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Total animation: A multimedia computer resource program for secondary art education

Frank Houston Wyatt

TOTAL ANIMATION: A MULTIMEDIA COMPUTER RESOURCE PROGRAM FOR SECONDARY ART EDUCATION

A Project

Presented to the

Faculty of

California State University,

San Bernardino

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts

in

Education: Instructional Technology

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ABSTRACT

This project, "Total Animation", is a computer-based, Hypermedia resource/instructional program on the subject of animation. This program is designed for use by secondary high school art students in an animation program or for independent study. "Total Animation" will cover various topics on animation, including: (1) Conventional Animation. (2) Types of Animation and Techniques (3) Computer Animation, and (4) Careers in Animation.

The instructional design of this multimedia program addresses some of the general problem issues in art education. This program, through its use of interactive multimedia, is designed to accommodate users with different learning styles. The program is also designed to provide motivation and enhance achievement through simple navigational design and use of graphics, audio, video, and animation. It includes a section to address the need for information on careers in animation for students.

"Total Animation" is designed to be an instructional supplement and reference. It is meant to provide additional experience and knowledge as part of an animation course, that might form the basis for future major or minor studies at a university or art school.

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Introduction

A continually recurring task for art educators is preparing, delivering, and revising instruction designed to help students achieve art curricular goals. The computer is a natural vehicle for addressing such tasks, although much has yet to be learned about how to use this medium effectively. One means whereby teachers and students may interact powerfully with a computer in an instructional setting is through programs usually named "hypermedia" or "multimedia" (Slawson, 1995).

In the last few years, with the rapid development in computer applications as well as the rise in popularity of computer authoring systems, it is now possible for the average classroom teacher to create some form of computer animation to be used in a presentation or hypermedia project (Xiaopian, 1993). Another important aspect of multimedia programs is that they are not in any way restricted to serial organization and are usually at their best when organized to offer multiple pathways through a body of instruction. Modifications to these programs may be made easily and rapidly, so that new information about an artist, an art form, or a teaching method may be quickly added. Outdated and ineffective material may be removed just as quickly. With text, pictures and sound easily incorporated within a program, it becomes possible to integrate these three primary modes of communication in one product. According to Hubbard (1995), imagery lies at the heart of all art instruction. The traditional types of instructional images are reproductions, slides, and film strips. But these instructional media are expensive, bulky, and deteriorate over time. On the other hand, images captured digitally into a computer's memory or stored in a videodisc or CD-ROM, never change over time. Individual items can be quickly and repeatedly retrieved to serve varieties of instructional needs.

For all the reasons mentioned above, as well as the motivational value, a teacher developed computer program is an excellent means of delivering instructional materials. The art educator teaching animation courses would benefit greatly from the use of computer technology in producing multimedia programs.

Educational Issues and the Role of Technology

One of the many problems for educators today is meeting the needs of the diverse student population, and this is often more true for the art instructor. The 1990 U.S. census reported a dramatic increase in the minority populations during the last decade.

Hispanics, for example, increased 53%, Asians by 108%, and African Americans by 13.2%, while the Anglo population increased by a moderate 4.4%. By the year 2000, it is predicted that the Hispanic population will increase to 35% (Bermudez & Palumbo). In the nation's fifteen largest school districts, minority enrollment already comprises 70 to 96% of the total school population (Hodgkinson, 1986). The issue of minority access to technology needs to be aggressively pursued as current school restructuring will, more likely than not, integrate computer-based technologies in the targeted circular overhaul.

A large percentage of the student population is LEP (Limited English Proficient), and many others have come from an environment in which standard English is not practiced or learned. In many school districts, teachers are also faced with an ever-growing population of SDC (Special Day Class) students being mainstreamed into the classrooms. This increase in special needs students is particularly true for art instructors in the public school system. Art courses in high schools have no prerequisites, and are typically open to grades 9 through 12, with students being of every ability level.

Emerging technologies and their inherent need to constantly update information have created a new type of literacy which has widened the gap between the "haves" (i.e. mainstream students) and the "have nots" (i.e.the various minority students, particularly language minorities). Ethnic minorities and women, for instance, have been historically under-represented in science, mathematics, and technology careers. In addition, according to Bermudez and Palumbo, access to technology has been substantially unequal for these groups.

Educational Psychology addresses the implications of learning styles for cultural and ethnical differences. One important example of the problem of learning styles in the public school environment concerns the growing Hispanic population. The cultural background of Mexican-American students tends to make them more field-dependent. Their socialization practices emphasize strong family ties and respect and obedience to elders, experiences that lead to a relatively field-dependent cognitive style (Dembo, 1988). In the situation of students with a field-dependent cognitive style, learning may be increased through cooperative projects, or in independent study that is not overtly competitive, such as computer mediated.

Another problem is the need for students to have new communication skills in order to be marketable in the job market, or better prepared for continued education. The Information Age has shifted the traditional ways of communicating to include machine mediated interaction (Everett & Terence, 1994). New technologies, such as networks, e-mail, telecommunicating, online databases, and electronic bulletin boards, suggest that there is a need to prepare students and workers for human-to-machine interaction as well as for face-to-face communication.

Another problem concerning educators in many of the public school districts, is that a growing proportion of the student population are from low socioeconomic homes. The research suggests that a child from a low socioeconomic background often learns more by doing and touching than by reading. Some students shift easily from one modality to another, but the child from a low socioeconomic home may find this transition more difficult. Socioeconomics, ethnic diversity, English language proficiency, learning disabilities, and learning styles, are all issues making up the overall problem concerning our student population that must be addressed by public school educators. These important issues may also be addressed in part through the use computer technology and educational multimedia programming.

Project Specific Problems

A learning style that should receive attention is sensory modality, the system of interacting with the learning environment through one of the three basic senses. The sensory modalities important to the teacher are the visual, auditory, and kinesthetic. This multimedia computer program is a means of addressing the issue of students with different sensory modalities.

Among the many problems and challenges to the art instructor is the issue of motivation. It is the opinion of some that art class would be "fun" and intrinsically motivating to students, but with either Art or Foreign Language a requirement for graduation, many of the students have little interest. The issue of achievement behavior also applies to art classroom, where you have students with the need to achieve versus the need to avoid failure. Many of the low achievers avoid failure by simply not doing the learning tasks assigned. Often these students also have a high level of stress in working with a computer when they lack experience, but are much more motivated by computer mediated tasks once they are familiar with the technology.

Art educators have a role to play in helping students in acquiring needed skills for success in all areas of both personal and career goals. An art educator should employ the use of technology in the classroom to help improve the acquisition of learning for the students and to inform them of their post-graduation alternatives.

Significance of Project

Integration of technology into the curriculum is necessary for a better understanding of its importance and its use in many applications, such as the creation of art and animation. (Dana, 1993). To better prepare students to adapt to and deal with new and emerging technologies, teachers must devise methods that give students opportunity to be exposed to and work with these technologies. The computer, as a relatively new technology in schools, has proved to be an effective teaching and learning tool, and it is capable of delivering instruction in forms of visual, audio, color, and animation.

The primary function of the multimedia-based computer is to deliver instruction which accommodates a diversity of learning styles. A learner receiving instruction via multimedia is exposed to a variety of textual, graphical, audio, video, photographic, or animated information. In contrast, a learner receiving traditional instruction is less likely to be exposed to such an informational diversity (Sultan & Jones, 1995).

Student motivation is another significant issue. The literature points to the need for more technology-based instruction in the Visual Arts, and computer-based instructional resources on specific topics are not being commercially produced. The principles of cognitive theory can be addressed in the design of this computer-based resource program, in such ways as helping to draw, gain, and maintain the student's attention. This program, as a resource incorporated into the regular animation course curriculum will provide the student new information that can be added to that attained through classroom instruction, and as a resource tool for a variety of cognitive strategies.

Another significant aspect of this program has to do with the fact that during the 20th century, animation has moved from being a perceptual curiosity to becoming an important art form (Ehrlich, 1995). Animation has not received the attention in the classroom that it enjoys in the commercial marketplace, yet the pervasiveness of the film and television make it a popular art form in every sense of that phrase. Moreover, it is one that children of the 20th and the 21st century can relate to readily. It is the position of Hicks (1993) that as technology increases, aesthetic considerations also become more important.

Current directions of change are indicating that greater priority be given to the connection between technology and aesthetic education by art teachers. This thinking about how technology should be applied to art education in general should be specifically employed in the teaching of animation. This is especially true in light of the fact that that computer technology is being used to much greater extent in the creation of animation than in the past.

The computer also has provided a creative device for image creation and enhancement for the visual arts educator (Madeja, 1993). Technology should be thought of as facilitating the artistic and creative process in which the artist or designer engages. It is a delivery system for instruction in art, and an art form itself. For art education, it implies a total rethinking of of how we deliver instruction in the visual arts and the art curriculum at every level.

Finally, according to publications of the Bridges Institute of Visual Arts, today, animation and interactive multimedia production is a global, multi-billion dollar business. Currently, the industry is experiencing enormous growth, and is expected to expand dramatically in the coming years. The potential for employment is at a record high. With increasing demand for products, comes the need for a continuing flow of artists capable of rendering production services.

Within the high schools of the greater Los Angeles area, there is a wealth of artistic talent that could be trained to satisfy this growing demand for animation professionals. This is another significant reason for a resource program that provides reference information on careers and educational institutions in animation.

Project Overview

This instructional design project, “Total Animation”, is a computer-based, multimedia resource/instructional program on the topic of animation, created using the multimedia authoring tool Hyperstudio. The scope of the program's design will be to cover some of the general goals and objectives within a Beginning Animation course at the high school level. As opposed to a tutorial animation program, this will be an informational reference/resource program on animation. Within this program will be some various topics on animation, including: (1) Conventional Animation, (2) Careers in Animation, (3) Types of Animation and Techniques, and (4) Computer Animation.

“Total Animation” will address the issue of different learning styles by its incorporation of text, graphics, audio, and animation.

Students are expected to be motivated to learn from the use this program, because of its easy user control navigation and interactivity. Informational content will be reinforced by user-controlled text vocabulary audio. Methods and techniques will de demonstrated through sample animations, to increase student learning and interest. This program will also be an animation art career reference resource, with basic job titles and descriptions for the animation industry.

Chapter Two

Multimedia and Hypermedia

Multimedia as a new tool for the incorporation of text, graphics, audio and video has only recently engaged the attention of researchers. Information science has directed its attention primarily at the system-level access to information, the provision of retrieval and browsing capabilities. Hypermedia has been the favored navigational tool for the multimedia databases (Begoray, 1990).

Hypermedia, which is a general term for HyperCard and HyperStudio multimedia environments can best be described as a technology tool for accessing information in a media-rich environment. This multidimensional environment allows users to access information in a nonlinear, self-tailored fashion. Hypermedia-based systems allow the user to redefine both the structure and the content of the material to be learned.

A major goal of hypermedia is to provide a learning environment that facilitates exploration. This type of learning environment provides immediate access to large collections of information. Hypermedia also offers advances from previously available technologies in that it is strongly connected with a cognitive conceptual framework, yet this framework does not limit or constrain its possible application (Bermudez & Palumbo, 1994).

Hypertext and hypermedia are interactive nonlinear media made possible by digital computers. A hypertext/hypermedia system is a computer-based document made up of nodes and links. Nodes are the blocks of information that form the document. These nodes can contain text, graphics, video clips, and animation. Each node is linked to another node, forming a network that users can travel through (Barnum, 1993). Links among blocks of text are the heart of the hypertext. The mechanics of linking cards in HyperCard or HyperStudio is easily mastered. Cards are the individual screens that make-up a stack, which is a group of related and linked cards which makes-up a program in the Macintosh multimedia authoring program, HyperCard. However, the art of creating meaningful links determines the ultimate success or failure of the project.

Hypertext and hypermedia are of increasing interest to psychological researchers (Wolfe, 1995). Landow and Delany (1991) argue hypertext will change our sense of authorship, authorial property, and creativity. In doing so, it promises to have an effect on the culture and intellectual disciplines as important as those produced by earlier shifts in the technology of cultural memory that followed the invention of writing and printing. Others claim, according to Wolfe (1995), that the nonlinear nature of hypertext will fundamentally change the culture of the United States from one based on linear and hierarchical thinking to one based on relational thinking.

The program that most hypertext and hypermedia literature is written about is HyperCard, an authoring tool that is easy to use and was once available on every Macintosh. HyperCard is not an application in the same sense as a word processor, database or drawing program. As an authoring tool, HyperCard can create databases with text, attractive graphics, and controls to make looking at information more gratifying and intuitive (Smith, 1992).

Yarrow (1994), a multimedia specialist at a Texas school district, suggests one of HyperCard's most powerful applications is its ability to create interactive tutorials. Tailored-made tutorials are entertaining, exciting and informative reach out to students. Instead of being forced to plow through mundane textbooks, students are absorbed into an interactive world that challenges their knowledge and problem-solving skills. Tutorial stacks can depict how an atom is formed, illustrate history, teach algebra lessons, test comprehension - the options are limitless. HyperCard projects also tend to become interdisciplinary and easily lead to learning in many curriculum areas.

With HyperCard, peripherals such as scanners and video and audio digitizers, allow the user to add visuals and sound to a stack. HyperCard stacks can also be used to control interactive learning devices such as a laser disc player. To create these interactive multimedia projects and lessons, one does not need to be an expert programmer. Although HyperCard is a complex authoring language, its basic commands are easy to earn. This is what makes HyperCard so attractive. However Hypercard does not support full color and is being replaced by HyperStudio as the authoring tool of choice for many .

Newer programs such as HyperStudio and SuperCard add additional features and functions with even greater ease of use.
In HyperStudio, many navigational and interactive design options are available without written hypertext authoring. Relatively speaking, with HyperStudio anyone can develop a creative hypermedia project, it only takes some effort and imagination to move into the world of multimedia.

Learning Theory

According to the principles of learning, changes in the behavior of human beings and their capabilities for particular behaviors take place following their experience within certain identifiable situations (Gagnes et al. 1992). These situations stimulate the individual

in such a way as to bring about the change in behavior. The process that makes such a change happen is called learning, and the situation that sets the process into effect is called a learning situation. If one has the intention of making learning occur, as in planning instruction, one must arrange the conditions of learning.

It has long been the conventional wisdom that educational materials should be developed from a sound theoretical base. Gagnes et al. (1992) further states if we are concerned with designing instruction so that learning will occur efficiently, we must look for those elements of learning theory that pertain to the events about which an instructor can do something about. From an historical perspective, the answer for a instructional design theoretical base clearly seems to have been behaviorism.

From the early days of programmed instruction, through the development of of teaching machines to the current computer mediated programs, most developers appear to have been influenced by such behavioristic considerations as providing for active responses, immediate reinforcement, and behavior shaping (Smith, 1989). Recent developments, particularly in the area of hypermedia, appear to signal a change from behavioristic to cognitive psychological theory.

In modern terms of learning theory, a cognitive strategy is a control process, an intellectual process by which learners select and modify their ways of attending, learning, remembering, and thinking. Cognitive strategies and control are exactly what instructional designed hypermedia programs allow.

Hypermedia-based individualized learning environments also provide the possibility of decreasing the cognitive load associated with accessing information from within such an environment (Heller, 1990). Any information presentation/retrieval system has some load associated with its operation. Users must wrestle with issues of learnability, efficiency, ease of remembering, and error frequency. The amount of time a user must devote to such operational issues directly increases the amounts of time and cognitive energy required to effectively interact with the information system.

With respect to computer-mediated instructional design and cognitive psychology, a hypermedia program can allow the learner to be involved and self-directed in the materials. The materials should provide for inductive as well as deductive sequences, as well as be presented in forms consistent with the cognitive development of the learner. Further, the learner is made aware of relationships among and between concepts and principles in content.

The ability to individualize information access to accommodate the possible users has traditionally been the strength of instructional technology. Matching the presentation style of the information with the pupil enhances cognitive outcomes and allows students to become more involved in the learning process. A fundamental reason for instructional design is to ensure that no one is "educationally disadvantaged" and that all students have equal opportunities to use their individual talents to the fullest degree (Gane et al. 1992).

The remarkable diversity of human abilities, backgrounds, cognitive styles, and personalities challenges the interactive system designer (Shneiderman, 1987). Successful designers are aware that other people learn, think, and solve problems in very different ways. Materials should present information in varied forms related to the preferred modes of thought of learners, as well as their preferred perceptual strengths and emotional preference.

Motivation

Motivation creates new incentives for individuals and provides impetus for cognitive engagement. There is a large body of research documenting how knowledge and experience are dynamically related to motivation, and the notion of motivation refers to how students regulate or deploy their own cognitive strategies to achieve learning goals (ChanLin,1994).

In an article educational systems and program design, Romiszowski (1994), lists some conveniently classified categories in program publishing as; 1) communication, 2) entertainment, 3) motivation, and 4) education. The four principle purposes of publishing should have integration. Educational material should motivate the student to wish to study is often mentioned in theory, but is very frequently ignored in practice (Romiszowski, 1994).

To implement motivational elements into instruction, four important aspects need to be addressed: gaining and maintaining students' attention, relating to their interests, building up their confidence in understanding, and satisfying their learning curiosity to encourage learners' involvement in learning from computer-based materials.

For motivational purposes in electronic publishing and multimedia design a conceptual organizing framework is suggested called ARCS. (Keller,1987) The four components of John Keller's (1987) theoretical model are; Attention, Relevance, Confidence, and Satisfaction. They represent four ways in which a instructional designer may build and maintain learner's motivation. Multimedia technologies may be employed to gain students attention and establishing relevance to the student's own goals and interests.

Design Issues for Computer-Based Learning Environment

The literature to date strongly suggests that design criteria for multimedia products are highly significant in determining their educational effectiveness. Good integration of text and animation seems crucial (Large et al. 1995). Additional multimedia features like sound and full-motion video must also be considered. Research suggests that other design factors like animation sequencing, text-animation linkages, and animation complexity require more investigation.

The task of setting standards for the development of quality educational software for school use is difficult. There are a multitude of opinions on what should be included and what constitutes effective software. However, the literature indicates that there are specific pedagogical and research-based developmental standards that can be used in the design of educational software (Schaefermeyer, 1990).

Standards will improve the quality of the software and make the evaluation process more objective and substantive. The instructional design of computer courseware should reflect many of the same qualities of any other form of instruction or training, including the proper sequencing of content, as well as the necessary visual considerations.

In educational software design, screen design is the main visual consideration. However much of the screen design literature is dated, and the existing guidelines do not allow for advances in computer technology (Jones, 1993). According to Faiola and DeBloomis (1988), good screen design can represent a critical factor in the interface between man and machine. Thoughtful utilization of text and graphics has proven to be a significant in aiding insight and understanding the relationship between concepts and valuable in illustrating processes.

The quality of screen design has shown to be a strong encouragement to improved performance when it maintains the interest of the user while lowering the chances of confusion, eyestrain and fatigue caused by poorly designed information. Screen design should follow fundamental visual design principles and visual factors related to visual attributes and locations of textual and graphic elements.

Two basic concepts in screen design include the grid system and typography design. The grid provides the screen designer with a tool for solving basic to more sophisticated visual problems. The use of grids determines the variety of constant dimensions of space between text and graphic elements on the screen, the grid provides a consistent location for text, such as paragraphs, headings and tables, as well as graphic objects such as buttons, icons, and other forms of graphic representation. It should be used to communicate a sense of orderliness of design (Jones, 1993).

A well laid-out grid provides a strong foundation and consistent guide in the creation of an effective interface.
This in turn saves the viewer from erratic and confusing changes of course elements. Both text and object location should be considered within a grid with the potential graphic images and digital video in mind. For example, if established buttons are too large or located

too far within the image area of the screen will interfere with video viewing.

The need to effectively communicate information by means of a computer interface requires the designer to maintain specific typological standards. In making topological decisions for screen design, the designer is limited by the typefaces originally designed by the graphic or authoring software manufacturer. In achieving a higher standard of design and legibility in the computer program's interface, proper selection of text and heading typefaces and their arrangement on the screen are crucial.

Only certain computer fonts provide a clean and attractive image for text, so one must be selective in choosing typefaces. It is disconcerting to use more than two or three typefaces and sizes within one screen frame. As far as headings go, the proper modification of letter space is especially helpful to improve attractiveness and clarity (Faiola & DeBloomis, 1988).

In the area of print legibility, the concept of "chunking" information is supported by the research and has proven that a text could be made more comprehensible and more functional through the deliberate emphasis on form. In a study of visual factors it was found that levels of legibility are higher when lower case text is used for screen design. The variation of the shapes makes the screen more legible, primarily because words are perceived by shape and outline and not letter by letter. As a result, researchers have found that lower case text provides optimum levels of legibility to reader for titles, subtitles and bodies of text (Failoa & DeBloois, 1988).

With changes in computers comes change in how information appears on the screen. Jones (1995) suggests that new open-ended guidelines may offer designers sufficient guidance for designing computer screens and user interfaces without stifling the creativity of the individual designer. The paradigm of static screens has changed to one of active, interactive, screens filled with dynamic visual elements.

All of the literature has focused on the design of the screen, and screens have been seen as individual units linked together by proceeding through the information a screen at a time. In today's environments, windows overlap, multiple events can happen at the same time, and the user is faced with controlling not only a complex piece of software, but also a complex piece of instruction. Software designers are unanimously concerned about computers offering only one way. Instead of rules to learn, they want to create environments to explore.

These new interfaces project the message, 'Play with me, experiment with me, there is no correct path" The new software design aesthetic effectively says that computer users should not have to worry about syntax; they should be able to play with shape, form, color, and sound (Turkle, 1995).

The first step in creating a high quality interactive environment, is to ascertain the necessary functionality, which are what tasks and subtasks must be carried out. Task analysis is central, because systems with inadequate functionality frustrate the user and are often rejected or underutilized. If the functionality is inadequate, it does not matter how well the human interface is designed.

Multimedia is experimental and although every medium has experimental elements, multimedia frequently offers multiple elements simultaneously, or in rapid succession. At the same time the user of the multimedia program is usually invited to interact with it; in fact, most instructional programs would not do much of anything unless the user does interact with them. At a fundamental level, the components that the designer must manipulate in creating experience is function and form. Function and form are not the same thing, although they are highly interdependent.

Functions are capabilities of the system and learner within the system. Forms are the manifestations of function in all possible states. Interactivity is not determined by the production value of the product. The type of interactivity is the result of design decisions, whether they are made consciously or unconsciously (Boiling & Kirkly, 1995).

The point is that the computer is a dynamic medium. Authoring systems make it possible for non-programmers to develop remarkably sophisticated programs which are interactive and kinetic. Consequently, designers need to provide opportunities for the user to take advantage of its potential (Jones, 1995).

Technology has moved beyond any specific set of do's and dont's for the design of the screen or the design of the user interface (Jones, 1993). While today users wrestle with digital video and multiple windows, tomorrow they will be faced with virtual reality. These changes affect not only what the computer can do, but what can be done with education as it is delivered on the computer.

New commercial programs are pushing the envelope of not only what had been done before technically, but in what educational software could be. Programs are using overlapping windows and presentation areas that require the user manipulate the information on the screen. These dynamic programs make it nearly impossible to say where things should go on the screen. As with any multiple windowed environment, it is the user who will decide what window is displayed, and when it should be displayed.

Probably the single most important instructional design issue raised by computer-based instruction has been learner control. It is both philosophically and pedagogically satisfying to allow the learner to make decisions about the content, method and style of instruction with which he/she would like to interact (Jonassen & Wallace, 1987). The notion of interactivity is realized when software allows the student to weave an individual educational environment. This is not to say that the learner chooses which problem areas to approach, but it grants to the student control over the rate of presentation, entry and exit, review of instructions if needed or desired, helps menus or hints, and even the number of examples or problems to be solved.

Related to user control is a new concept of interface control known as browsing. Browsing allows for the flexible exploration of the content of the program through variety of controls. Browsing can be done topically by providing users with a list of topics covered in the program through the use of a menu. Once a topic is selected, users can use methods such as clicking on right or left arrows to access related or extended material. While browsing should be be flexible and exploratory, it should not be indiscriminate and uncontrolled (Jones, 1995).

One of the common methods of providing for browsing in a computer-based learning environment is through the use of menus. Menus provide lists of navigational and informational choices using arrows or buttons on the screen to take the user to other screens, such as “next” or “previous”. Jones (1995) has come up with some guidelines for browsing interface elements. One guideline is to provide selectable areas for allowing users to access information, such as buttons or hot text within a text field. It is recommended that one be consistent in implementing particular controls for particular functions. Another guideline would be to let users access information in a user-determined order through topic indexes of all the information available in the program.

Another user-interface design element of a computer-based learning environment is dynamic graphics. Graphics are traditionally thought of as a separate element of the screen. The purpose of the graphic has been to offer significant redundancy between the object and the text used to describe it. Today’s programs use graphics in a variety of ways beyond simply illustrating a point. Icons are an example of this, used to indicate to the user that a choice is available. Additionally graphics may be interactive. Scanned images and clip art can have buttons layered over them offering the user the chance to explore an image and receive further information.

Animation can obviously offer the user a dynamic element in the program. While research has shown no significant difference in the use of static graphics versus animation (Rieber, 1994), it is generally recognized that the use of animation can offer many subtle benefits. When animation is congruent to the learning task, it can offer instructional benefits to the learners (Reiber, 1990).

Another important issue in designing a computer-based learning environment is the authoring system. An authoring system should allow flexibility for the author to create courseware in a manner accommodating a natural style of design. This style can vary among authors and be different for different subjects (Schaefermeyer, 1988). The authoring process is never without error in instructional design. Provision should be required for reversing a set of actions, or at least the capability to experiment with the instructional sequence, with the possibility of incorporating it into the courseware or discarding it.

Finally the point must be made that technology is only another tool that can be applied to improving instruction. It does not mitigate but rather increases the important role of instructional design. Technology is transforming the manner in which instructional are developed and delivered.

Despite the relentless pursuit of leading edge, cutting edge, and bleeding edge technology, let us not jump off the ledge until important instructional design issues are addressed. There is no compelling reason to use technology in the learning process unless the end product enhances the learning experience of the learner (Bacon, 1996). Shneiderman (1988) makes the point that every designer wants to build a quality interactive system, but successful designers must go beyond the vague notion of "user friendliness" and probe deeper into a checklist of subjective guidelines. Effective systems generate positive feelings of success, competence, and clarity in the users. The users are not encumbered by the computer and can predict what happens with each of their actions. When an interactive system is well designed, it almost disappears, enabling the users to concentrate on their work or pleasure. Creating an environment in which tasks are carried out effortlessly requires a great deal of hard work for the designer.

Animation in Computer-Based Instruction

Although the animation created on a personal computer is not as eloquent as that which is produced in the Walt Disney Studio or with large super computers, it does approach that which is used in arcade game animation. Animation gives students immediate feedback and makes learning more interesting and enjoyable. Because movement creates constant change, viewers continually reevaluate and update the information they see. This makes them active learners (Wilson, 1993).

Perceptually, animation is an example of apparent motion, which is the phenomenon of perceiving motion when there is, in fact, no physical movement of an object in the visual field. When an animated sequence is carefully produced, a person "sees" motion in a collection of separate and static visual displays (at least 15 frames per second is usually the minimal requirement) through an up and down process called correspondence. Because animation can be thought of as external visualization of an idea over time in a certain direction, general theoretical support of animated visuals is believed to be provided by one of several theories of knowledge representation that support the use of visuals (Rieber, 1991).

In a study by Rieber (1990) about the effects of animated presentations on incidental learning and the intrinsically motivating characteristics of computer practice activities, the results showed that the students extracted incidental information from animated graphics without risk to intentional learning. As far as the motivational influence, when students had a choice, they would overwhelmingly choose to return to the practice activity consisting of the computer simulation. Considerable empirical support is given the dual-coding hypothesis (Rieber, 1991), that suggests that long-term memory consists of two separate but interdependent coding mechanisms; one verbal the other visual. The assumption is that two codes are better than one and research shows that pictures are often better than words for memory tasks. When information is dually coded, the probability of retrieval is increased because if one memory trace is lost, another is still available.

Animation has long been a popular feature of computer-based instruction, but without serious consideration for its true instructional purpose or impact. Recent reports have offered encouraging results for the use of both animation as a presentation strategy and practice activities involving interactive animated graphics.

Animation has been described by Rieber (1991) as the external visualization an idea over time in a certain direction. So in this respect according to Milhiem, (1993) an animated sequence can supply a learner with information concerning physical movement, changes over time, movement within three dimensions, and so on. Programs have often used animation as an extrinsic motivator, but new techniques and authoring tools are providing instructional developers with the ability to include animation as a significant factor within computer-based lessons. In the past few years with the rapid development in computer applications as well as the rise in popularity of the guided user interface-based authoring systems, it is now possible for the average classroom teacher to create some form of computer animation to be used in a presentation or student practice after just a few hours of training (Xiaoquan & Marshall, 1995).

Computer users are confronted with an increasing demand to learn a greater variety of complex tasks than ever before.
In addition, they are searching for ways to learn these tasks more quickly. Animated demonstrations of procedural tasks are often a way to speed up this learning (Palmiter & Elkerton, 1993). Claimed benefits of animated demonstrations have led to an insurgence of

demonstrations used in research and commercial software.

A procedural task is one in which a series of actions is executable by someone or something to attain a specific goal. Procedural information may better be supported by animation, but Mayer & Anderson (1992) found that that the effect of animation on learning was by no means straightforward. In their research, animation per se did not improve understanding; only when it was presented concurrently with narration did it result in large improvements in problem-solving capabilities. Even with accompanying text, the simplicity of using animated demonstrations may encourage superficial processing and disregard for the procedural task. Perhaps the motivational value of animation is sufficient reason for its use, aside from any other possible benefits.

The properties of animated demonstrations suggests how they should be helpful during acquisition. Like pictorial instructions, animated demonstrations immediately identify what objects are available. Orientation of actions on these objects also becomes clearer with demonstrations and should be an advantage as shown with static pictures. An animated demonstration also seemlessly links user input and system response (Palmiter & Elkerton, 1993).

In research by Mayton (1991) on learning dynamic processes from animated visuals, the primary focus was on learning higher order concepts aide by the animation of graphic, instructional elements. Dynamic process was exemplified in the content as (a) the simultaneous functioning of several parts of the human heart, (b) relationships among the parts, and (c) the resulting overall function of the cardiac system through the consequent heart beat cycle. It was observed that the animated visual group maintained superiority of performance over a visual static group following a one week delay. This strongly suggests the role of animated visuals in learning dynamic processes. It appears that subjects in the group experiencing the animated visual treatment were able to better retain information about how the cardiac system operates.

There are an number of other ways that animation may be used in computer-based learning environment for instructional delivery. One example given by Horton (1995) is to explain a complex mechanical device with moving parts, such as a laser printer, to show things that move and change. Effectiveness of animated presentations seem to depend on the requirement of the task, and the needs for the intended audience. This illusion of movement can be utilized to represent abstract concepts in engineering design. In this field of study where psychomotor skills and rotation or portrayal of three-dimensional objects are involved and required, the use of animated graphics by the instructors has been recommended (Asoodeh & Clark, 1993). Computer-generated visuals can be used to manipulate objects by rotation and transformation, making them effective tools for the delivering of instruction.

Finally, on the subject of animation within a computer-based lesson or multimedia program, Milheim (1993) gives some guidelines for design and general use. The first of these guidelines is that animations should be kept simple. While the current state of animation software allows an instructional developer to produce animated sequences that are extremely complex, it appears that simpler animations may be more be more appropriate within an instructional lesson. Animated graphics should be sufficiently complex to convey the important information within it, yet simple enough to be easily understood.

Another guideline has to do with designing animation presentations so that the important information is easily perceived. Even if the learner attends to an animation sequence, they may fail to notice the relevant information contained within it. Lessons containing animation should therefore be designed so that learners are able to focus on the important features of the computer display in addition to directing the learner to attend to and use the animated material in an appropriate manner (Rieber, 1991). A strategy for increasing the potential for the perception of animated features would include providing verbal narration to accompany the presentation of an animated sequence (Mayer & Anderson, 1991). Another strategy could be providing guidance to the learner before the animation occurs concerning the importance of the relevant points within the sequence, also by emphasizing important points through the use of animated prompts, color, sound, or other cueing strategies (Rieber, 1990).

A multimedia design should also include options for the varying of speed of an animated presentation to provide emphasis at various points during the sequence. One of the beneficial characteristics of computer-based animation as against traditional videotape or videodisc presentations is that the computer sequence can be played back at a variety of speeds. This variation in presentation speed can be effective when complex events are being displayed or when students require additional information concerning a specific process (Milheim, 1993). Based on various instructional needs, speed variation can be controlled either by the program itself, or by the learner during the actual lesson. Specific control features could include playing a sequence in fast, slow, or frame-by-frame displays, or allowing the animation to be played in reverse if needed. All these controls, together with the option of continuous loop, could be put under user control using desktop video software such as Apple's QuickTime.

Based on various studies by Rieber (1990, 1991), animation is particularly appropriate when the instructional content includes the use of motion and/or trajectory. In terms of motion, animation can clearly show specific characteristics of an object while it is moving through an overall sequence. With respect to trajectory, animation can easily indicate the direction an object is moving in a manner readily apparent to the learner. An example of this type of animation might be simulating the motion of the planets and their moons around the sun.

A significant difference between animation and 'true' representation, as by videotape, is the ability of animation to show events that are invisible to the human eye or ideas that have not yet been developed into concrete examples. Examples of this for animated sequence could be demonstrating sub-atomic collisions of microscopic particles, or perhaps prototyping processes or ideas that have not yet been built into physical models (Simone, 1992).

Although the greatest potential for the instructional use of animation rests in its ability to present educational material, it has traditionally been used for motivating students or focusing their attention within various sections of a specific program (Milhiem, 1993). In this sense, animation has been used for a variety of purposes, such as transitions between frames or sections in an instructional lesson, illustrating important features of the material being presented, or just generally providing extrinsic motivation as feedback to student responses (Rieber, 1990).

Computers and Art

In context to the broad topic of visual arts curriculum and use of technology, one should look at the fact that when microcomputers first gained recognition in the field of art education, some were so taken by their extraordinary capabilities that the demise of traditional art pedagogy seemed likely. Many were charmed by the dazzling array of options, seduced by their easy of use, and lured by their seemingly limitless aesthetic possibilities.

From a more recent vantage point, the argument is made that technology will not divorce educators from timeworn methodology in the classroom, nor are computers wondrous and magical devices that make teaching any simpler, better, or easier. Still one should examine how they are using these machines with a view towards making them an unique and viable medium in instructional programs.

Commonly, the focus of activity for students using a computer involves having them become comfortable with the "mouse" or stylus as a drawing implement and learning the features of a particular digital paint program. The predominance of this approach to computer art instruction may be attributable to three factors; 1) digital programs make computers easy machines to operate, 2) students are able to edit work in progress with ease, and 3) the appealing aspect of paint programs is that they popularize what is considered a elitist activity. The novelty and ease of the process apparently releases inhibitions. Students afraid of drawing with a pencil are often quick to try there hand at drawing with a computer.

The belief of Medeja (1993), is that the preoccupation with paint programs is unwise, given the misconceptions they promote regarding the computer as an artistic medium. Paint programs tend to foster the view that the computer is merely an electronic sketchpad used for emulating fine art techniques and process. Similarly, students come to see the computer as simply a static medium, useful for executing two-dimensional graphic imagery. An even greater misconception involves the idea that the software and hardware can turn anyone into an artist.

Roland (1990) states that he does not mean to imply that the educational use of paint programs in art classes is without merit. However, art instructors must help students to understand that the computer becomes an artistic medium only when it serves as a mirror to their own thought processes; imagination and judgment must be exercised in determining what choices are to be made with the computer. The microcomputer should expand the scope of art education process by providing students with avenues that were not available, or only with difficulty.

Although the the computer has been used primarily for producing static pictures in the drawing and painting tradition, it has more in common with the dynamic time-based arts of animation, performance arts, video art, music, and theater. The development of a dynamic composition is based on a sequential system in which events appear to gradually shift or change over time. Students can produce time-varying imagery with the computer and should think of their work as would a composer of music or a director of cinematography.

They can infuse aesthetic content into the sequence of images as a whole that may not be obtained from any one image by itself.

The major premise is that art educators need to move beyond regarding the computer as merely an extension of older art forms.The future holds the promise of rich interchanges between the worlds of art and technology. Art teachers can take advantage of this link by developing innovative approaches to the computer.

In another related way the use of computers in art education can by vitally useful is the fact that art educators have the continuing task of preparing, delivering, and revising instruction to help achieve curricular goals, the computer is a natural vehicle for addressing such tasks. A computer program can be created for organizing an entire course for electronic delivery (Hubbard, 1995).

Computer graphics programs have often been viewed with greater enthusiasm than computer-managed instruction. The reason for this is that it provided an additional medium to offer students, and the products were close to traditional art production. The adoption of electronic technology to design and manage the delivery of art instruction has been slow. However, with the recent advances in technology, such as speed and memory capacity of micro - computers, the development of instructional programs is within the reach of almost anyone with the desire to do so.

Hypermedia programs are defined as authoring languages and freedom databases, and some are easier to use than others, but all perform the same kinds of tasks. The multimedia programs are not restricted to serial organization and are usually at their best when organized to offer multiple pathways. Modifications to these programs may be made easily and rapidly, so that information, such as about an artist, or art form may be quickly added. The incorporation of text, pictures, and sound, within these programs gives you the integration of three primary modes of communication in one product.

One example that vividly demonstrates the potential of interactive multimedia to invigorate information, ideas, and learning is an innovative project called *Ulysses* - based on the poem by Tennyson (Slawson, 1993). Using the computer to interact with this massive multimedia collection, students can access an overview of the general history, philosophy, technology, people and ideas that influenced Tennyson.

The goals of this master's project are quite similar, if not as grand as the Ulysses project, but perhaps in terms of the number of different of topics this animation program is broader in scope.

Wilson (1993), an instructor in air traffic control, said that successful teachers know the importance of using a variety of methods to keep students receptive to instruction.

Computer-based instruction using a HyperStudio-designed resource and instructional program is an appropriate medium and authoring tool. HyperStudio allows the project designer to incorporate nearly all of the multimedia interaction contained in the Ulysses Project, but with considerably less equipment and professional resources. The newest technologies developed into the HyperStudio program, combined with those of the computer hardware running it, makes it possible to create a fairly sophisticated and professional looking interactive program without being a programmer.

Animation Art

Film animation applies techniques of cinematography to the graphic and plastic arts in order to give the illusion of life and movement to cartoons, drawings, paintings, puppets, and three-dimensional objects (Burnette, 1996). Beginning with crude and simple methods, animation has become a highly sophisticated form of filmmaking, involving the use of automation, computer, and even laser technology to achieve its effects. Some animation techniques overlap with those used to produce special effects in live-action cinematography. In watching such films as 2001--A Space Odyssey (1968) and Star Wars (1977), a person often finds it difficult to tell whether a certain result has been achieved through animation or through special effects.

Basic graphic animation is produced by a technique called stop-frame cinematography. The camera records, frame by frame, a sequence or succession of drawings or paintings that differ only fractionally from one another (Valentine & Cybulski, 1996). The illusion of progressive movement is created by projecting the series of frames through a camera at the normal rate for sound film (24 frames a second). The same method is used in puppet or object animation; the position of the figures or objects is changed very slightly prior to each exposure. In graphic animation, the drawings may vary from the simplest outlines, as in such traditional animated films as Felix the Cat, to elaborately modeled and colored paintings, such as those produced in Walt Disney's studios during the 1930s.

A history of animation begins with the invention of picture animation in 1831 by Joseph Antoine Plateau. He created the illusion of movement with a machine, called a Phenakistoscope, a device that consisted of a spinning disc that held a series of drawings and a windows that framed the viewers perception of the drawings (Thomas, 1991). In 1894 an Englishman named Horner invented the Zoetrope, which was a revolving drum with regular spaced slits in its sides and held drawings on the inner wall. When the drum revolved, the viewer could see the drawings through the slits. The Zoetrope was refined by the Frenchman Emil Reynard, who developed the Praxinoscope (Sklar, 1992). The slits were replaced with mirrors that spun in the center of the drum. In 1892, Reynard created the first movie theater in Paris, the Theater Optique.

The first animated cartoons were produced before 1910 by pioneers such as Emile Cohl of France, whose Sinking of the Lusitania (1918) has been called the first animated feature film. In 1909, the American Winsor McCay produced "Gertie the Trained Dinosaur", which can be considered the first cartoon. During the years 1913-1917, various American cartoon series were produced, the most well-known of them "Felix the Cat" by Pat Sullivan. In these early productions, a simple drawing of a mobile figure was photographed against an equally simple background, and a new drawing was required for each exposure. Relief from the labor of drawing hundreds of pictures for each minute of action came only when the figures could be made momentarily static. The evolution of cel (for celluloid) animation after 1913 enabled animators to use a single, more elaborate background for each shot or scene in the action. The mobile figures in the foreground were inked in black silhouette on transparent celluloid sheets and then superimposed in series on the background. Rotoscoping was invented around 1915 by Max Fliescher, who would eventually own the studio that would bring Betty Boop and Popeye to life (Trasher, 1996).

For much of its history, rotoscoping has been used in only its most basic form, that is for carefully tracing every frame or every other frame of live film footage of the desired moving images. This has been done not only for character animation but also for moving backgrounds, for moving inanimate objects, and for many things moving in perspective in order to precisely capture the action.

With the introduction of color filming early in the 1930s, animators began to use opaque paints in place of black ink. Greater efficiency was achieved when artists began to specialize in particular figures or other mobile elements of cartoons. Such teams of animators collectively created drawings for feature-length films, for example, Walt Disney's Snow White and the Seven Dwarfs (1937) and Fantasia (1940).

One of the most important figures in animation was Walt Disney, the creator of the cartoon character Mickey Mouse and a film innovator who won a record 26 Academy Awards, Walter Elias Disney, born in Chicago, Dec. 5, 1901. In Kansas City he met Ub Iwerks, who became a Disney collaborator. When their Kansas City animation studio failed in 1923, Disney founded a new studio in Hollywood, and Iwerks became chief artist and special-effects designer.

By 1928, Disney and Iwerks had perfected the immortal Mickey Mouse, who made history the same year in Steamboat Willie, the first cartoon with sound. (Mickey's squeaky voice was supplied by Disney.) In succeeding Disney cartoons, including the famous series Silly Symphonies, the characters moved to the rhythm of a prerecorded soundtrack, making possible a humorous and ingenious match of motion to sound . By the mid-1930s all Disney cartoons were made in color. The world's first feature-length animated film, Disney's Snow White and the Seven Dwarfs (1937), proved a stunning financial success and was followed by Fantasia (1940), which combined classical music with animated sequences.

Since the early, popular shorts involving such animals as Felix the Cat and Mickey Mouse, the international history of animation has been characterized by the almost constant introduction of ever more complex forms. Many advances were made in Europe: Lotte Reiniger employed mobile silhouettes; Oskar Fischinger and Len Lye experimented with abstract designs choreographed to music; and George Pal of Holland created techniques of puppet animation. Since World War II, animation was increasingly used in instructional films and in television and cinema commercials. Advanced forms of graphic design, both in black and white and in color, and new methods of puppet and object animation were developed. From the 1940s until the early 1980s, Norman McLaren, one of the most versatile of all animators, experimented with three-dimensional animation and with such other innovations as drawing images directly on film.

Another type of international animation that has become recently popular in the America is the Japanese anime. The earliest Japanese animation was by individual hobbyists inspired by American and European pioneer animators. The first three Japanese cartoons were one-reelers of one to five minutes each in 1917 (Patten, 1996).

After Japan went to war in China in 1937, the need to get production approved by the government censors resulted in a steady stream of militaristic propaganda cartoons. The first Japanese full-color animation did not appear until 1955. Japan's most popular comic-strip and comic-book artist during the 1950s, Osamu Tezuka organized the first TV animation studio, its first release was Astro Boy, which debuted on New Year's Day 1963. It was an instant success and the first of what has become known as anime. Television animation became much more popular in Japan than it ever was in America. In the 1980s came the emergence of the home-video market and animation began to be produced especially for the American market.

Television, with its insatiable need for new material, introduced a type of inexpensive semi-animation in its cartoon programs for children, beginning in the late 1940s. Because it required only about 300 drawings per film minute compared with 1,000 drawings for traditional animation in TV cartooning only the simplest movements were animated, colors were limited, and detail stripped down to bare essentials. TV cartooning took much of the magic out of animated film. It was only in the late 1980s that fully animated feature films began to make a comeback, with An American Tail (1986), by ex-Disneyite Don Bluth; with the Disney Studio's cartoon-and-live-character film Who Framed Roger Rabbit (1988);

with such later Disney features as Aladdin (1992), The Lion King (1994), and Pocahontas (1995); and with the huge success of Matt Groening's animated TV series The Simpsons (1989-present).

Many people are amazed when they learn how much skill, effort and labor are involved in the making of a cartoon. Thousands of drawings and cells, and dozens of finished backgrounds, plus a script, musical score, special effects, and voices are required for even a short cartoon (Beck, 1994). Every animation studio has followed its own production procedures, but most follow the same general plan.

In most studios, ideas are fleshed out on storyboards, where gags are plotted and refined. Usually, dialogue is recorded before the drawing in commenced, so that animators can time their sequences to the words being spoken. Once the story is finalized the work is divided up, and in most cases several animators work on each character. For every second of film time, between twelve and twenty-four drawings are created each only slightly different from the proceeding one. The master animators draw the main poses for each character, and the “in-betweeners” draw the rest. These drawings are then traced onto celliod by inkers, and the back of the cells are painted to exact specifications. For the average short film, about four thousand animation drawings and cells are required.

At the same time, background paintings are prepared by layout and background artists. Cameramen combine the cells and backgrounds, shooting each cell against the proper background for continuity, frame by frame. Musical scores and special effects are then added to the finished film.

Animating a film is very much like making a flip book, where you flip the pages and the figures seem to move. The closer the various parts of the character are to the position in the previous drawing the slower the action will appear to be: the wider the spacing between the parts, the faster the action (Culhane, 1988). The pages of a flip book are bound, to ensure registry. The animator maintains registry by working on paper that has punch holes, designed to fit on pegs fastened to a drawing board. In the center of the board is of glass, and under it is a light box. The paper is thin enough so that when the light is on, the animator can see the animation on four or five sheets of paper. That way, the position of the animation on the next drawing can be gauged.

In the unique and useful sections of his book, Gray (1991) stresses the importance of the animators ability to draw well, and also makes the point that drawing skills are developed through study and practice. Gray also stresses the importance of drawing the realistic human figure as well as the stylized cartoon. He makes the point that he hated life drawing, but that it is necessary to learn and forced himself to learn to draw the human figure.

The most interesting advice in Gray's book is using laser videodisc which allows you to view the film in single-frame play back. By seeing the subtle range of movement used in quality animated films or in many live action films the animator can learn a great deal.

For the individual experimental animator, or the small, less commercially successful animation studio, an important venue for showing their animation has been the animation festivals. The history of animation festivals goes back further than generally thought; in effect to 1946, at the time of the first Cannes Film Festival. During the 9th Cannes Festival 1956, largely due to the work of Andre Martin and Pierre Barbin "The First International Animation Days (JICA) took place. The first Festival of Animation took place in Los Angeles in 1965 (Edera, 1997)

Festivals have become important occasions to honor creators, to reveal the state of the art, to underline the evolution of talents and techniques (Back et al. 1997). Festivals are a major focus of professional attention to independent and commercial animated filmmaking and a great stimulation of discourse on the dimension of the industry. They bring creators and marketers together. Like any art form, animation needs the means and the events to be enhanced and discovered.

A brief history of computer animation begins with the first computer Film being made in 1951 at the Massachusetts Institute of Technology, on a computer called Whirlwind. The first major step towards wider usage was made by Scientists at the Bell Telephone Laboratories in the Mid-1960s; they wrote in the FORTRAN language for movie making, this opening up the technique for animation (Halas,1990).

Computer animation has changed drastically in the past few decades. There were no programs that were used as tools for animation in the past and there were no color renderings. Beginning in the 1960s, films showing abstract color designs in motion were programmed by means of computers that could calculate intricate movements with amazing precision. Today, computer animation has achieved the ability to create moving images and backgrounds of great complexity. Using an electronic surface, the artist draws figures and backgrounds and selects colors. Computer programs manipulate the figures and change the backgrounds. The work is reproduced on a TV monitor and stored on a computer disc. Computerized animation is widely used in producing television commercials and music videos, and provides many of the special effects in the films of directors like George Lucas and Stephen Spielberg. Old-style cel animation continues to be the sole technique by which quality animators create their characters. Backgrounds, and the movement of objects within a scene, however, are often computer-generated.

Tron was the beginning. It was the moment when computer graphics made its first contact with animation.Nobody had ever done it before and there were no experts around. Tron did not revolutionize the animation industry, but it did give encouragement to the computer industry (Kroyer, 1995).

The term "computer animation" is imprecise and misleading according to Thalmann & Thalmann (1990), because the computer can play a variety of different roles. There are a number of different ways of classifying computer animation systems, but a popular and simple way is to distinguish between "computer-assisted" and "modeled animation". Computer-assisted animation, sometimes called Key frame animation, consists mainly of assisting conventional animation by computer. Modeled animation means the drawing and manipulation of more general representations which move about in three-dimensional space.

Another classification for computer animation is the mode of production, being either "Real-time" or "frame-by-frame". In frame-by-frame the computer is used to produce each frame individually to be photographed and the images are very complex and realistic. With real-time, the animation is immediate and interactive, as that in a video game. Real-time animation does not require films to be recorded, because the results are seen directly on the terminal. Real-time computer animation is limited by the capabilities of the computer (Thalmann & Thalmann,1990).

On the international market it has been said that four countries provide the leadership in 3-D computer animation: United States, Japan, Canada, and France. In all countries a large percentage of computer animation is run on Silicon Graphics work stations, a platform that uses the old, but powerful Unix operating system Cotte, 1996). Unix is a very flexible platform, which allows each individual animator to customize his or her own setup with small personalized programs.

Today, more traditionally trained animators are coming into 3-D animation. Most of the animators and other staff who worked on "Toy Story ", and some reports number them in the 100 to 150 range, were from traditional backgrounds with experience in clay, puppet or hand drawn animation (Grush, 1996). As everyone who saw the feature length , computer animated toy story would agree, this type of entertainment is exciting, novel and fun to watch and probably presents a serious threat to the status quo (Zucker, 1997). In the opinion of Dyer (1996), "The best, the absolute best, example of computer animation that's being done is Toy Story. It cost a lot more than traditional animation. They pulled out all the stops, and yet it still can't measure up to the kinds of expressions and feelings that can be transmitted to the viewer through hand-drawn animation" (p. 4)

On the subject of animation markets, Halas (1990) sites "Screen Digest", at monthly magazine specializing in analysis of the visual communication industry reported in 1989 that only two percent of animation is children television cartoons. This is a much smaller section of the market than most people suspect. The main markets are: 1) commerce, 2) leisure and entertainment industry, 3) titles for television, 4) full-length animated feature films, 5) entertainment series for television, 6) education films ,7) science, 8) public relations, and 9) architecture and industrial design.

In his book on animation careers, Gray (1991), explains the ups and downs in the animation business through its short history. The early animations mentioned were primarily the films of the Walt Disney Studio from the "Golden Age of Animation" in the late 1930s and early 1940s. Gray also mentions the decline in the quality and amount of animation created during the 1950s through the 1970s. Since 1984 the employment picture improved with many new animated feature films and the growth of a new marketplace for original television programming. Some of the various jobs in an animation studio are: director, assistant director, writer, layout artist, storyboard artist, background artist, character animator, assistant animator, special effects animator, in-betweener, clean-up artist, ink and paint artists, music and sound track , voice, camera, and editor.

This chapter has covered the theory behind multimedia and instructional design. The subject content has been given as well on the topic of animation. This research information accounts for the basis and foundation for this multimedia computer on animation.

Chapter Three

Objectives

As an instructional resource, this animation program, "Total Animation", would supplement the goals and objectives of a general course in animation. This animation program is intended to enhance the instructional design of the general animation course and serve both as a motivational tool and as informational reference material. It will help students learn about the process of creating animation and a variety of techniques used in animated films. As an instructional tool, this program will serve as a research source for students in an animation course and provide for self directed, individualized learning within a variety of lessons.

This program could be used directly by the teacher for delivery of a lesson, or as part of a unit in an Art History, Graphic Arts/ Technology, or other related course. This HyperStudio animation art program could also be used as a resource for all teachers of art or related courses within the school district, by being on file at the district media center.

In terms of instructional design this project will incorporate multiple instructional objectives to meet the goals of various users.

The primary instructional objectives would be the same as the course objectives for animation, including; (1) an understanding of the development and mechanics of animation, (2) development of vocabulary essential to animation, and (3) the process and practice of story writing. An objective which is an extension of the course objectives would be knowledge of job options for those choosing a career in animation. In a broader context, this program will address the issue that the Information Age has shifted the traditional ways of communicating to include machine-mediated interaction. In a case study, Everett & Terence (1994) stated, "The rapid technological changes occurring in the workplace are forcing teachers to find innovative ways of teaching. To better prepare students to adapt to and deal with new and emerging technologies, teachers must devise methods that give students the opportunity to be exposed to and work with these technologies. The classroom is the appropriate laboratory for innovation and preparation." (p. 350)

Chapter Four

Project Description

This HyperStudio animation project covers the basic concepts, techniques, and procedures in producing animation. The purpose of this program is to furnish the user with enough information that will serve as a basic foundation to produce a simple animation for themselves.

Computer animation as well as conventional animation will be covered with text information of the processes involved in the creation of each. Elaboration of this information will be made through the use of graphics, audio, video, and animations. A section on various techniques and types of animation will cover the specific topics of 1) Early Techniques, 2) Character Motion, 3) Claymation, and 4) Limited Animation. A final section on careers in animation will provide descriptions of a full range of basic career job options within the animation industry.

This program is designed to accommodate the different learning styles and sensory modality of potential users through its user-control navigation and interactivity as well as use of audio, video, and graphics. Users can navigate through topics sequentially, or choose to go from a sub-menu directly to a sub-topic of interest. Throughout the program are animated examples of described processes or types of animation to enhance learning .

Animations are also incorporated into the design in order to increase user motivation. Simple navigational design helps to improve achievement by reducing the stress of working on the computer for less experienced users. The use of a host character, "Captain Wingfoot" is designed to make the program more "fun" and to provide a guide for the user. Examples of student animation also provides inspiration and motivation for peer program users.

This animation program is to be only part of a complete course, and used as an instructional supplement and reference. It is meant to provide additional experience and knowledge as part of animation course, that might form the basis for future major or minor studies at the University. A list of basic career opportunities is given to provide the user with information and options in the animation industry

Content Area

Animation art is the specific subject content area of this project, a subtopic of a more general art curriculum. The subject topics within the content area are; 1) careers in animation, 2) techniques and types of animation, 3) computer animation, and 4) conventional animation (see Figure 1). The content within the program will be primarily informational, but teachers could use it to guide a user through the process of creating an animation. This program is not a tutorial, but is of similar design and could be used for instruction by an animation instructor to teach the fundamental steps and stages of the animation creation process. This information could then be elaborated on in the classroom with further demonstration, guided practice and evaluation and critique.

Because animation combines artistry and technology, its history also involves the development of techniques and procedures which vary from simple cutouts to elaborate computer setups. This program attempts to cover the history, development, techniques and procedures as well as possible working within the limitations placed upon this project. The primary limitation to completing a more comprehensive coverage of the content area is due to copyright laws. Most of the history of animation was left out of the project because of the inability acquire copyright permission for the necessary supplemental graphic images and animations to accompany the text and audio information.

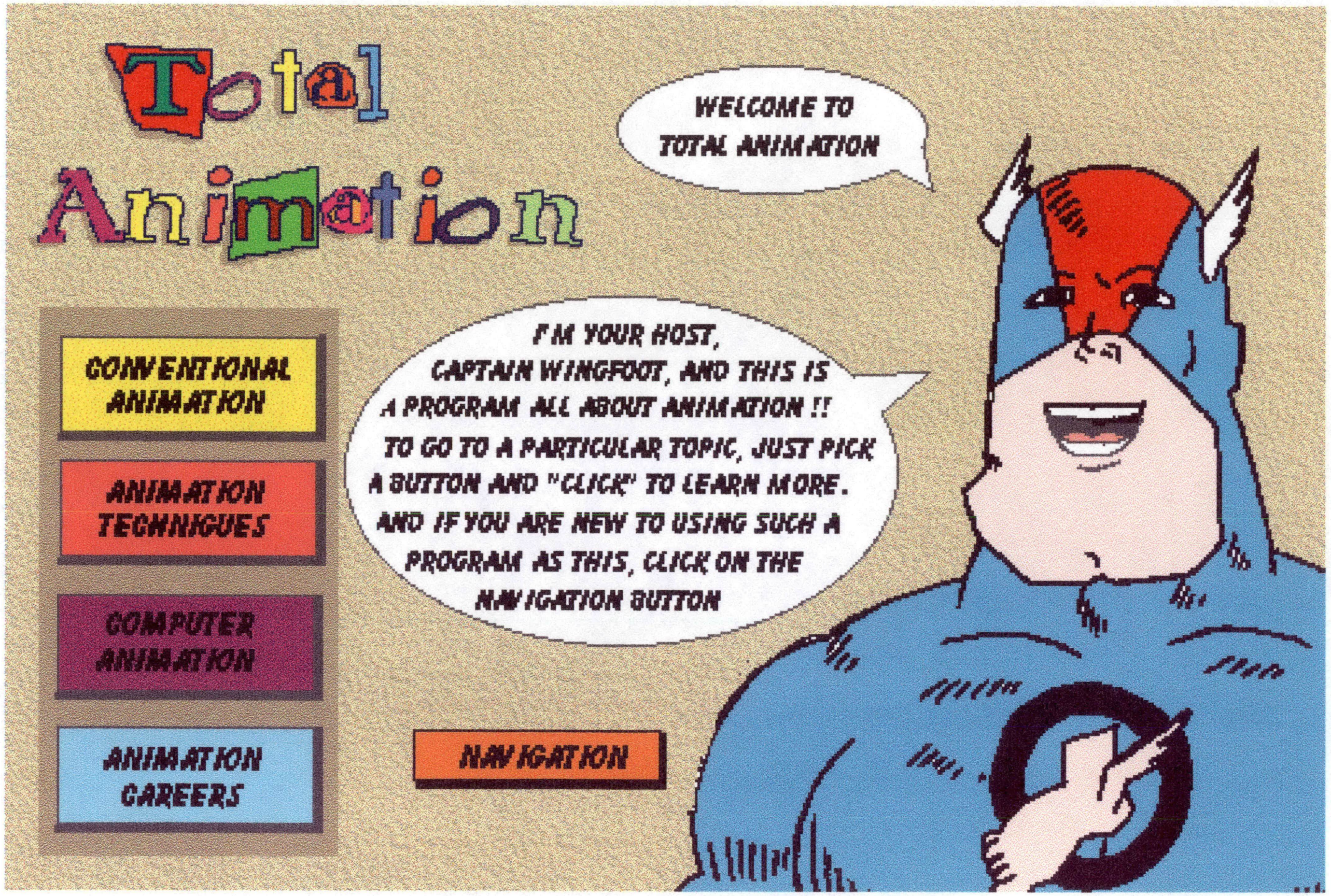

Figure 1, The main menu page from "Total Animation

The first step in learning about the creation of animation is to understand the procedures involved in making an animated film. This program will cover the sequence of steps and procedures for the creation of an animated film in the section "Conventional Animation" (see Figure 2).

The first stage of any film production is the creation of the script. From the script a storyboard is produced, which is a series of drawn images that portray the action described in the script. After the script and storyboard are completed, the recording of any dialogue or key music is undertaken. Since animation relies totally on perfect synchronization of the picture to the soundtrack, the animator must receive the final recorded track before beginning to draw. The next stage is referred to as track breakdown. When the soundtrack has been made, an editor assembles it into the precise working length of the film and then breaks down the track. Basically, the breakdown is a simple process of analyzing the dialogue phonetically, and documenting the precise position of each sound in relation to the film frames. While the soundtrack is being broken down, the director selects one or film designers to produce visual interpretations of all the the characters featured in the film.

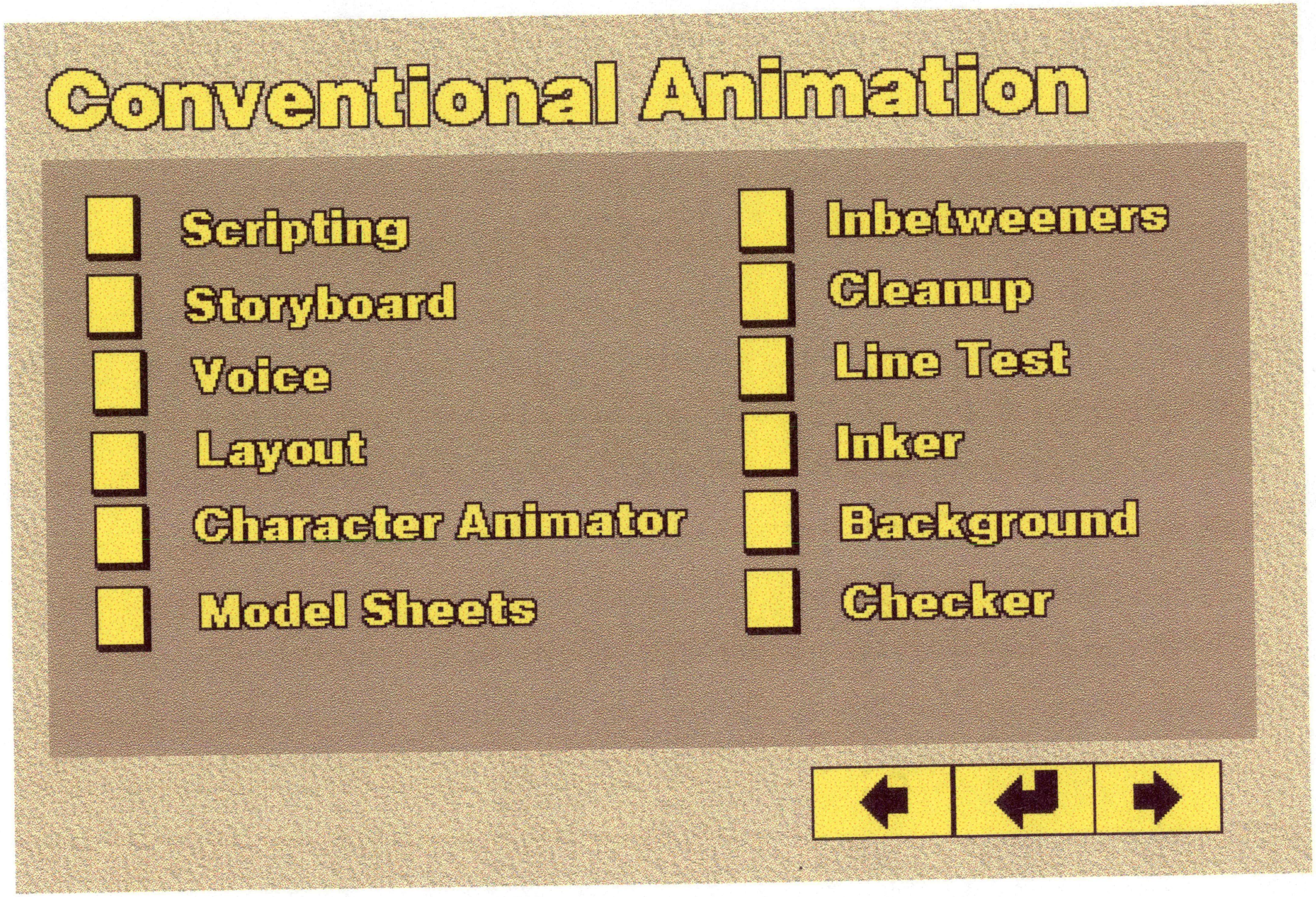

Figure 2, "Total Animation" sub-menu for the topic section "Conventional Animation"

A line test is then produced. The line tests are the animation drawings, produced in pencil on paper, filmed to the precise timings of the scene. Sometimes it is necessary to alter the the animation several times in a particular scene. After the line tests have been approved the next stage is cleanup. All the animation drawings are taken to the cleanup artists who clean them up to give them a consistent visual style. The next stage is Ink and Paint.When the cleaned-up line test is finally approved, each drawing is transferred to a thin sheet of celluloid or acetate and painted in the colors of the original design. While the animation is being traced and painted, another team of artists produce backgrounds.

The final stages consist of checking, final shoot, and dubbing. As the finished animation cells and backgrounds are completed scene by scene, they are passed to the checker, who makes sure that everything is correct. When the checker is satisfied that all the artwork for each scene is right, the artwork is passed on to the rostrum cameraman, who shoots the completed scene. When the whole film exists in final form, and the director is satisfied with it, the editor, with the director, proceeds to choose the sound effects.

After all the sound effects are chosen and laid in perfect synchronization with the action, the editor and director go in to the dubbing theater, where voice track, music, and sound effects are all mixed on one complete soundtrack. The last step is making the final print of the animated film for distribution.

Another important aspect of the animation processes is the procedure of inbetweening. Inbetweening is the production of drawings inbetween the key drawings, and is of fundamental importance to the success or failure of animation technique. In the studio, the inbetweening is done by the assistant. It is essential that the assistant can accurately carry out what the animator indicates on breakdown chart which gives the number drawings between two key positions.

Although the “History of Animation” has be left out of this project, some concepts leading to the development of animation will be included in the topic “Animation Techniques” (see Figure 3). True animation could not be achieved until people understood a fundamental principle of the human eye; the persistence of vision. This was first demonstrated in 1828 by the Frenchman, Paul Roget, who invented the traumatrope. It was a disc with a string or peg attached to both sides. On one side of the disc showed a bird, and on the other an empty cage. When the disc was twirled, the bird appeared in he cage. This proved that the eye retains images when it

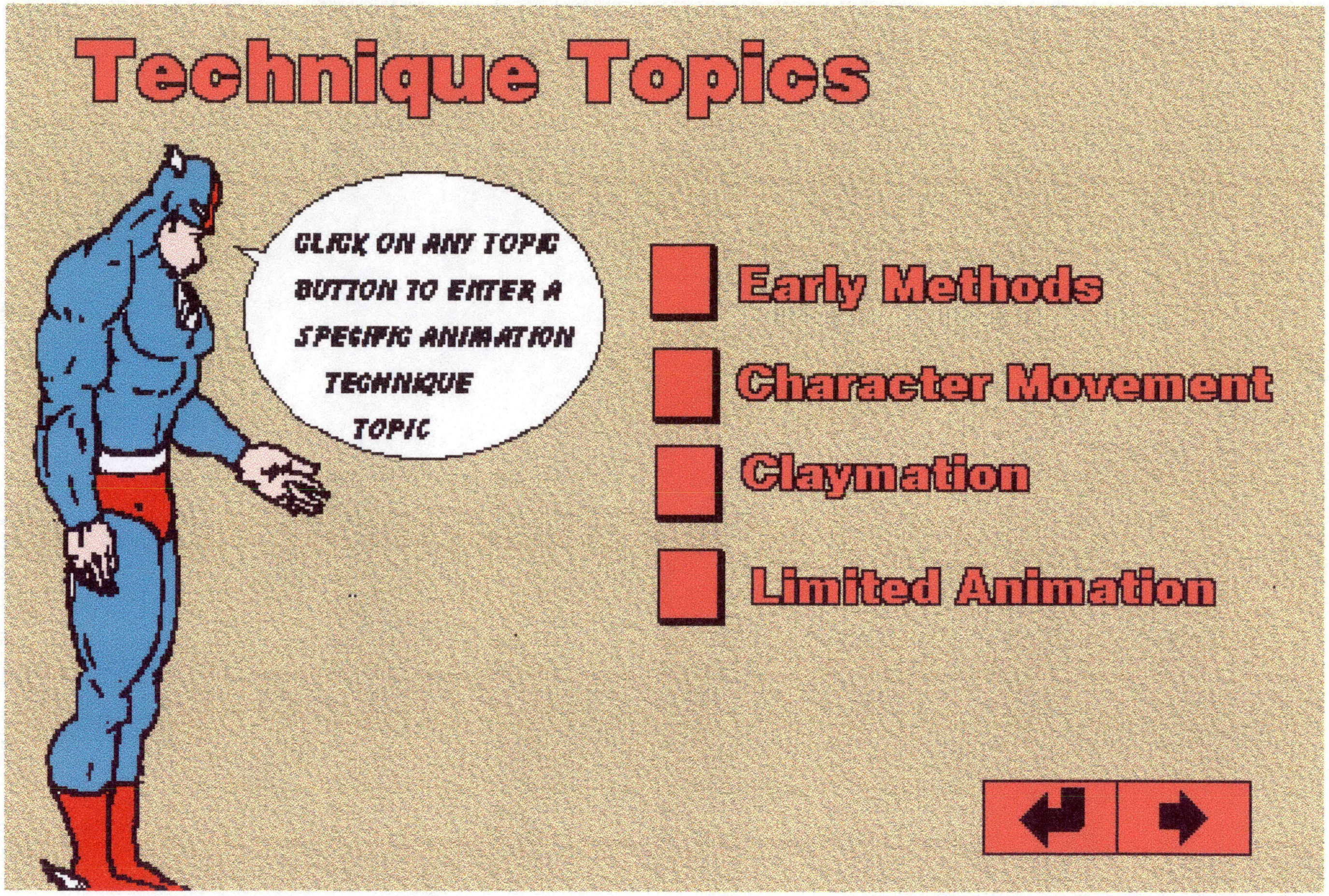

Figure 3, "Total Animation" sub-menu for the topic section "Animation Techniques" exposed to series of pictures on at a time. The same technique applied to the invention of the Zoetrope and other similar devices. By putting a series of pictures around the inside of a drum twirled on a spindle and creating a method for fixing the vision on one spot you can create the illusion of motion.

A technique topic of importance is the drawing process for the creation of convincing character motion. This is the number of positions that must be rendered in order to create the illusion of fluid, natural motion of a character, including; eye movements, walking, running, and all the many additional subtleties of animal locomotion. The final technique topics give brief description and examples of the technique of limited animation and claymation.

In the the section topic, "Computer Animation" the types of computer animation are described and represented in graphic form and video animation (see Figure 4). These types of computer animation include, frame-by-frame and real-time. A number of market applications are given for computer animation, including; 1) art, 2) education, 3) entertainment, and 4) simulation. A final sub-section provides technical information on the types of production and software used in the creation of computer animation.

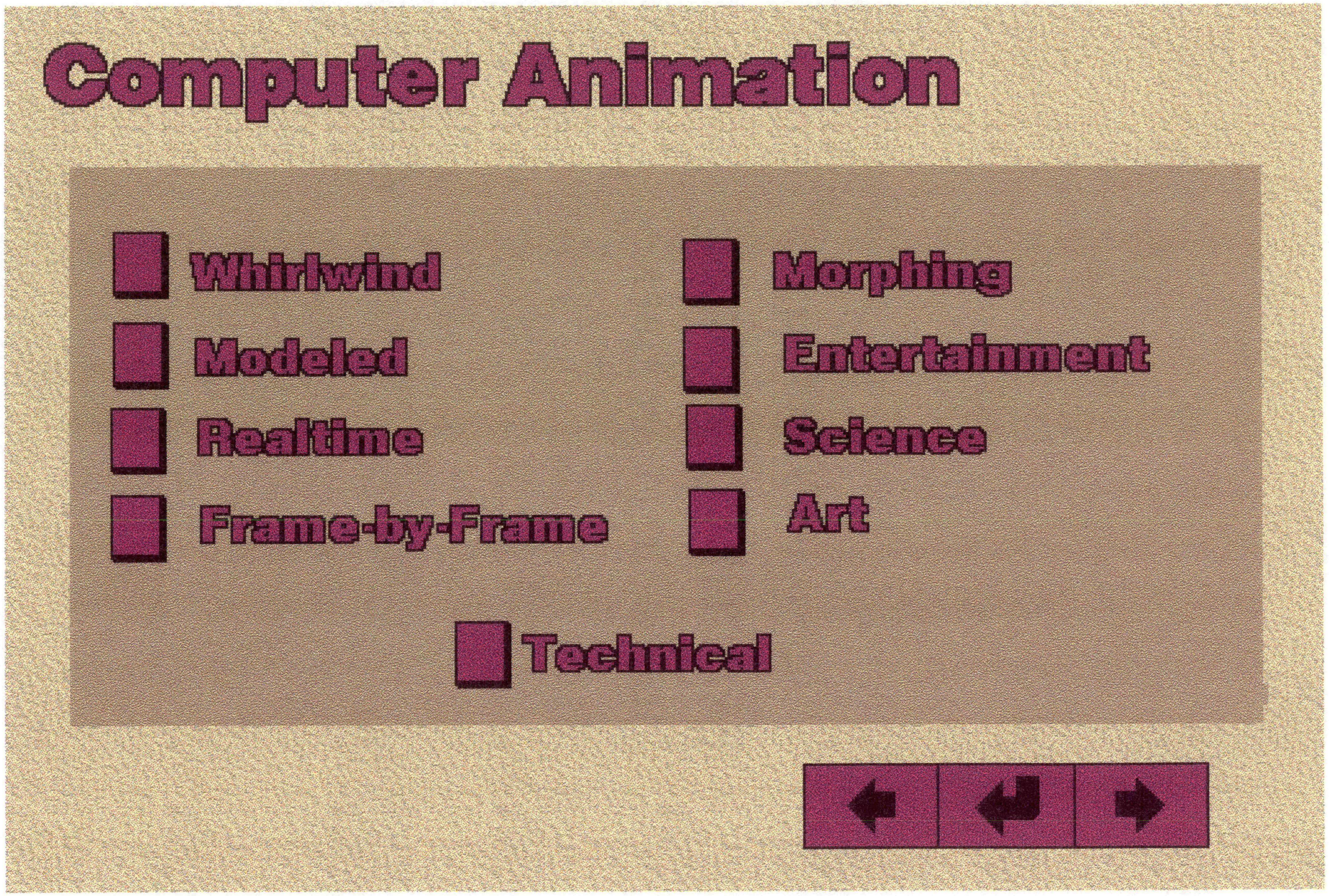

Figure 4, "Total Animation" sub-menu for the topic section "Computer Animation"

The final section of this program "Animation Careers" the subject of employment opportunities in animation is addressed (see Figure 5). A short introduction provides information on the industry and the basic employment qualifications. Also a list of the most common jobs is given with a description of each.

Audience

The users for this project would be high school students, 9th through 12th grades, from Rialto High School, enrolled in animation classes.The community Rialto High School serves is described by the administration as "blue collar", lower to middle-class citizens, who are very supportive of their schools. The student body of nearly 3,000 students includes an ethnic distribution which is approximately 52% Hispanic, 26% African-American, 18% Anglo, 3% Asian, .6% Filipino, and .0003% Native American.

In 1995-96, nearly 24% of students were in the AFDC (Aid to Families with Dependent Children), and 42% qualified for the national free lunch program, an indication of the economic status of the families of the student population. Approximately 18% of the students are Spanish-speaking only, many supported through sheltered and English as Second Language classes. This is also a

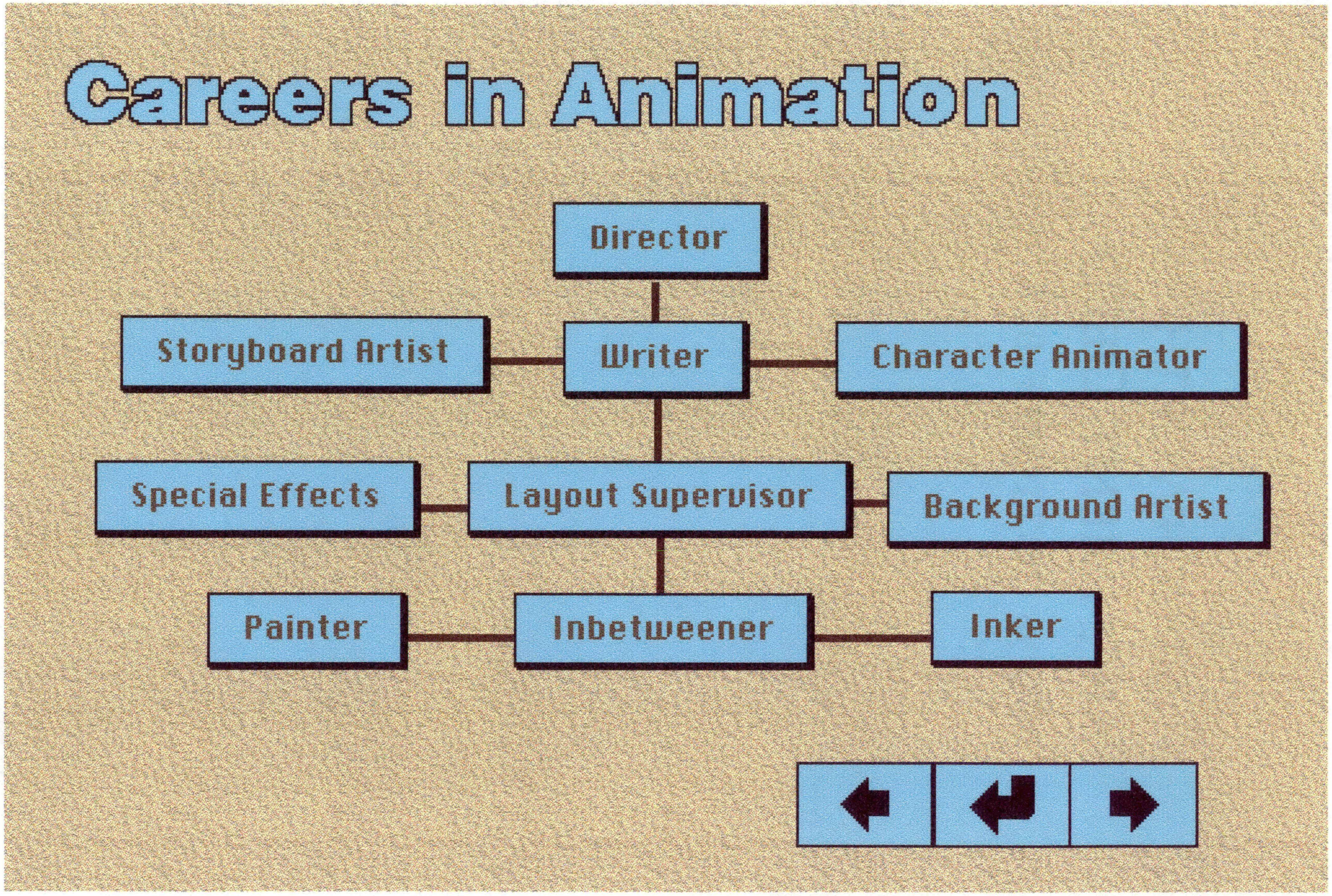

Figure 5, "Total Animation" sub-menu for the topic section "Animation Careers" fairly transit population with a mobility rate that appears to be 15 to 20%. While this is a description of a specific audience, this program would be appropriate for a generalized audience of any high school art students.

Technology Requirements

The computer used in the creation of this project consisted of an Apple Power Macintosh 6100, with 40 Megabytes of RAM, and a 15" Apple color monitor. Input devices consisted of an extended keyboard, mouse, drawing tablet with wireless stylus, and a color flatbed scanner. The program authoring software for this project was HyperStudio. Other software used text, graphics, photo imaging, and animation, was: Borden Typestyler, Adobe Photoshop 3.0, Aldus Freehand 4.0, and Apple Quicktime video.

Additional technology was used for accessing the internet to acquire textual information and graphics used in the project. Hardware consisted a 33.6 bps modem with dedicate phone line. Internet dialing software was Apple's Internet Connection Kit, with Netcom the service provider. Browsing software used was Netscape Navigator Gold 3.0

Requirements for using the finished program would be any Apple Macintosh computer with a CD-ROM player and color monitor. Minimum RAM requirements for CD-ROM program would probably be 8Mb, and at least a double-speed CD-ROM player would be necessary for smooth play of Quicktime animation clips.

Navigation Design

The first task in the sequence of using this program would be the selection of a topic from the menu card of animation topics. The user would then proceed through a sequence of informational cards containing text, graphics, audio, and animation clips. Within each card will be various choices that the user can make, from: (1) proceeding to the next card, (2) returning to the menu card, (3) receiving more specific information or (4) some elaboration on the information presented, in the form of more text, audio voice, or animation. Navigational icons in the form of "buttons" are "clicked" in order to go to another screen page in a section, or perhaps to play an animation. The user may also click on "Hot text", which is some word or words of a specific color within the body of a text frame. These navigational procedures are laid out for user clarification on in the brief topic section "Navigation" (see Figure 6).

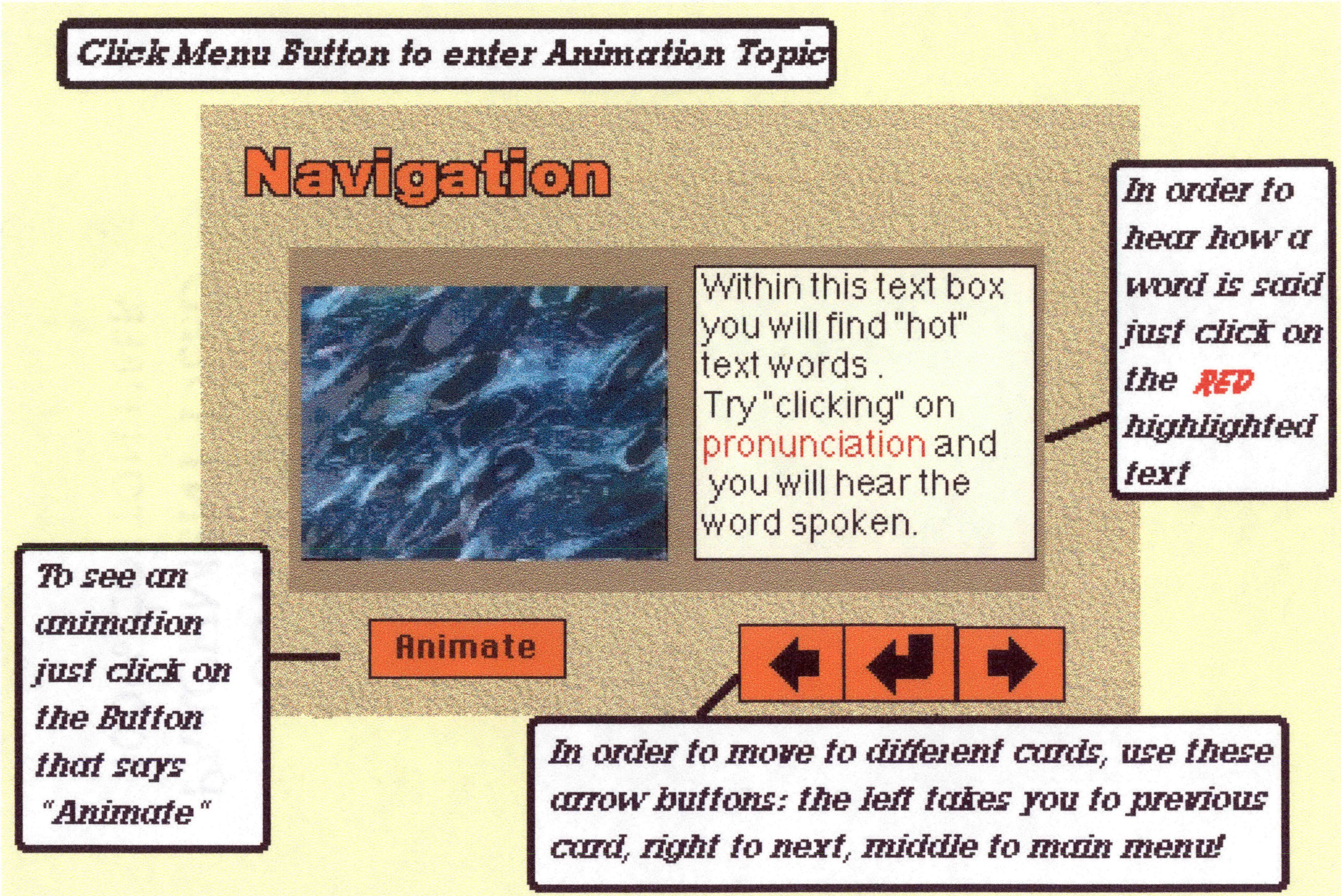

Figure 6, "Total Animation" sub-menu for the topic section "Navigation"

Instructional Design

The material contained under the main topics will be presented in a combination of linear and nonlinear form to accommodate different learning styles. The linear sequence presentation is often used because of the procedural sequence of events for the creating a particular type of animation. The student will have the ability to move through the programs sub-topics and study specific information out of sequence, thus providing learner control and making the program useful as a review or reference resource. The informational material contained in the program consists of emphasizing features such as highlighted text, graphics and animation for illustrating concepts, word definitions, and audio word pronunciation.

The primary learning theory on which multimedia programs such as this one are based is the cognitive theory. This program is instructional in so far as it facilitates learning, however the control is in the hands of the user. The learner can decide in what order or sequence they receive the information in the program by choosing which topics or subtopics to go to from the menu pages. In terms of modern learning theory, a cognitive strategy is a control process, an internal process by which learners select and modify their ways of learning.

This program, through its navigational design, allows for easy implementation of varying cognitive strategies for various learning objectives in animation. As an example, the user may wish only to research specific topics in animation in order to obtain information on a creation technique for the production of an animation project. The programs design allows for the user skip around in the program and go quickly to topics with the relevant information they are seeking.

The unspecified outcome of using this program for instruction is increased knowledge. The learning outcomes can be accomplished for various categories through the applied use of this program, such as procedural knowledge for the creation of some form of animation. The information disseminated through this program can also add to declarative knowledge of the user. Perhaps the outcome most hoped for by using this program would be creating a more positive attitude toward the study and creation of of animation.

Guidelines for Instructional Use

Since this project is designed as a resource and reference guide on the topic of animation, the instructional design for this program is limited to being used as a supplemental resource in the instructional design of a particular teacher's lesson or course. The instructor would determine what the desired outcomes for his or her particular lesson and determine if the program is appropriate in helping to meet the behavioral, learning, or performance objectives. Transfer of learning outcomes from this project program would have to be provided by the instructor using it for the specific use of meeting course objectives. As an example transfer of learning to meet a performance objective could be demonstrated for evaluation, by the learner creating a simple animation project.

The animation instructor would be responsible for evaluation of the program's instructional appropriateness for a particular objective. The stated lesson purpose for using the program would be communicated by the by the instructor, as the program gives no stated objectives. This program is designed primarily as an informational resource on the subject on animation with consideration to its use for many possible learning objectives.

Learning-task analysis for this animation resource project identifies for the instructor the essential user prerequisites of: (1) Intellectual skills involved in basic computer usage and program navigation, (2) cognitive strategies for learning and remembering, (3) basic language skills to to learn and store verbal information, (4) a positive attitude for learning the particular information contained within the program, and (5) the motor skills necessary for using the computer to navigate through the program.

The prerequisite skills for using this program would have to be determined by the instructor to determine its appropriateness for the incorporation in an animation lesson. The prerequisite skills would include knowing how to turn the computer on, simple mouse operations, and minimal keyboard skills. Other helpful prerequisite skills would be knowing how to open menus and enter programs and how to use commands or buttons to navigate through the program. Once in the program stack, the various elements of the screen design incorporated into the individual cards in the stack would give cues, information, and instruction on how to further navigate and use the program.

Screen Design

The screen design for "Total Animation" incorporates the principles of good design, including use of space, consistency, color and type, and simplicity of navigation. Each page screen has symmetrical or asymmetrical balance of elements and space. The use of bright, but reasonably low-key colors has been used consistently throughout the project. Each topic is loosely color-coded through the use of a different color for each in the title text and buttons.

The title card is a menu of topics with a button selection titled "Navigation" with a card giving the stack's purpose and how to use it. There are travel buttons on each card within the topic stacks and buttons or highlighted words or graphics, more text, audio information, graphics, and animations. Animation would be the logical device incorporated into the program stack for gaining learner attention. Because animation stimulates interest and motivation, upon opening the program there is a short animated cartoon introduction.

Formative Evaluation Setup

The formative evaluation of "Total Animation", a multimedia computer program on animation, was administered at Rialto High

School. The evaluators used a Macintosh computer in the high school's journalism classroom, which has the only a computer equipment needed to run this program. The evaluation time given was one fifty-minute class period.

<u>Evaluators</u>

The evaluators for this project were a Rialto High School art teacher and 12th grade student. The teacher has fifteen years experience as an art teacher for the district and has taught animation courses for the past four years. This teacher was selected as an evaluator because of his expertise on the subject content of this project program. His evaluation would be important for determining how comprehensive the coverage of the animation topics is.

The student evaluator is an eighteen year old senior, whom has taken a semester of animation and is currently enrolled in his second semester of this class. He was selected for having enough basic background in computer usage and a very basic knowledge of animation topics as to have necessary prerequisite skills for using this program.

Both evaluators have limited experience with the use of multimedia or hypermedia style programs. However, the teacher and student have experience on computers running DOS platform animation programs. These programs include Disney Animation and Deluxe Paint Animation, which are simple animation creation programs. Their computer experience gives them both all the fundamental knowledge in basic computer functions, including keyboarding and mouse operations. Their level of experience made them good candidates for the evaluation of the navigational quality of the project program.

Procedure

The evaluators were each given the appropriate IRB form for signature (see Appendix A). The evaluators were given an evaluation form on the "Total Animation" program asking then to rate items on a numbered scale (see Appendix B). The form asked for them to circle the number that most appropriately reflected their impressions about the program. They where also asked to add written comments about the items immediately below each one. The evaluators where given approximately fifty minutes to navigate through the program and then give their feedback on the evaluation form.

Feedback Received

The feedback was in general very positive with the items all receiving an 8, 9, or 10 on the positive side of a 0 through 10 rating scale. The comments were primarily enthusiastic and expressing positive remarks for all the items. The problem statements were not entirely clear, but seemed to imply some difficulty with navigation. The student evaluator expressed the feeling that sometimes he was a little lost within the program.

Revisions Made

Revision of this program was primarily in the area of navigation, in order to make it more consistent and give the user more options and control. This was done through the creation of new sub-menus from which to go directly to specific topics within that animation topic area. Also some changes in navigation buttons were made to make the navigational selections perhaps a bit less confusing. While some copyright permissions were recieved (see Appendix C and D), another revision was made as of the result of not being able to acquire the necessary copyright permission for some of the materials that where part of the original program design. As a result of not being able to use some copyrighted materials, photographs of animation class students were substituted. These Photographs necessitated student signiture on photogragh release forms (see Appendix E). in It was also twice necessary to revise the text font in the text windows of the program as the result of finding that other Macintosh computers would not have the same font installed.

Strengths and Limitations

One of the primary strengths of "Total Animation" is that despite it being necessary to remove a lot of the original artwork and animation, it was possible to substitute enough of the work with work of my own and that of students, to make a very complete program. There are numerous examples of animation, if of a rather simple nature. This program could still be built further upon and could not be considered entirely complete, but it covers all of the main concepts of an introductory course.

Further strengths of this program are its screen design and graphics, as well as practical use of animation. Users of this program are able to see animated examples of what they read about in the text on the various subject topics. The user control helps to motivate learning through the use of of not only text, but interactive use of audio, video and animation. The program also provides ease of navigation through a simple, well designed structure of menu, sub-menus, and cards. A final strength of the program is the content deals with relevant issues to students with regard to job opportunities and career preparation.

Most of the limitations for the creation of this project are technical or financial, because computer based animation can require expensive and complex software and computer hardware. The program must remain within the constraints of developers budget and the expected users equipment. Other serious limitations for the creation of this project program is the amount of time has to invest in such a time consuming task as the creation of even fairly simple animation.

The biggest limitation to the creation of this animation project program was the inability to include a history of animation topic, due to copyright constraints. One is not able to make any sort of a complete history of animation without referencing the landmark animations. Without the ability to graphically show examples of the animated works of Disney, Warner Brothers, Max Flecher Studios, and others, there is no real history of animated films.

Recommendation for Future Projects

The recommendation to any person thinking of replicating this type of program, is to be aware of the difficulty of obtaining copyright permission, which will be a requirement. It is recommended that anyone doing a program on animation to think about the amount of time and effort that would be invested on the history topic which will be difficult if not impossible to do justice to with copyright permission from the major studios.

A recommendation would be to expand and concentrate on the future trends of animation, such as computer animation, because more helpful sources of information and reference can be found fairly easy on the internet. Also this program could be possibly be expanded from a reference/resource to a tutorial or one could explore the idea of creating a presentation program from this material. Another recommendation would be to research on learning effectiveness with use of such a program.

Appendix A IRB Form

CALIFORNIA STATE UNIVERSITY
SAN BERNARDINO

APPROVED
Exempt Review
IRB File #
I97050
APPROVED

The California State University

April 18, 1997

Frank Wyatt
c/o Department of Science, Mathematics, and Technology Education
California State University
5500 University Parkway
San Bernardino, California 92407

Dear Mr. Wyatt:

Your application to use human subjects in research, titled, "Total Animation: A Multimedia Computer Resource Program for Secondary Art Education," has been reviewed by the Institutional Review Board (IRB). Your application has been approved. Please notify the IRB if any substantive changes are made in your research prospectus and/or any unanticipated risks to subjects arise.

Your informed consent statement should contain a statement that reads, "This research has been reviewed and approved by the Institutional Review Board of California State University, San Bernardino."

If your project lasts longer than one year, you must reapply for approval at the end of each year. You are required to keep copies of the informed consent forms and data for at least three years.

If you have any questions regarding the IRB decision, please contact Lynn Douglass, IRB Secretary. Ms. Douglass can be reached by phone at (909) 880-5027, by fax at (909) 880-7028, or by email at ldouglas@wiley.csusb.edu. Please include your application identification number (above) in all correspondence.

Best of luck with your research.

Sincerely,

Joseph Lovett

Joseph Lovett, Chair
Institutional Review Board

JL/ld
cc: Rowena Santiago, Science, Mathematics, and Technology Education

5500 University Parkway, San Bernardino, CA 92407-2397

Appendix B Formative Evaluation Form

User Evaluation of Interactive Computer Program on Animation

Please circle the numbers that most appropriately reflect impressions about this computer program.

Please add your written comments about any Item immediately below it.

Learning program navigation	difficult	easy
	0 1 2 3 4 5 6 7 8 9 10	
Navigational design	poor	excellent
	0 1 2 3 4 5 6 7 8 9 10	
Display layout and screen design	inconsistant	consistant
	0 1 2 3 4 5 6 7 8 9 10	
Terminology	confusing	clear
	0 1 2 3 4 5 6 7 8 9 10	
Artwork and animation	dull	stimulating
	0 1 2 3 4 5 6 7 8 9 10	
Informational content	inadequate	adequate
	0 1 2 3 4 5 6 7 8 9 10	
Instructional level (9-12)	difficult	easy
	0 1 2 3 4 5 6 7 8 9 10	
Overall reaction	terrible	wonderful
	0 1 2 3 4 5 6 7 8 9 10	

Appendix C Copyright Permission 1

I hereby grant to Frank Wyatt permission to use the following works:

Title:	Description:
Primitives	Computer Graphic
Sphere Mesh	Computer Graphic
Modeling	Computer Graphic
Beolean	Computer Graphic
Surface Map	Computer Graphic
Rendering	Computer Graphic
Wire Frame	Computer Graphic
Flat Shaded	Computer Graphic
Phoung	Computer Graphic
Ray Tracing	Computer Graphic
Art	Computer Graphic

As part of a multimedia computer project on animation, created for the sole purpose of completing his Masters of Educationin Instructional Technology at California State University, San Bernardino. As a express condition of this authoriztion a credit line shall appear within the project for each of the copyrighted materials used, and a copy of this authorization form shall appear in the appendices of the project paper.

Krys Cybulski

Krys Cybulski

1/6/97

Date

Appendix D Copyright Permission 2

Permission Form

I hereby grant to Frank Wyatt permission to use the following works:

Title	Description
Virtual Reality	A video excerpt (audio & video) from "The Mind's Eye
Seeds of Life	A video excerpt (audio & video) from "The Mind's Eye
The Pyramid	A video excerpt (audio & video) from "The Mind's Eye
Theater of Magic	A video excerpt (audio & video) from "The Mind's Eye

In the following manner: as an approximate 3 to 5 second quicktime video animation in a multimedia project for my Masters of Arts in Education for Instructional Technology at California State University, San Bernardino.
As an express condition of this authorization a credit line shall appear with the video and a copy of this form will appear in the appendix of the project paper.

Copyright holder

2/19/97

Date

Appendix E Photography Release

CALIFORNIA STATE UNIVERSITY, SAN BERNARDINO
ACADEMIC COMPUTING AND MEDIA

PHOTOGRAPHY RELEASE

For and in consideration of my engagement as a model by Frank Wyatt, hereafter referred to as the photographer, on terms or fee hereinafter stated, I hereby give the photographer, his/her legal representatives and assigns, those for whom the photographer is acting, and those acting with his/her permission, or his/her employees or employers, the right and permission to copyright and/or use, reuse and/or publish, and republish photographic pictures or portraits of me, or in which I may be distorted in character, or form, in conjunction with my own or a fictitious name, on reproductions thereof in color, or black and white made through any media by the photographer at his/her studio or elsewhere, for any purpose whatsoever; including the use of any printed matter or video in conjunction therewith.

I hereby waive any right to inspect or approve the finished photograph or advertising copy or printed material that may be used in conjunction therewith or to the eventual use that it might be applied.

I hereby release, discharge and agree to save harmless the photographer, his/her representatives, assigns, employees, employers or any persons, corporation, acting under his/her permission or authority, or any person, persons, corporation or corporations for whom he/she might be acting, including any firm publishing and/or distributing the finished product, in whole or in part, from and against any liability as a result of any distortion, blurring, or alteration, optical illusion, or use in composite form, either intentionally or otherwise, that may occur or be produced in the taking, processing or reproduction of the finished product, its publication or distribution of the same, even should the same subject me to ridicule, scandal, reproach, scorn or indignity.

I hereby warrant that I am under/over eighteen years of age, and competent to contract in my own name insofar as the above is concerned.

I have read the foregoing release, authorization and agreement, before affixing my signature below, and warrant that I fully understand the contents thereof.

DATED 2-3-97

NAME Ray Bishop III

ADDRESS 752 W. Monrose St.

____

I hereby certify that I am the parent and/or guardian of ______________________________ , a child or infant under the age of eighteen years, I hereby consent that any photographs which have been or are about to be taken by the photographer may be used by him/her for the purposes set forth in the original release hereinabove.

____
PARENT OR GUARDIAN

____
ADDRESS

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