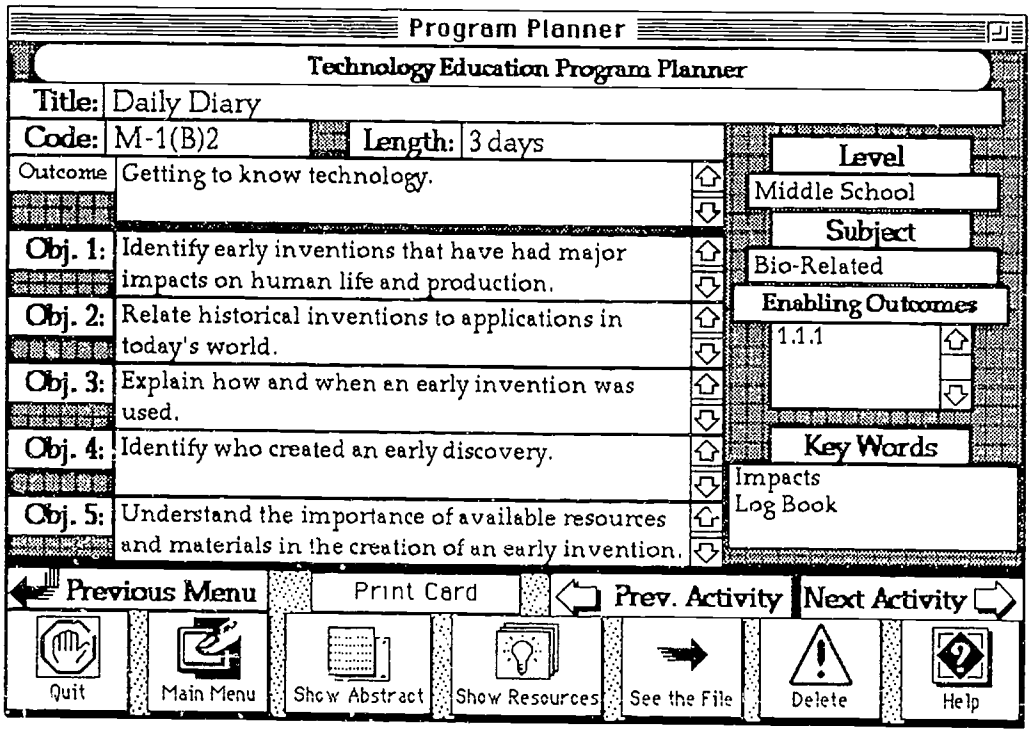

Figure 4.

Once the desired activities have been selected, they can be called up on either Microsoft Word or Works. Each activity, with the exception of 10 Cooperative Learning activities, has virtually the same contents and format. The following list shows the contents covered in each activity in the order they may appear.

- Title
- Matrix Reference Code
- Primary Objectives
- Length of Unit (Days)
- Description of the Activity
- Developed by
- Adapted by
- Content to be taught

- Instructional techniques to be used
- Secondary objectives
- Time requirements
- Equipment/tools required
- Materials required
- Teacher Presentation and Student Activities
- Reference
- Sources for Materials and Suppliers
- Interdisciplinary Linkage
- Evaluation Strategies
- Common Problems Encountered and Suggestions for Improvement

Each activity also contains a Student Activity Packet covering the following areas:

- Overview
- Your problem for this activity is to
- Procedure
- Student Evaluation
- Design brief
- Identify the Resources for this Activity
- People
- Information
- Materials
- Tools and Machines
- Capital
- Energy
- Time
- Systems Model

Weber, (1990)

System Limitations and Alternatives

Almost immediately upon embarking on this ambitious venture, the limitations of Hypercard and a low budget grant surfaced. The Hypercard limitations were that it is not cross-platform and it is not in color. The grant limitations will be addressed later. There are a number of authoring program that operate on windows type environments such as Authorware, Oracle Media Objects, Multimedia Toolbox, IconAuthor, Quicktime, Multimedia Viewer, and Multimedia Explorer (Holtz, 1995). It appeared that the Macromedia-developed program Authorware provided the answer to these concerns. Authorware is easy to learn, has excellent built in commands and can run on Windows/DOS or the Macintosh. It has nice graphics capabilities, speed and performance. Color and sound are easy to

use (Brownstein, 1993). With a more colorful screen and a greater ease of representing graphics, this program allowed the same sorting to occur as shown in Figures 5 and 6, and it was transferable to both Macintosh and Dos/Windows platform. The two significant limitations of this program were its cost and its inability to easily call up activities; a real plus in the case of Hypercard. Although educational copies of Authorware cost up to $600, the commercial version cost around $5000. Granting that the program could be played without the primary program, this was still too expensive for the MITS project.

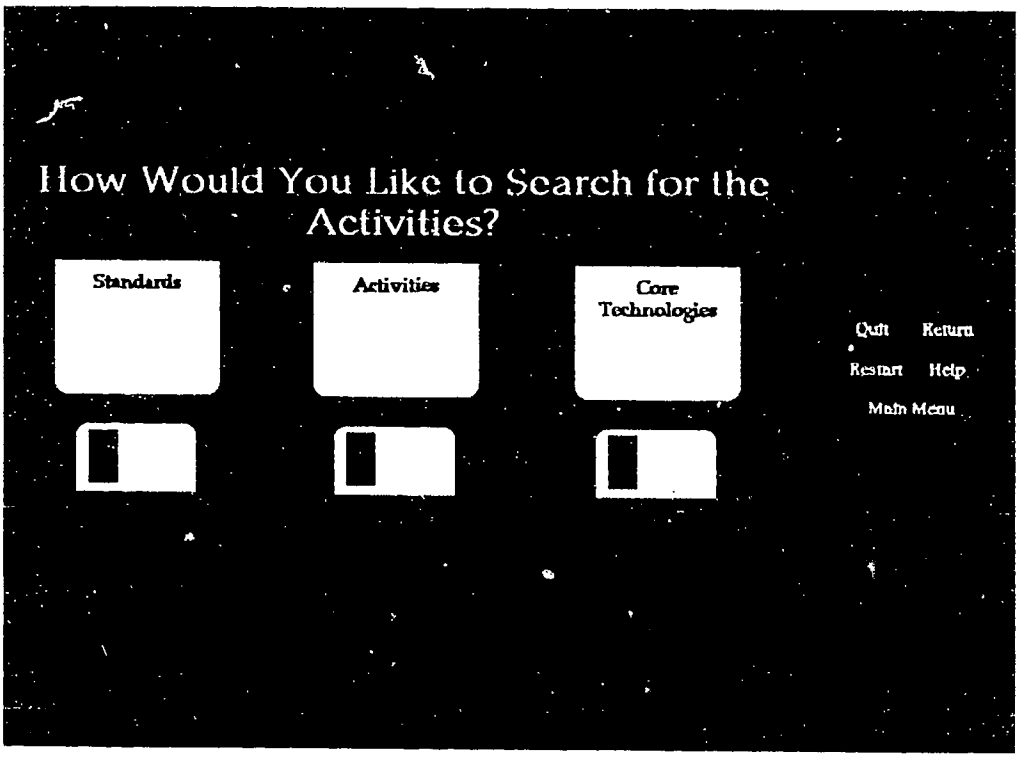

Figure 5.

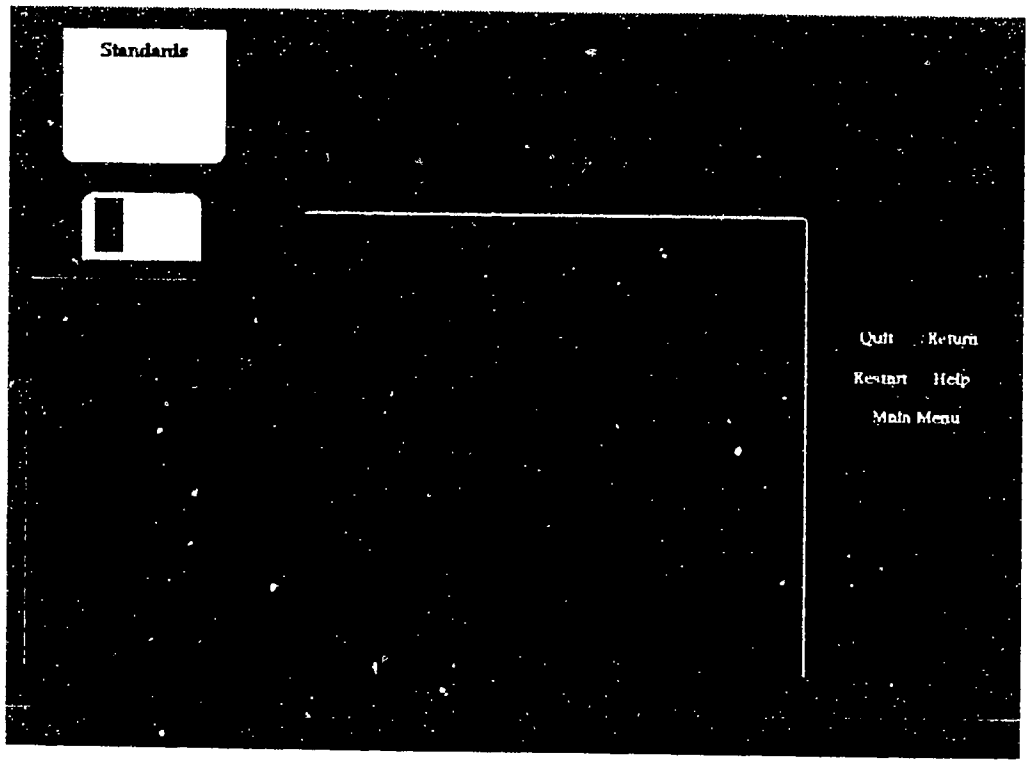

Figure 6.

The present solution to this curriculum development problem appears to be a program developed by Oracle Corporation called Oracle Media Products. Oracle Media Products appears to have all of the characteristics of Hypercard with color. It also works across all platforms with minor modifications such as a need to change colors. Applications built using Oracle Media Products are highly graphical, approachable, interactive and interfaceable to data including audio, video and text stored on remote database, CD-ROMs and media servers (Oracle, 1995). Oracle Media Products was purchased commercially for $99 making it most attractive to low budget curriculum projects. Examples of some of Oracle Media Products' screens can be found in Figures 7 through 9.

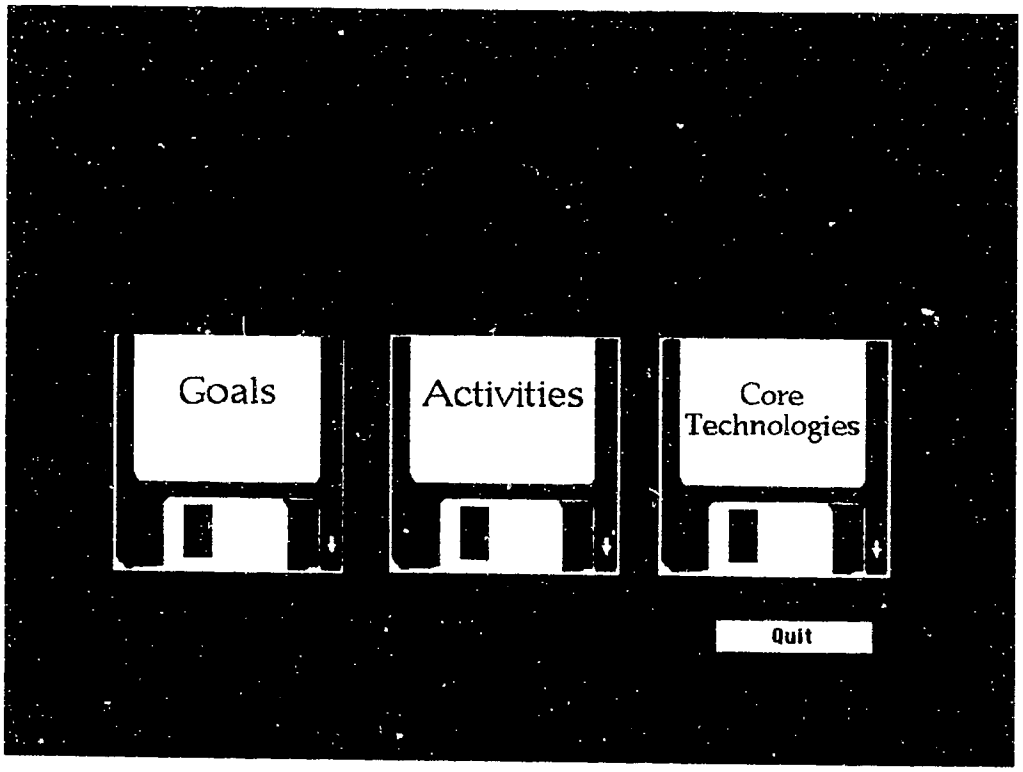

Figure 7.

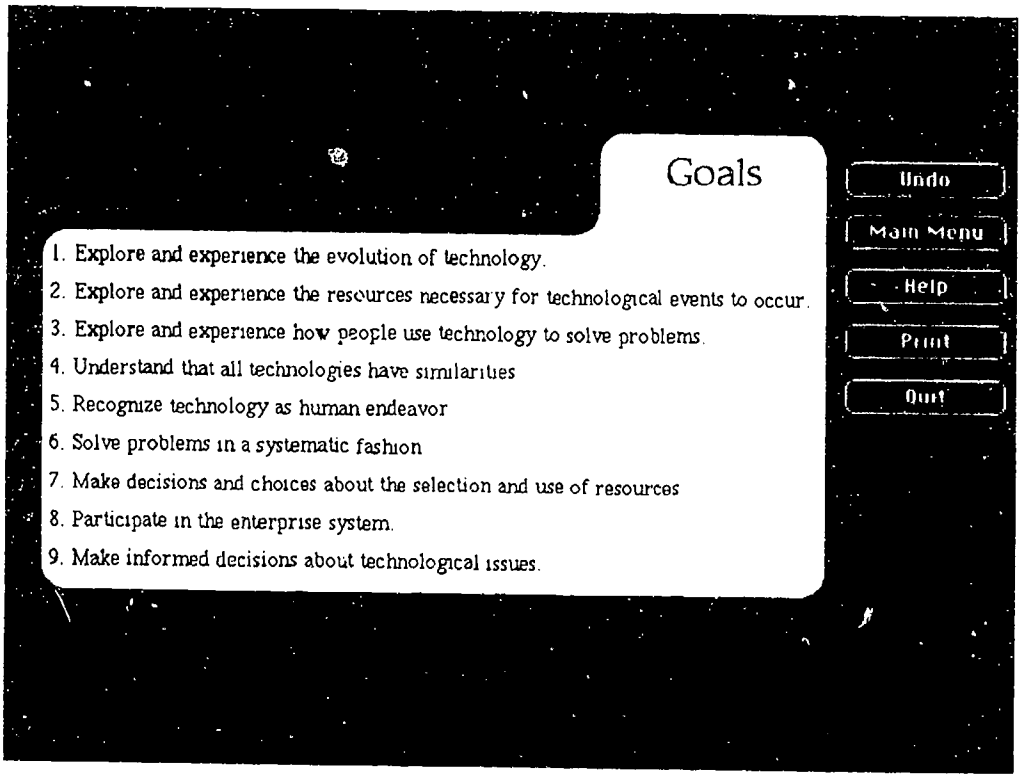

Figure 8.

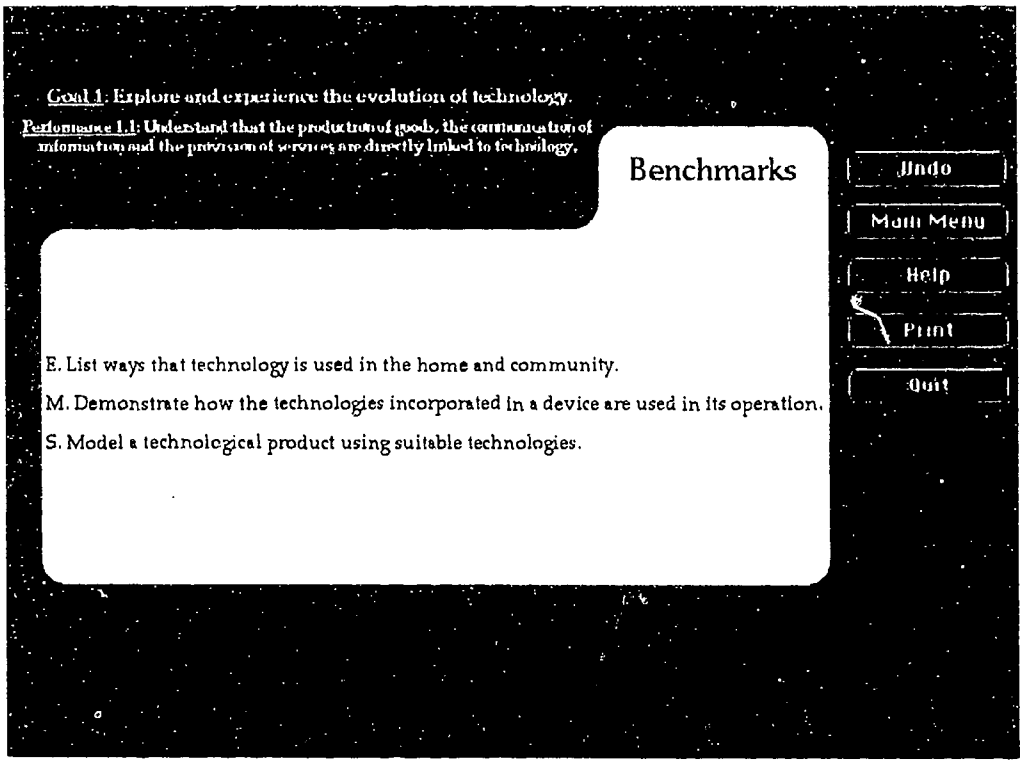

Figure 9.

Regardless of the hypermedia program that is used to present activities, the greatest long term difficulty the curriculum project or developer will face is obsolescence! Early on in this project it became obvious that significant effort needed to be placed on upgrading and updating the activities already in the pool. For example, if an activity developed in 1989 called for a certain diode to be used, you can rest assured that specific part number has changes a few times since then. Constant review and diligence is required to merely maintain the status quo. One solution to this problem is to form partnerships with commercial vendors who, by the nature of their business, can provide this service. This process can be difficult because it requires permission and releases from all of those agencies with whom you've had a relationship for the development of activities. Another way would be to partner with a company that has, or is willing to develop, activities that would be accountable to your outcomes. Unfortunately, they appear to be few and far between.

Closing Comments

Using technology to organize a system for teaching technology is an idea whose time has come. There are still many problems with the selection and use of the "one best system" or software for a project's particular needs. But, those problems, although the focus of this paper, pale against the need to understand the user cognitive processes necessary to make these products functional, learnable and usable (Kuo, 1993). In efforts to make these systems as user-friendly as they need to be for universal consumption, we are constantly needing more powerful and faster computers. We must be careful not to reach the economic point of diminishing return; after all, teachers are always telling me about the realities of their budgets and the effectiveness of their 386 computers. This hypermedia system was developed with them in mind. Until our white knights surface in the form of foundations or vendors, we must join together to share our resources...for the children.

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