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The Design, Development, and Formative Evaluation of a Prototype:
A Computer Simulation Game to Inform the General Public
About the Production, Documentation, and Exhibition of Artwork.

Julia Feldman

A Thesis

in the

Department of Education

Presented in Partial Fulfillment of the Requirements
for the Degree of Master of Arts at
Concordia University
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ABSTRACT

The Design, Development, and Formative Evaluation of a Prototype: A
Computer Simulation Game to Inform the General Public
About the Production, Documentation, and Exhibition of Artwork.

Julia Feldman

The design, development, and formative evaluation of a prototype for visual art education is described. The prototype illustrates aspects of a computer simulation game that would ultimately be used to inform the general public about the production, documentation, and exhibition of artwork. The computer was selected as the appropriate medium for representing the contents of the subject matter, as it allows the user to quickly manipulate and observe many aspects of the visual arts in one location at a given moment. A storyboard depicting the overall gaming concept as well as the features of the simulation game was produced. The storyboard was evaluated by two experts as well as by two end-users in terms of the overall gaming concept, content, language used, visual design, and navigation. The results of the storyboard evaluation were considered for the development of a prototype. Two focus groups as well as two experts evaluated the prototype in terms of its visual design, navigation, and presentation of content. The end-users' acquisition of knowledge was examined. Results of the focus group and expert evaluation are presented. Overall, the visual aspects are considered to be the main strength of the prototype. Navigation is considered to be the prototype's main weakness. Although it was difficult to interpret the post-test results due to the users' difficulty with navigating throughout the prototype, the results of the post-tests indicated various terms that require clarification. Evaluative comments and suggestions for the further design and development of the simulation game, as well as suggestions for further research, are discussed.

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Chapter 1:**Introduction**

Informing the general population about the production, documentation, and exhibition procedures of professional studio fine artists has become a growing need for the Canadian Fine Arts community

In 1970 a meeting of experts on arts education for the general public was held in Ottawa (Canada), in order to analyze and discuss the trends at the time, which determined the relationship between the arts community and the general public. It was recognized that many of the great art institutions had become centralized in their approach to art education, yet a trend of decentralization was foreseen (Cameron & Kattan, 1970). Certain innovations in arts education for the general public in the 1970's were discussed, and some of the activities that were revealed included the following: libraries functioning as cultural centres, lending books, sound recordings, pictures, and other audio visual material; the decentralization of art education could be carried out by means such as mass media and touring groups (Cameron & Kattan, 1970).

Although arts education in Canada has traditionally lacked consideration as being a serious discipline relative to others such as reading, writing, and arithmetic, some art educators across Canada have managed to include art education in their institutions in spite of the severe budget cutbacks (Kelly, 1992). For example in Alberta, the Victoria Composite High School provides art courses which include promotional arts, graphic arts, and commercial arts . As well, the art studies course offers multi-media presentations and gallery visits, which focus on artists as well as on the purpose of art, and the artistic process

(Adams, 1993). Another example of a pioneering arts educational program is at the Art Gallery of Nova Scotia, where education is one of four areas in the gallery's mandate-to educate the population at large. The gallery offers the following programmes: a schools' programme, a public programme for adults, and an education gallery for all age groups (Kelly, 1992).

It is necessary to recognize that art education in some Canadian provinces is presently viewed as being merely a 'frill', thus threatening the seriousness of the discipline. An example of this is in the province of Quebec, where the Ministry of Education guidelines state that art courses are only required until the end of Grade 8 (a requirement which has been often ignored in practice) as other priorities have been considered more urgent (Kelly, 1993). As well, in the province of Alberta, besides the budget cutbacks, the new three year limit for completing a high school diploma has contributed to the high drop out rate from art classes (Adams, 1994).

In a review of the Federal Policies for the Arts in Canada (Schafer & Fortier, 1989) it was revealed that although the arts are presently more accessible, and the conditions which enable artists to attain professional status have improved, it is now apparent that the present needs and problems of artists are basically the same as in the past. For instance, many artists are still seeking adequate income and better employment opportunities, and arts organizations are still struggling with deficits.

As a result of this review, it was recommended that over the ten year period between 1989-1999, the priorities of federal arts policies must be centred on performing and creative artists. The following are just some of the important

activities that were specified: encouraging the development of arts education within the schools; developing more effective programs for attracting the public, thus fostering the use by creative and performing artists and arts organizations of new technologies for the dissemination, administration, and development of the arts; the use of computers, wordprocessors, computer graphics, satellites and video should be especially considered.

Although the need to enhance the support available to the arts community as well as the general public has been recognized in the past, the Canadian arts community presently face the implications of budget cutbacks. For example, due to budget cuts the Canada Council Art Bank announced the possibility of dismantling their Art Bank in 1995, which has stored their collection of Canadian artwork and provided rental services to institutions across Canada. The arts community was at the very least surprised to hear this announcement, and art organizations such as Regroupement des artistes en arts visuels du Québec (RAAV) rallied members of the art community to challenge the notion of closing the Canada Council Art Bank. A committee consisting of fifteen members, who are active participants of the Canadian arts community, has been formed by the Canada Council to assess the situation. The decision to dismantle the Canada Council Art Bank is presently being reviewed.

Problem Context

In light of the successful attempts to improve the status of the Canadian Fine Arts Community, it is apparent that there remains a growing need to enhance public support for artists and art education, due to the budget cutbacks and curricular deficiencies at the secondary school level, where art education seems to be rarely experienced in depth.

As a result, the implications of not exposing young adults to arts education may be the following: they may lack the opportunity to foster their creativity, thus affecting their abilities to develop ideas and concepts (i.e., alternative thinking), they may lack appreciation for fine artwork, due to not being exposed to the standard practices and procedures of professional studio fine artists, they may be unable to distinguish the differences between various kinds of artistic practices (i.e., processes involving graphic art production as opposed to those of a painter or sculptor). There is an indication to the users of some computer software applications that the production of fine artwork occurs through the mere selection of colours and pictures with a quick or neatly cut and paste procedure. In some cases where art education is not offered past grade eight, such as in the province of Quebec (Kelly, 1993), misconceptions about the production of fine artwork may be present amongst the young adult population, as they may not be able to distinguish the differences between fine artwork and mass produced commercial art products.

Aim of Thesis

The aim of this thesis was to produce a prototype of a computer simulation game. This simulation game was developed for the general public of the Canadian young adult population (14yrs-21yrs). The overall objective of the simulation game is to inform young adults about the production, documentation, and exhibition procedures of professional fine artists, who work particularly in the areas of drawing and painting. The production of a storyboard and prototype were utilized as tools to design the described simulation game. In order to illustrate the functionality of the game, information specific to the acrylic painting medium was used as an example in both the storyboard and the prototype. A formative evaluation was conducted on the storyboard and the prototype in order to improve the quality of the product.

An educational computer-based simulation game may allow the user to momentarily engage in some of the activities related to the acts of professional studio artists. This simulation game contains information pertaining to the areas of drawing and painting, thus allowing the user to possibly view certain artistic processes in a more cohesive manner (e.g., producing artwork, documenting artwork, exhibition of artwork).

Target Audience

The prototype of the simulation game, which is named 'Art Life', was designed for the general public of the Canadian young adult population (14 yrs-21 yrs). In the event of developing the entire simulation game, it would be ultimately available to the target audience through avenues such as libraries,

community centres, or commercial outlets. The concept was to provide, in a somewhat leisurely setting, an avenue for educating/informing the general public about the production, documentation, and exhibition processes of studio fine artists

The product is being directed towards the young adult population with the hope of possibly enlightening their interests in the arts, which may contribute to the growth and success of the Canadian Fine Arts Community.

Rational of the Instructional Medium

Educational microcomputer games and simulations can encourage users to engage in certain learning activities, which they wouldn't normally encounter if the program would not be available to them on a computer (Dede, 1987; Lajoie, 1990; Spiro, Feltovich, Jacobson, & Coulson, 1991).

Many young adults who want to learn about certain procedures concerning the production of fine artwork would either traditionally take a course about artistic practices, or visit the museum, or question those who have the relative knowledge such as artists or teachers. Quite often the investigation of such procedures would require the individual to enter an institution, such as a museum or school, in order to attain the appropriate documentation or visual aids.

Traditional avenues may provide the young adult with information about some of the working processes of visual artists, but the individual would most likely not have the opportunity to immediately engage in an interactive environment, such as permitting the learner to immediately view certain concepts and procedures related to the practices of professional studio artists.

However, a simulated context addressing for example, the definition of materials, information on toxic pigments, selection of materials, colour mixing, documentation of artwork, and exhibition applications may be created by using computer simulation and gaming as an instructional medium.

The microcomputer could not only provide the young adult with the opportunity to navigate and interact with this kind of information in a simulated environment, but the computer may be used as a vehicle, thus allowing art education to be brought to the young adult population in a more leisurely setting such as the home, community centre, or library. Rather than fostering knowledge of the art world solely through avenues such as formal institutions (such as museums or schools) and using traditional instructional media (i.e. to books, slides, etc.), the use of computers in art education may be a viable alternative .

There are CD ROM's presently available such as 'Art Gallery: The Collection of National Gallery, London TM (Microsoft, 1993)' and '20th Century TM (Fondation Marguerite et Aimé Maeght, 1995)' where the user can view artwork and access historical references. For instance, information concerning the artist's life as well as his or her artwork can be obtained. Nevertheless, these CD ROM's do not allow the user to explore the process of art creation in relationship to the process of documenting and exhibiting artwork.

Exposing the young adult to information about studio art practices and procedures in an environment where she could easily engage in such related activities could allow her to quickly view those practices in a more cohesive manner. Using more traditional methods to view such information (courses,

books, teachers, video) would most likely require more time in terms of research, and to some extent application (i.e., making an actual artwork, photographing the artwork to send applications for exhibitions). Thus, informing young adults of such studio art practices may eventually reap more benefits for our Canadian young adult population and fine arts community. It may contribute to raising public support and awareness of the arts, increasing financial support for artists, and enlightening the artistic spirit of Canadians (Adams, 1994, Cameron & Katton, 1970; Schafer & Fortier, 1989).

Scope of the Thesis

The following activities represent the scope of the project.

- The identification of content and the development of instructional strategies
- The production of a storyboard that illustrated some of the basic activities and information related to the production, documentation, and exhibition processes of studio artists who work in the acrylic painting medium (e.g., preparation of materials, slide selection, colour mixing, applications for exhibitions, exhibition locations, critical reviews, preparation for a vernissage)
- The development of a prototype that illustrates certain critical features of the simulation game depicted in the storyboard
- An on-going formative evaluation commencing with the storyboard and following the prototype.

Resources/Limitations

The prototype titled 'ArtLife' was created for the Macintosh platform, due to its notable multi-media environment and user friendly interface

The team included the participation of the following two experts: Ken Peters, a subject matter expert in the field of studio fine arts/arts education pertaining to specifically the media of drawing and painting, and Benoit David, a media expert who specializes in the development of computer courseware. The expertise of the subject matter expert and the media expert was crucial in order to assure the quality of the product, both in terms of the accuracy of content and the technical design of the prototype. The invaluable assistance of Scott Morrison, a multi-media developer/programmer, was necessary for the development of the prototype. The participation of users representative of the target audience was of utmost importance so that the product may ultimately be improved.

Having access to a programmer and the SME's and their specific expertise was necessary for the design and development of the prototype. The author was responsible for the activities mentioned previously under the scope of the project.

The scope of this project does not include the entire design or development of the simulation game. Rapid prototyping was used as a design tool in order to quickly view and assess certain critical features of the game that were initially illustrated in the storyboard. The formative evaluation of the prototype was necessary in order to assure the quality of the product. In the event of continuing the design of this simulation game in the future, formative evaluations should be conducted throughout the design and development phases, as this process will only improve the simulation game.

Time Schedule

The following time line reveals the necessary deadlines for the completion of this project.

| | |
|---|----------------------|
| Storyboard Development..... | Nov. 21-Dec.25, 1994 |
| Expert Evaluation -Storyboard..... | Jan. 1, 1995 |
| One-to-one Evaluation-Storyboard..... | Jan. 5 |
| Modify Storyboard for Prototype..... | Jan.5-10 |
| Prototype Development..... | June - Oct |
| Media Expert Evaluation..... | Oct 23 - 27 |
| Evaluation of Prototype-Focus groups..... | Oct. 28 - Nov. 8 |
| Data Analysis..... | Dec. 15 |
| Complete Report..... | Jan. 4 1996 |
| Review Report-Modifications..... | Jan. 7 |
| Submit Report to Thesis Office..... | Jan. 8 |
| Thesis Defence..... | Jan 19 |
| Modification and Final Submission..... | Feb. 15 |

Chapter 2: Design Principles and Concepts

The design principles and concepts discussed in this section were referred to throughout the design and development phases of this simulation game.

Interface Design

Some of the general design principles of the Apple Desktop Interface were considered for the interface design of this simulation game. The following design principles were regarded: what you see is what you get (WYSIWYG); user control; forgiveness; feedback and dialogue; aesthetic integrity; informative design; simple and clear layouts of screens; consistency (Apple Computer Inc., 1987). Listed below are examples of how these principles were applied for the design of this simulation game.

- What you see is what you get: the user of this simulation game needs to immediately identify the meaning of the icons depicted in the game, in order to play the game efficiently. For example, in order for the user to mix colours she would have to first identify the icon of a colour wheel.
- User control: the user must be able to initiate and control the actions in the game. He must understand why he is in a given environment. For example, the user must leave the studio environment in order to send her application to the 'ChanceStar'.
- Feedback and dialogue: if the user should make an error some form of feedback or guidance is presented. For example, if the user selects the wrong response to a question in the colour exercise, she will be provided with

feedback.

- Forgiveness: if the user should make an error in terms of accessing an inappropriate screen, the user will require a way out. For example, buttons are available to the user for navigating forward or backward.
- Informative design, clear layouts of screens, and consistency: the graphics and screen designs of this simulation game should be consistent, clear, and simple in order for the user to perceive the information easily. For example, the definitions of the graphic icons in the studio environment are obvious to the user, and the text illustrated in the rectangle is the same size and font for each screen.

Instructional Strategy

Anchored instruction attempts to ground knowledge acquisition, and application of skill, in the engagement of real world problem solving situations. Instead of relying on decontextualized problem sets, anchored instruction requires learners to use multiple operations in a macro context in order to solve problems (Jonassen, 1993; The Cognition & Technology Group at Vanderbilt, 1990). Anchors were used in this simulation game, in order for the user to grasp various procedures/concepts pertaining to the production, documentation, and exhibition of art work (e.g., illustrating procedures for preparing art materials in a studio environment that which are used to carry out the production of artwork).

ID Models/Instructional Theories

The user's performance in this simulation game is crucial for the activation of certain gaming functions. For example, answering correctly to the posed questions concerning colour mixing will allow the user to build his portfolio. Behavioral objectives are used for defining what the learner must accomplish in this simulation game (Dick & Carey, 1990).

The process of producing, documenting, and exhibiting works of art is in itself a problem-solving activity. Some of the problem-solving activities represented in this simulation game are the following: the user (role-playing the artist) has to complete the preparation of the colour palette for the production of an artwork, in order to give the user access to selecting a portfolio that will be used to apply for an exhibition; the user has to cope with the high risk or chance factor when sending an application for a show, as the granting of an exhibition may depend on previous reviews of the artists work, as well as the opinions of committee members (Eisner, 1985)

Malone (1981) in his concern with instructional environments involving interactive computers, constructed a framework for a theory of motivating instruction. This framework is based on three categories: challenge, fantasy, and curiosity. Certain components of this framework were referred to for the design and development of this simulation game. For example, Malone refers to the use of uncertain outcomes in order for an environment to be challenging. The user of this simulation game can send an application for an exhibition without knowing the likelihood of the results. As well, Malone reveals that in order to engage a learner's curiosity the feedback should be surprising. The

user of this simulation game may receive a negative or positive review for her latest exhibition from the local art critic, thus effecting her potential to be accepted for another show.

Lessons from Computer-Based Learning

Advocates of the view that the computer may function as a means of cognitive enhancement basically recognize a constructive relationship between the computer and the user. Some believe that the partnership between the computer and the learner may permit novices to engage in cognitive activities that would be otherwise unattainable without the technology.

Lajoie (1990) refers to various cognitive enhancing characteristics of Sherlock 1, an intelligent tutoring system developed as a computer-based supported practice environment for avionics troubleshooting. Some of the characteristics of Sherlock 1 are the following: the computer may carry out the lower level operations of troubleshooting, thus freeing up the learners cognitive resources for higher order thinking skills; the user may have access to repetition as needed; the user may be presented with dynamic hints; the computer can provide a problem space where a guided discovery environment occurs, in that hypothesis generation is constrained by the options appearing in the menu interface.

This simulation game includes instructional environments where the user may be provided with repetitive exercises and explanations when required (e.g., colour mixing exercises that are repeated until they are completed correctly and a glossary that is available to the user at any time which may

explain the meaning and purpose for using certain materials). Another aspect of the game is such that the computer will carry out the function of actually constructing the materials or artwork so that the user may concentrate on viewing the procedures for the preparation of art materials, as well as interacting with the simulation game as the procedures and activities are displayed.

The learner will have control over the accessibility of information in this simulation game, due to the linking and branching alternatives available through the interface (Allred & Locatis, 1988). For example, the glossary and help function will be in a sense a database available to the user at any given time.

Papert (in Hanfling, 1989) reveals that microworlds may contain paths that allow the user to explore novel outcomes without feeling afraid of failure or contradiction. This simulation game provides the user with an opportunity to explore various activities that would possibly cause the user to feel self-conscious or afraid of failure in a real life context (e.g., the user may send an application for an art exhibition).

The advantage of using computer simulation and gaming in education is that it allows the user to become actively involved and to explore a manipulable environment (Crookall, 1988; DiBlasio, 1983). Computer simulation games may allow the user to deal with an environment that could be otherwise difficult to manipulate in the real world (DiBlasio, 1983). One of the purposes for designing this simulation game is to provide young adults with an opportunity to engage in activities involving art production, documentation, and

the exhibition of artwork. Ultimately, this simulation game in its completion will provide the learner with a brief overview of the art making, documentation, and exhibition process.

Implications for the Project

As previously discussed in the introduction section, art is presently not a required course in the secondary schools of Quebec. As well, the high school drop out rate for art classes in the secondary schools of Alberta, due to time limitations, has caused concern amongst art educators.

A misconception of the differences between computer assisted art instruction and computer generated art work may also exist amongst the Canadian general population. Computer assisted art instruction refers to the employment of the computer to teach about art as computer generated art refers to the computer as a medium for producing artwork (DiBlasio, 1983, Hayward, 1990). The purpose of this simulation game must be clear to the user from the outset: the simulation game is not to be used to produce artwork but rather it is for the user to be exposed to the processes of producing, documenting, and exhibiting artwork.

One implication for the design of this simulation game was the question of how much information should be included in the model of the artists 'world' (Hanfling, 1989). The gap between the expert's model and the student's model of the subject was a concern throughout the design and development phases. The information presented in the simulation game should be comprehensible to the novice end-user, and at the same time, the simulation game must entice

the end-user who will be more familiar with the subject matter, as the entry skills of the target population, young adults of the Canadian general public 14 yrs to 21 yrs, will most definitely vary.

Another implication was the role of the computer in the overall mode, as important decisions had to be made concerning which parts of the model should be contained within the computer, and which should remain in the hands of participants (Crookall, 1988). For example, the user of the simulation game selects an exhibition space but the computer performs the function of constructing the stretcher for creating the artwork.

The anchors used to ground the knowledge and acquisition of skills are crucial, as they determine the overall operation of the simulation game. The anchors must be easily identified throughout the game order to be effective (i.e. the user must instantly recognize and understand the context at all times so that he can play the game).

The use of uncertain outcomes has to be regulated so that the user does not lose motivation as the game is played when, for instance, the user sends an application for an exhibition and the outcome is negative (Malone, 1981). As well, there is a concern for the presentation of the subject so that the user is able to identify with the content and will feel that the content is useful to her (i.e. to what extent does the design of the game and the interface contribute to the user's motivation to play the game) (Malone, 1981). The use of uncertain outcomes is directly connected to the element of providing surprising feedback in the game (e.g., the user sends an application for an exhibition and the outcome is crucial for the winning or losing of the game).

In order for the user to play the game with ease the glossary and the help function is readily accessible to the user. The speed at which the term may be found in the glossary should be quick enough so that the user may link its usage to the gaming environment. The linking and branching alternatives should have a clear relationship, in order for the user to remember the goals of the game.

The danger in designing a computer simulation is that there may be less concern with the simulation than with the computer and its aspects: hardware, authoring language, and programming concerns (Crookall, 1988). The expertise of a courseware developer, programmer, and a professional studio artist was required for the design and development of this simulation game. Rapid prototyping was used as a design tool in order to assess certain critical features of the game, such as the end-user's ability to navigate and to identify the meaning of the icons illustrated in the studio environment.

The methodology used for designing this simulation game is discussed in the following chapter.

Chapter 3:**Design Methodology**

In the design of a computer simulation game that exposes users to information about the production processes of studio artists working specifically in the acrylic painting medium (i.e. for the development of a prototype) learners are provided with an opportunity to engage in activities that are relevant to the production, documentation, and exhibition procedures of a studio painter (e.g., viewing the preparation of materials used for painting, colour mixing, etc.). This simulation game may be used to some extent as a reference tool and as a practice environment, in which gaming and simulation is employed.

The instructional design required for the development of this computer simulation game required an eclectic approach, as various design tools, principles, and concepts were useful when applied in combination. Various design tools, principles, and concepts were referred to for the development of the prototype.

ISD & Software Development

Andrew & Goodson (1980) note that the application of only one model or approach for all design efforts is not feasible. The complete implementation of ISD models is often difficult due to the many constraints of real-world contexts including cost factors, suitability for purposes, lack of detailed information for interpretation.

The Dick & Carey model (1990), a traditional linear approach to instructional design, consists of the following generic sequential steps: analysis,

design, development, production, and evaluation. These steps include activities such as front-end analysis (refers to training needs analysis, or needs assessment), instructional analysis (refers to learner analysis, content or task analysis, the construction of objectives, the selection of strategy), development tasks (refers to the selection of media, production of storyboard or script and the authoring of content), production activities, and evaluation procedures (refers to the conduction of formative and summative evaluation).

The waterfall model, a standard approach to software design, consists of the following steps: analyze, design, implement, test, and maintain (Tripp & Bichelmeyer, 1990). An implication of both the standard 'lock step' waterfall method and the linear approach to ID, is that one given stage is completed before the results may become input for the next stage in the process

Both models emphasize the development of specifications and standards through analysis. This analysis primarily occurs prior to the large scale generation of the standards and development of a program's components, thus the design options are narrowly constrained at an early point in the design process. Both the waterfall model and the traditional ISD model deal with constraints such as budgeting, planning, scheduling and tracking the development of materials (Tripp & Bichelmeyer, 1990).

Rapid Prototyping

Another approach to software development is called 'rapid prototyping'. The primary characteristic of rapid prototyping is that at the earliest stage possible, a model of the system to be built is constructed. This model is then used as a foundation for designing and developing the system itself (Tripp &

Bichelmeyer, 1990). Designers may attempt to apply rapid prototyping when they are lacking knowledge or experience to draw upon and when they are confronted with complex factors. These factors may include communication problems such as human-machine interaction, and cognitive processing capabilities such as higher-order thinking skills, and 'soft skills' pertaining to management tasks (Tripp & Bichelmeyer, 1990).

Some advantages of using rapid prototyping for software development are the following: enhanced communications among team members and between developers and end-users; decreased development times; the possibility of end-user testing from an early stage, which can lead to the discovery of problems before too much effort has been invested to allow for changes; increased creativity through quicker user feedback; the accommodation of iterations and changes which are natural consequences of instructional systems development, as clients tend to change their minds (Tripp & Bichelmeyer, 1990).

In spite of the advantages of rapid prototyping, certain disadvantages should be regarded when applying this methodology for software development. In order to apply rapid prototyping constructively, one should keep the following aspects in mind: prototyping can lead to a design by repair philosophy; prototyping does not eliminate the need for front-end analysis; a prototype cannot substitute completely for a paper analysis; there may be instructional design problems which are not addressed by prototyping; and prototyping may lead to a premature commitment to a design.

Two requirements for rapid prototyping are modularity, the possibility of

revising one portion of the prototype without affecting other components, and plasticity, meaning the ability of rapidly and inexpensively revising aspects of the prototype. Many instructional media are modular, but in the medium of computer based learning there are tools that provide particularly for the second requirement, being plasticity

Rapid prototyping was used as a tool for designing this simulation game. The prototyping of certain features that are critical to the functionality of the game has allowed the author to quickly assess the impact, characteristics, and feasibility of certain gaming features. The cost effectiveness of formatively evaluating the gaming features depicted in a prototype can prove to be extremely worthwhile, as problems with the game design and interface may be detected at an early stage while production is underway. The process of designing and developing this simulation game was an iterative one, as the data gathered from the evaluation is being considered for the modification of the simulation game design and its further development.

Analysis, Design, and Development Phases

Analysis Phase

Needs Analysis

A needs analysis was initially conducted by reviewing the Federal Policies for the Arts in Canada (Schafer & Fortier, 1989) and other related literature such as the CARFAC (Canadian Artist Representation) and the Arts Bridge Newsletter. In reviewing the related literature, the need for arts education amongst the young adult population became evident. Due to budget cutbacks art education at the primary and secondary level is at risk across

Canada. For the most part, art classes are either not mandatory or are not available past the eighth grade. In many instances the art classes that are available are not necessarily taught by art specialists. It is uncertain the extent to which the arts will remain a fundamental discipline in the elementary and secondary schools.

Informing the general public about artistic processes and procedures may benefit the Canadian Fine Arts Community and the Canadian general public at large. Providing the young adult population with an outlet to explore art exhibitions and procedures for art making may ultimately enhance their personal creativity.

The following are some of the characteristics of the end-users (young adults of the Canadian general public 14 yrs-21 yrs): the users are not very familiar with basic painting materials used for the acrylic painting medium addressed in the prototype; the users will either be studying at the secondary level or will have completed their high school education; the users probably did not receive any formal art education after grade nine; the users are probably not motivated to access information about the production, documentation, and exhibition procedures of fine artists; the users may not be comfortable with using computers; the users may not have access to a computer; the target population is multi-cultural.

Task Analysis

A task analysis was performed by the author in order to identify and define the informational content for the simulation game. The author performed

the task analysis by accessing relative documentation and by consulting an expert in studio art/art education, and as a result certain knowledge and skills were identified

The following is a list of behavioral objectives representative of the basic content selection for the prototype: the user will identify the appropriate colour group by selecting the correct colour that belongs to that particular colour group in question (e.g., primary or secondary colour groups); the user will identify the procedure for building a stretcher; the user will identify the procedure for stretching a canvas; the user will identify the procedure for grounding a canvas; the user will determine how to use the glossary located on the screen by clicking on the appropriate icon; the user will select a portfolio, the user will identify the contents of an artists portfolio by selecting a slide portfolio to send to the ChanceStar; the user will identify the locations for exhibiting artwork by selecting an exhibition location to explore; the user will apply the results of the ChanceStar to decipher her status in the simulation game

The following are examples of the problem-solving objectives that are specific to the content of the prototype: the user will manage to cope with the chance factor regarding the exhibition of artwork by manipulating gaming features (e.g., portfolio contents, colour mixing exercises, and information concerning critical reviews), the user will eventually comprehend aspects of the production, documentation, and exhibition of artwork (e.g., the construction/preparation of materials, the impact of critical reviews, the contents of a portfolio); the user will comprehend the impact of the chance element on an artists career through playing the game, the user will acquire an overview of

some of the production, documentation, and exhibition procedures of a studio painter (for the prototype), thus providing the user with a conception of some of the problems and possible solutions to the difficulties encountered by a studio painter.

A portion of the skills and knowledge identified from the task analysis was used for the design and development of the prototype, thus the behavioral objectives were specified and modified accordingly as the design of the simulation game progressed.

Design Phase

The following procedures were implemented sequentially, but at certain points some aspects of the prototype design were modified as the simulation game took form.

Selection and Structuring of Content for the Overall Game

Initially, the information that was to be possibly used for the overall game was gathered. The information was organized into specific main categories (e.g., painting, drawing, documentation). An outline was created to illustrate the overall structuring of the content organization (see Appendix A). Various instructional strategies were outlined in association with the appropriate gaming functions (e.g., secondary colours are taught by matching colours to sets of primary colours, a chance wheel that spins and exposes exhibition locations).

A flowchart was developed to reveal the layout and direction of the content structure for the overall game.

Interface Design

Some of the general design principles of the Apple Desktop Interface were considered for the interface design of this simulation game. The following design principles were regarded: metaphors; what you see is what you get (WYSIWYG); user control; forgiveness; feedback and dialogue; aesthetic integrity; informative design; simple and clear layouts of screens; consistency (Apple Computer Inc., 1987)

Although a programmer was a member of the team during the development phase of the project, from the outset certain design principles were at risk (i.e., user control, forgiveness) due to the author's lack of programming skills. This was an implication for the success of the project, as not having the proper assistance or resources for programming the game effected the end product.

Storyboard Design for the Overall Game and the Prototype

Initially a storyboard depicting the gaming concept and some of the basic content to be used for the overall game was produced (see Appendix B) This allowed the author to map out an overall concept of how the game would generally appear and function.

Feedback was obtained from experts, as well as from two end-users of the target population. A media expert evaluated the storyboard in terms of the gaming concept and its features. A subject matter expert in the area of studio art/art education, a professor of studio art at university level, reviewed the storyboard. This expert evaluated the gaming concept, the appropriateness of the defined target population, as well as the accuracy, scope, depth, and

sequencing of the content. Two learners of the target population reviewed the gaming concept revealed in the storyboard, as they were helpful in verifying the learners' characteristics as well as the accuracy and scope of the content.

The results of the storyboard evaluation were used to generate the second storyboard, which consists of thumbnail sketches that outline the basic contents of the prototype (see Appendix E).

Development Phases

A programmer as well as end-users were consulted during the development phases. The prototyping of certain critical features of the game aided in assessing their functionality, attractiveness, and effectiveness. Aspects of the game were evaluated and modified in an iterative fashion throughout the design and development phases

User Interface

The authoring software 'Supercard TM' (Allegiant Technology Inc., 1994), allowed the author to create an interface that lends itself to the Macintosh platform (e.g., pull down menus, mouse driven that is 'point and click', window formats, etc.).

The user interface was created for the specific gaming environments developed for the prototype. The user is able to navigate through various gaming environments by selecting an option on the 'Game Menu' screen. The metaphor of a picture hanging is used throughout the game, as well as a coloured star. The hanging picture is used to reinforce the concept of an end product that is viewed. The coloured star synthesizes the chance factor of gaining recognition in the art world.

Certain features of the game (e.g., the function of the Chance Star, the Studio Environment, the Warehouse Gallery, the Simulation, the Colour Matching Exercise) required continual analysis throughout the design, development , and evaluation phases.

Layout and Graphics

The gaming environments developed for the prototype were initially sketched out on paper. The painting and drawing tools of the application 'Superpaint [™]' (Aldus, 1993) and 'Supercard [™]' (Allegiant Technology Inc., 1994) were used to quickly mock up the layout and graphics for each gaming environment (e.g., the Warehouse Gallery, the Studio, the ChanceStar, etc.).

The various gaming functions relative to each specific environment were then developed (e.g., icons, menus, help functions etc.) Colours were selected according to the activities that were predominant for that specific environment (i.e. the contrast of colours was used to make an object more or less apparent)

Scanning Slides and Modifying Stock Photographs

Slides of the author's artwork, which exists in a 35mm slide format, were scanned by a technician from an imaging company, Koloriste Inc. These images were used for the Warehouse Gallery screen. The author cut and pasted stock photographs from a CD-ROM, which were used for the Portfolio Selection screens. These images were then modified with a software application, Graphic Converter [™] (Thorsten, L. 1995).

Text Entry

The text was created and entered for each gaming environment. The font size and colour were modified once the entire prototype was laid out with graphics and menus.

Glossary

A glossary was developed so that the user could access information needed as he would play the game.

Help

A help menu was developed in order for the user to have assistance when needed. Although the help menu wasn't 'active' (i.e. not programmed in the prototype), the end-users had the equivalent information on paper in the form of documentation for guiding the end-users through the prototype trial.

Programming and Revisions

The author initially programmed the graphics, cards, buttons for each gaming environment. Once these environments were considered more or less complete, the author linked them together.

A programmer then refined the programming of the prototype, as well as developed various design features of the game including sounds for the simulation and the review, menus to facilitate user navigation, and animation. Revisions for the programming and design features of the prototype occurred on a continual basis, as the design and development of the simulation game was an iterative process throughout each phase of the project. For examples of

prototype screens see Appendix F.

The prototype was then reviewed by a media expert and an expert in studio art/art education. As well, two focus groups tried out and evaluated the prototype.

Chapter 4:**Formative Evaluation**

The behavioral objectives, problem solving objectives, and the characteristics of the target learners determine the procedures required for the formative evaluation. Various aspects of formative evaluation will be discussed in this section. As well, the methodology that was used for the formative evaluation of the storyboard and the prototype is outlined.

Formative Evaluation of Educational Software

The term formative evaluation, originally coined by Scriven (in Cambre, 1986), refers to the evaluation of educational programs during their development phase, thus allowing for the quality of the product to be improved.

The benefits of formative evaluation have been noted as early as 1921. Lashley and Watson (in Cambre, 1986), assessed a civilian version of a sex hygiene film that was originally created for army use in the United States and France during World War 1. The film was initially named "Fit to Fight", and it was then changed to "Fit to Win" after evaluating the affects of the product on the general public .

Cambre (1986) notes the following aspects of formative evaluation that were employed in the study conducted by Lashley & Watson: the authors expressed the belief that their findings would be of value in planning future products; the methodologies that were employed resembled those an evaluator would use in pre-testing a prototype product (i.e., expert judgement, testing the product on samples of the target audience, and conducting interviews).

Baggaley (1986) notes that CTW programmes such as 'Sesame Street' have devised formative evaluation methods for supplying producers with evidence regarding the impact of a television programme, thus allowing for the modifications of the program to be made inexpensively and within time constraints. Patterson and Bloch (1987) mention that CAI developers should conduct formative evaluations of courseware as part of the instructional design process, as they refer to the considerable amount of funds often wasted on the purchase and utilisation of computer courseware that proves to be unsuitable or ineffective.

The accumulated evaluations of educational software in databases such as Micro Soft in the United States, The Educational Products Information Exchange Institute, the Council of Ministers of Education, as well as York University, provide valuable information to those employed in the field of education and to the public at large (Duchastel, 1987).

Formative Evaluation Procedures and Models

Andrews and Goodson (in Weston, 1986) reviewed 40 instructional design models and found that 38 of them had recommended the trial and revision of instructional products. Although there have been a variety of models developed for conducting formative evaluations, most of them contain some common procedures.

The general approach to formative evaluation involves the collection of empirical and non-empirical data during formative stages of product development. The data is often gathered by performing the following: a self

critique of one's own material or involving others in the analysis of materials, having an expert review the material, and conducting developmental testing that involves learners as primary sources of feedback for revision (Weston, 1986).

For the purpose of this thesis equivalent, some models of formative evaluation are discussed. Dick & Carey (in Hannifin & Peck, 1988) have divided formative evaluation into the three following phases: (1) One-to-one evaluation is conducted extensively during the initial lesson design and development. This phase consists of informal procedures, and its purpose is to identify potential major problems with the instructional material, (2) Small group evaluations are often conducted when the lesson is nearly completed, in order to assess the effectiveness of the material more formal evaluation techniques are employed at this phase, (3) Field testing occurs when materials are in final draft quality, and is conducted in the actual setting or in a place similar in which the instructional materials are implemented, thus formal evaluation techniques are applied.

The CSE Model (Popham, 1975) deals with the development of the product as well as the process of evaluating the program. This model consists of the following five phases: needs assessment (attempt is made to ascertain the current status of an educational program's outputs, then this status is contrasted with desired program outcomes), program planning (provides information regarding the types of instructional programs that meet the needs identified during the needs assessment stage), implementation evaluation (provides information on the degree to which the instructional program is

actually being carried out in accordance with the program plan), progress evaluation (provides information regarding the extent to which the planned program is achieving its objectives), and outcome evaluation (provides information regarding the basic worth of the program as reflected by the outcomes it produces).

Another model by Arenson (in Patterson & Bloch, 1987), initially involves a technical review of the program by "technical experts". Experts would review the material in order to detect errors in content data, quality of presentation, timeliness of the material, and appropriateness of the evaluation instruments. Major revisions are then carried out to the original CAI prototype. As well, the model proposes a combination of individual and group tryouts and student feedback. Following the first student tryout, a debriefing session is conducted which can identify major problems through student comments and item analysis. Once the prototype is reviewed, and if there are no major problems detected, the minor revisions are then completed in order for the prototype to be field tested. However, if a problem arises it is then revised until the program is deemed appropriate for field testing.

Flagg (1990) notes certain techniques of formative evaluation. The characteristics, advantages, and disadvantages of each technique are revealed in Table 1.

| Technique (Flagg, 1990) | Characteristic | Advantage | Disadvantage |
|---|--|---|--|
| Tests-content referenced | performance is referenced to the program content and objectives | mastery of instructional outcomes may be analysed | lack information about the learning process and about why outcomes are not obtained |
| Self-Report * continuous reaction measures | obtains respondents' immediate assessment of the comprehensibility and persuasiveness of the program in its early and later production phases | thinkaloud technique-obtains users' immediate assessment of program appeal and it is open ended | cannot obtain everyone's opinion about a particular program feature |
| | | escorted trials technique-developers can obtain users' feedback before production has begun | cannot entirely emulate functionality of certain media i.e. computer |
| | | paper and pencil technique-enables learners to evaluate appeal of program during viewing or usage | needs more processing time and are not immediately available for interpretation |
| | | program evaluation analysis computer-assess program appeal-produces regularly elicited comments | experimentation is needed to establish its usefulness in assessing processes related to outcome effectiveness |
| *questionnaires (Multiple choice phrase questions - yes/no, true/false-Likert scale, Semantic differential scale) | assess learner outcomes and reactions to program content-collect data on appeal (opinion, attitudes) of program either in written or verbal form provides demographic data | questionnaires are easy to administer & analyse, provides a standardized presentation and anonymity for respondents | intended meaning of questions cannot be clarified for respondents-certain aspects of program may not be clearly remembered |

| Technique (Flagg, 1990) | Characteristic | Advantage | Disadvantage |
|---|--|--|---|
| Self-Report *Interview (telephone, face-to-face) | <ul style="list-style-type: none"> -assess learner outcomes and reactions on program content -collect data on appeal (opinion, attitudes) of program either in written or verbal form - provides demographic data | open-ended and can help to understand why certain results occur | labor and time intensive yielding small homogeneous samples |
| Observation (Online monitoring, video, audio) | <ul style="list-style-type: none"> -can give insight into the ease with which learners are achieving their objectives | typically it does not interfere with normal use of program in natural setting-it is less subject to distortion resulting from respondents wanting to please the researcher- On line is most useful in discovering how program segments were used. | <ul style="list-style-type: none"> - observers must wait for the appearance of behaviors. - audio only records verbal responses and the video has a restricted field of view. |

Table 1. Cont'd educational software evaluation techniques (Flagg, 1990).

Certain criteria have been established for evaluating educational software. In Table 2 the criteria for educational software evaluation stated by Stadslev (1974), the Council of Ministers of Education (Canada, 1985), and Rothe (1983) are revealed.

| Author | Criteria Applied |
|--|---|
| Stadsklev, R. Games Analysis System (1974) | Checklist-a. Observable Factors b. Antecedent Conditions (requirements) c. Rationale and Objectives (why) d. Content (what) e. Operational Strategy (how) f. Evaluative Comments g. Judgemental Factors (opinion of basic characteristics) |
| Rothe, J. (1983) | Analytic categories dealing with the social implications of educational software-1. Language Usage 2. Knowledge 3. Ideology 4. Profit 5. Culture 6. Ethics. |
| Council of Ministers of Education (Canada, 1985) | <p>Routine procedures: review all instructional materials, ensure all components of product are included in package, try out materials, go through materials a second time in depth and make notes and observations, complete evaluation, review any parts of the material that need special attention.</p> <p>The evaluation:</p> <ul style="list-style-type: none"> a. Objectives b. Pedagogical Content (scope, sequence, depth, accuracy, bias, readability) c. Instructional format (student interaction, questioning technique, feedback, evaluation, branching, types of control) d. Technical Design (screen displays, colour, graphics and sound, ease of use) e. Implementational Support (ease of implementation in the classroom, management system) |

Table 2. Criteria for educational software evaluation

The methodology used for conducting the formative evaluation of this simulation game is explained in the following section.

Methodology

Subjects

The following two experts were involved in the formative evaluation of the storyboard: a subject matter expert in the area of studio art production, and a media expert in the area of courseware development. The subject matter expert assessed the appropriateness of the defined target population, the content in terms of its accuracy, scope, and depth, as well as the presentation and sequencing of the content. Information concerning the gaming concept and the opinions and suggestions of the subject matter expert were noted. The media expert evaluated aspects of the simulation game depicted in the storyboard in terms of the gaming concept, the visual design, the presentation of information, as well as the interface design. The opinions and suggestions of the media expert were noted.

The storyboard was evaluated by two subjects representative of the target audience. They assessed the content in terms of the language level, the scope and depth, the presentation, as well as the sequencing. The visual features and the interface design were evaluated by the end-users. Information concerning the gaming concept and the opinions of the subjects were noted. Background knowledge and demographics were obtained.

Following the completion of the prototype, two experts (a media expert and an expert in studio art/art education) evaluated the prototype. As well, two focus groups tried out the prototype. One focus group evaluated the prototype in terms of its appeal. Opinions and attitudes concerning the design features (e.g., gaming environments), gaming characteristics (e.g., the ChanceStar),

as well as on the presentation of contents were ascertained. The second focus group received a post-test which pertained to knowledge acquisition (i.e. concerning the preparation of art materials as well as certain documentation concerning colour theory and exhibition procedures). The opinions and attitudes of the subjects were recorded. Background knowledge and demographics were obtained from both groups.

Design

There were one-to-one evaluations conducted at the pre-production phase (storyboard) with two subjects representative of the target audience. Structured interviews were conducted with the subject matter expert and media expert.

Informal evaluations occurred during the production phase involving various persons: experts, possible end-users, programmer, author. An implication of relying solely on the storyboard evaluations for the final production of the prototype is that it is difficult to emulate the functionality of the computer and user interaction on paper. Problems in the instructional design of the final prototype may be detected earlier through using rapid prototyping as a design tool (Tripp & Bichelmeyer, 1990).

Initially, the experts (i.e. media expert and studio art/art education expert) reviewed and evaluated the prototype once it was completed. The experts completed a questionnaire, and the author interviewed the experts in order to note any suggestions or opinions. One focus group tried out the prototype and received a post-test in order to measure knowledge acquisition and to

record the overall appeal of the prototype. As well, a second focus group tried out the prototype and the specifics related to the appeal of the game were assessed. The subject's were asked to complete a questionnaire. Their opinions and attitudes concerning the design features, gaming characteristics, and contents of the prototype were obtained. Information concerning background knowledge and demographics were acquired from both groups. The author noted her observations concerning how the users interacted with the prototype. Following the completion of the post test (for group 1) and questionnaire (for group 2), a debriefing session occurred with each subject in order to discuss the subject's experience with the prototype and to note any suggestions for the design of the simulation game.

Instruments

Self reporting techniques, such as structured interviews with the experts and the two subjects were used for evaluating the storyboard. The interviews consisted of open-ended questions and covered the aspects that were previously stated (refer to the heading 'subject' and see Appendix D). One-to-one evaluations were conducted with the two subjects in order to assess various aspects of the storyboard.

The experts evaluated the final prototype, and were asked to complete a questionnaire in order to obtain data concerning the operations of the simulation game, the interface design, the visual features, the content, and the presentation of content. The opinions and recommendations of the experts were sought (see Appendices I and J). Following the experts' completion of the

questionnaire, the author conducted an open-ended interview with the experts in order to discuss any suggestions they may have had concerning the design and further development of the simulation game (see Appendix H).

One focus group tried out the prototype and then completed a questionnaire. The questionnaire recorded data such as the gaming characteristics, and the appeal of the game (see Appendix K). A second focus group received a post-test following the prototype trial (see Appendix L). Data was gathered concerning the acquisition of knowledge and the appeal of the game (refer to the heading 'subject').

The author noted her observations of the prototype trial, as this information provided further insight into how the program was being manipulated by the users, thus the users' requirements became more apparent. Following the questionnaire or post test, a debriefing session occurred in order to discuss the subjects's experience with the prototype and to obtain any suggestions concerning the development of the simulation game (see Appendix H).

Constraints

The non-random selection of subjects poses a threat to the external validity of the study, as the subjects of the focus group were selected through asking young adults (14 yrs-21 yrs) to participate in the study. Canadian citizens who are presently located in the province of Quebec were approached to participate in this evaluation. The focus groups' evaluation of the prototype occurred in a leisurely setting (i.e., the evaluator's home). Another threat to

external validity is the artificiality of the setting, as the conditions of a leisurely setting under realistic circumstances will change for each user. Therefore, it is difficult to control for the many environmental factors that may come into play throughout the evaluation procedure (e.g.noise, intrusion)

Although the participants in this evaluation are representative of Canada's multi cultural population, other focus group evaluations should be conducted across Canada, in order to fully accommodate the needs of the Canadian young adult population. The age range of the defined target population (14 yrs-21 yrs) was altered after the initial meeting with the subject matter expert from 18 yrs-25 yrs to 14 yrs-21 yrs, as the subject matter expert believed this game would motivate young teenagers due to the fact that they have very little opportunity to be exposed to the visual arts

The distribution of a post-test in order to assess knowledge acquisition (for the second focus group) controlled for the internal validity of the study. There was no pre-test given that may sensitize the subjects, thus preventing the subjects from experiencing a practice affect before they would actually try out the prototype. The difference between the users' knowledge of the subject before and after they played the simulation game could not be measured, as this is a drawback to not pre-testing the end-users

Data Analysis

The data collected throughout the preproduction phase is revealed in a discussion format. The results of the media expert's evaluation of the completed prototype are illustrated and discussed. The noted observations and the

contents of the debriefing sessions are discussed and used to complement the results of the post-tests and questionnaires.

The results of the post-tests and questionnaires were analyzed through the application of descriptive statistics, thus frequency and mean scores are provided.

Procedure for Evaluation

1. The subject matter expert and media expert were initially contacted in order to establish two separate times for evaluating the storyboard. The meeting with the studio art/art education expert took place in his art studio (Montreal, Que.) The meeting with the media expert took place in his office at the University of Montreal (Montreal, Que.). The evaluation consisted of reviewing the storyboard with each expert, as well as conducting a structured interview. The subject matter experts' opinions and suggestions concerning the needs and characteristics of the target population were noted. The results of the experts' evaluation of the storyboard were considered for the modification of the storyboard and the development of the prototype.

2. Two users representative of the target audience were contacted, in order to perform one-to-one evaluations of the storyboard. The evaluations occurred in the home of each user. The results of the one-to-one evaluations were used to assess various aspects of the computer simulation game. For example, aspects such as the language level, the scope and depth of content, and the presentation of content were assessed by the end-users. Their suggestions

were considered for the modification of the storyboard and the development of the prototype.

3. A second storyboard which consisted of thumbnail sketches was produced for the development of the prototype. A rapid prototype was produced in order to obtain an idea of how certain critical features of the simulation game may appear and function in the computer medium. The programmer and some end-users were consulted in order to assess the contents of the prototype. Suggestions and opinions were considered in order to further develop the prototype.

4. Once the prototype was completed, two experts were contacted in order to establish a time to evaluate the prototype. A media expert and an expert in studio art/art education reviewed and evaluated the prototype. A questionnaire was used to record information concerning various aspects of the simulation game (i.e. interface design, presentation of content, etc.). An interview was conducted in order to discuss the experts' opinions and suggestions.

5. Following the experts evaluation of the prototype, two focus groups, each consisting of three subjects, were formed in a nonrandom fashion. Subjects who were representative of the target population were contacted in order to establish a time for the evaluation. The two focus group evaluations were held in the author's home, as the computer simulation game is meant to be used in a leisurely setting. Initially it was emphasized to each subject that his or her

participation in this evaluation would be helpful for the further development of this simulation game.

Each subject tried out the prototype, and the evaluator noted her observations of the subject's response to the prototype. Following the prototype trial, the user was asked to complete a questionnaire or post-test (depending on which group the subject was in). Once the questionnaire or post-test was completed, a debriefing session was conducted with each subject in order to discuss the subject's experience with the prototype and to note any suggestions that the subject may have had concerning the design of the simulation game.

6. The analysis of the data will be considered and possibly used for the modification of the prototype at a later date.

Results

The purpose for having experts and end-users evaluate the storyboard was to verify the effectiveness of the overall gaming concept, as well as to verify the accuracy of the content. The results of the storyboard evaluation were considered for modifying certain gaming features/concepts (e.g., ChanceStar), in order to produce a prototype.

Storyboard Evaluation - Media Expert

A structured interview was conducted with a media expert for the evaluation of the storyboard. The interview with the media expert was held in his office at the University of Montreal. Initially the author walked through the storyboard with the expert, while explaining and questioning the expert about the various aspects of the simulation game. The media expert evaluated the simulation game depicted in the storyboard in terms of the gaming concept, the visual design, the presentation of information, and the interface design (see Appendix B and Appendix D). The opinions and suggestions of the media expert were noted.

Background

Benoit David has three years experience designing courseware for the field of medical education. He is currently working on various projects for the Dentistry Department within the University of Montreal. As well, Benoit is presently completing an M.A. in Educational Technology at Concordia University. His notable experience in developing interactive multi-media applications has aided the design and development of this simulation game

Gaming Concept

Information concerning the gaming concept was acquired. The degree of motivation and challenge revealed throughout the game was discussed. The following points were emphasized:

- The user should feel at risk in order to remain motivated to play the game and to 'learn more' in the studio space.
- Some of the possibilities for inducing risk were discussed (i.e. the user loses all of the shows gained or he may gain bonus points while exploring and answering questions).
- In order to build incentive the risks and goals of the game must be clear from the beginning to the end of the game.
- It was recommended that the risks should be representative of those in real life, over which the user would have no control. Possibilities for risk may be to include the role of an agent who may either make or break your career, or having a critique which may cause you to lose or gain your popularity, thus causing you to lose or gain more shows.

Interface

The author investigated the effectiveness of the 'interface design' comprising the ArtLife Menu, glossary, help, quit icons, visual layout, prompting, menus, and buttons. The media expert mentioned the following points:

ArtLife Menu, Glossary, Help, Quit Icons

- The ArtLife menu, glossary, help, and quit icons may be combined into a small

icon on the screen that may be opened by the user when needed This would afford more uncluttered space for the visuals.

Visual Layout

- The overall layout of the screens illustrated in the storyboard seems to be clear.

Prompting

- Rather than prompting the user to point and click, the use of a blinking icon was recommended.
- If the user doesn't access whatever is being prompted within, for example, a 15 second time frame, then instructions should pop up to guide the user.
- Try to avoid unnecessary repetition, as the user doesn't want to be presented with what she already knows.

Navigation-Menus, Buttons

- The use of buttons is important for providing a way out from different portions of the simulation game.

Visual Design (Graphics, Font)

- The artwork illustrated in the simulation game should be modern artwork that is meaningful to the target audience.
- The graphics should be skilfully rendered but simple.
- The text in the menus and screens should be included in the prototype in order to assess its impact.
- The use of illustrations in the menus must be immediately recognizable.

Opinions/Suggestions

- Motivating factors need to be built into the design of the game, for example, use the slides to solve a puzzle, thus providing a message to the user. This could motivate the user to access various aspects of the game in order to gain points.
- The target audience (14yrs-21yrs) will probably not be very familiar or comfortable with using computers. They will most likely require some orientation in order for them to use the equipment properly.
- The overall concept is interesting and creative.
- Users need to feel challenged throughout the game (e.g., use 'double or nothing' for points, use the slides as a puzzle (e.g., face of a famous artist).

Storyboard Evaluation - Studio Art /Art Education Expert

As well, an expert in studio art/art education evaluated the storyboard. A structured interview was conducted by the author in the expert's studio located in Montreal. The author basically reviewed the storyboard and the content with the expert, while explaining and verifying various aspects of the simulation game. The expert evaluated the simulation game that was illustrated in the storyboard in terms of the accuracy, depth sequencing, and scope of the content, as well as the language level, the presentation of the content, and the gaming concept (see Appendix B and Appendix D). The opinions and suggestions of the expert were noted.

Background Info.

Mr. Peters is currently teaching painting and drawing at Concordia University. He practices his art as well as teaches on a regular basis. Mr. Peters is highly recognized within the Fine Arts community and is dedicated both to the practice and teaching of the visual arts. He has taught 'studio art' to students at the High school, CGEP, and University levels for the past thirty years. Along with his notable teaching career, Mr. Peters has a wealth of experience in practicing the arts and has shown his work in numerous group and solo exhibitions. His experience as an art teacher and as an art practitioner was invaluable for the development of this simulation game.

Accuracy of Content

The accuracy of the content depicted in the storyboard was verified by the expert. The modifications to the terminology/definitions are listed below.

- Insurance: emphasize the importance of how the insurance must cover the entire value of the art work.
- Artist Co-op: mention that the members of an artist Co-op may decide to bring in other artists from outside the Co-op to show their artwork.
- Contracts: some artists won't sign contracts due to the constraint of being exclusive, say, to a particular gallery.
- Commission: change the percentage of sales from 40% and 70% to 50% and 60%.
- Transportation: add that an artist may receive funding from the museum to

cover transportation costs for a travelling show.

- Drawing surfaces: indicate the use of surfaces (e.g., newsprint is used for warming up with quick gestural drawings). Reveal that people have drawn on stones as well as on the surfaces of caves, and that such surfaces are still valid ones.
- Primer for Oil: explain that its purpose is to prevent the oil from rotting the canvas.
- Linen canvas: indicate that it outlasts cotton.
- Canvas Board: reveal that it is a cloth that is covered and sealed with gesso.
- Brushes: add artificial sable.

Scope of Content

The author questioned the expert concerning the scope of the content. The author's main concern was whether the amount of information was sufficient for the user to understand the concepts and procedures communicated throughout the game. The expert revealed that 'a good foundation is provided about studio art practices'.

Language Level

Overall, the expert claimed that the language level is appropriate for the target audience (18 yrs -25 yrs), although he felt that the target audience should be changed to 14 yrs - 21yrs, as he emphasized this younger range would most likely appreciate the simulation game much more than those in their mid-twenties.

Presentation of Content

The presentation of content was reviewed by the expert in terms of its accuracy and its attractiveness. Listed below are the points mentioned by the expert:

- When showing a 'Museum Solo Show' the age factor of the artist should be specified (e.g., at 50 or 60 yrs a retrospective of the artists work is usually provided).
- Museum 'group exhibitions' are not usually organized anymore. Although they used to have 'Spring shows' to expose many Canadian artists, budget cuts have eliminated many exhibition opportunities for young artists.
- The content is presented in an attractive manner.

Sequencing of Content

The sequencing of the content, the procedures for the production, documentation, and exhibition of artwork was reviewed by the expert. The expert expressed the view that the sequencing of the content is 'logical', thus allowing the user to learn the procedures and concepts depicted in the storyboard.

Effectiveness of Gaming Concepts

The author questioned the expert concerning the effectiveness of the gaming concepts (e.g., ChanceStar). The expert revealed that this simulation game is effective in terms of exposing artistic practices to individuals who would be initially interested in knowing more about them.

Suggestions

The expert recommended altering the age range from 18 yrs-25 yrs to 14 yrs-21 yrs. He revealed that students of this age range are generally more interested in the visual arts. He emphasized that they usually don't have convenient access to 'exploring the arts', thus making it difficult for those in this age range to foster their talents and interests in the visual arts.

The expert found the game to be very interesting and he enjoyed the basic design of the game. As well, he claimed that this game would be very helpful in terms of learning about producing, documenting, and exhibiting artwork.

Storyboard Evaluation - End-Users

The purpose of this evaluation was to verify how the end-users' would perceive the fundamental design of the simulation game. The information obtained from the evaluation was used to modify the game before the prototype was developed. Although it is difficult to emulate the functionality of the computer in a storyboard format, various aspects of the simulation game were assessed by the end-users: the scope of the content, the overall language level, the depth of content, the presentation of content, the sequencing of content, the gaming concept, the visual features of the game, and the interface design. The opinions and suggestions of the end-users were noted (see Appendix B and Appendix D).

Initially, the evaluator obtained information concerning the subjects' background in computers and art education. Demographics were acquired as

well. The simulation game was then introduced to the subjects, thus providing them with background information concerning the game's overall objectives. The evaluator walked through the storyboard with the subjects, thus attempting to emulate how the game would be played on the computer. The evaluator maintained an on-going communication with the subjects in order to acquire any information that could benefit the further design and development of the simulation game.

Background Information and Demographics

Michael is 21 years of age. He is an anglophone, and he is a resident of Montreal. He is currently employed in the restaurant industry. Michael graduated high school, and his last art course was taken in grade 9. Michael stated that he feels basically comfortable with computers, especially with the Macintosh platform as he has obtained frequent access to this particular platform by using his friend's computer.

Scope of the Content

Information concerning the scope of the content was acquired. Michael felt that there was basically enough information available to him. Despite this, Michael seemed to require information concerning the history/style of the artwork, as he wanted to understand the relevance of the artwork in its context (e.g., why the artwork is being exhibited in a particular gallery).

Language Level

Throughout the evaluation of the storyboard, the author probed the end-user in order to verify the use of language and its clarity. The overall language level seemed to be adequate. Michael appeared to comprehend the definition of terms.

Depth of Content

The author questioned the end-user whether he needed more information on a topic in order to understand its meaning. The depth of the content seemed to be appropriate. It was difficult to focus on one particular aspect of the game as there was an abundance of material to review. The main problem seemed to be the amount of text presented for the 'Rules of the Game'. Michael was overwhelmed by being exposed to such a large amount of information at one time. It was clear that the 'presentation' of the 'rules of the game' would have to be simplified in its presentation by reducing the quantity of information that may be available to the user.

Sequencing of Content

The author verified the sequencing of content with the end-user. Michael commented on the following:

- The styles of the artwork should be exposed and explained to the user. For example, the user could choose a style and then continue to the problem space in the studio. The question of whether the user could change styles after completing each artwork was posed by the user.

- The purpose of the studio in relationship to the 'ChanceStar' was slightly confusing to the end-user, as it was difficult for him to immediately link why the environment had changed from the studio to the ChanceStar.

Presentation of Content

The author verified the presentation of content with the end-user.

Michael mentioned the following points:

- The 'ChanceStar' reveals the results of sending an application for an exhibition. This surprise element of the game was received well.
- When clicking on the 'send icon' a warning stating the criteria for exhibition opportunities may appear in relation to the user's score (instead of stating all of the criteria under the rules of the game).

Interface Design

The author questioned the end-user concerning the interface design (i.e., ArtLife Menu, glossary, help, quit icons, visual layout, prompting, menus, and buttons) depicted in the storyboard. Michael's recommendations are the following:

- Once an artwork (e.g., painting) is completed the documentation icon should blink in order to cue the user to view his portfolio.
- The information given on 'Rules & Scoring' should state only the basic requirements for playing the game (i.e., how scoring works and the general rules of the game). The detailed requirements may be revealed in a 'pop up menu' format as the game is being played.

Visual Design

The author questioned the end-user concerning the graphics and fonts presented in the storyboard. Michael claimed it was difficult to assess the graphics in the storyboard format, but he indicated that the graphics should be colourful. As well, he emphasized that the text should be easy to read on the screen.

Gaming Concept

The author asked the end-user about whether he felt motivated to play the game. Michael mentioned the following points which could be used to create a more challenging environment for the simulation game:

- Once an amount of exhibitions have been won, the user can create a new portfolio consisting of recent works which may allow him to access other locations on the 'ChanceStar' (tempting the user to return to the studio environment).
- Bonus points may be won when an artwork is sold (this may be part of the criteria for exhibiting artwork in a commercial gallery).

Opinions/Suggestions

The author noted the end-user's opinions and suggestions.

- The main goal of the game should be more clear (e.g., highlight the museum).
- In order to prevent the user from losing interest, the surprise element should not explain outcomes.
- The procedure for developing a slide portfolio can be explained and the user can name his portfolio and create titles for the artwork.

- The role of the 'agent' throughout the game is not very clear.
- The use of a 'globe' isn't apparent in terms of how the content relates to geographical locations, especially since historical references and style are not explored throughout the game.
- The 'Chance Star' and the 'Portfolio Selection' are great features and should motivate the user to remain interested in the game.
- It's a fun and interesting way to learn about the visual arts. It would be fun to play this game.
- The game is helpful in terms of learning about producing, documenting, and exhibiting artwork.

Background Information and Demographics

Jessica is 16 years of age. She is an anglophone, and she is a resident of Montreal (Quebec). She is presently completing her high school diploma. Jessica revealed that her school considered art as a mandatory course for grades seven and eight. As well, she claimed that art was being offered as an optional course for grades 9-11, though Jessica hasn't taken an art course since the eighth grade. Jessica indicated that she felt basically comfortable with the IBM Platform, and that her experience with the Macintosh platform was quite minimal.

Scope of the Content

The author questioned the end-user concerning the scope of the content. Generally, Jessica felt that the scope of the content was adequate. However, Jessica wanted to know about the different styles of the artwork as well as its

historical or political references. The 'context' of the artwork was of interest to Jessica.

Language Level

The author verified the language level with the end-user. The overall language level seemed to be adequate, except for a few terms which required further clarification (i.e. C.V., Gesso, Dealer, Agent).

Depth of Content

The author questioned the end-user about the depth of the content. The depth of content basically seemed appropriate except for certain details that needed to be revealed in the definition of terms. Jessica paid close attention to the definition of terms, and pointed out certain areas which required some clarification. These areas are listed below:

- Vernissage: The kinds of individuals who are invited to a vernissage should be revealed.
- Commercial Gallery: The concept of a gallery functioning simultaneously as a 'gallery' and a 'dealer' required some clarification.
- C.V.: The definition of a C.V. should be provided.
- Gesso: The ground or base of the support required further definition.

Sequencing of Content

The author discussed the sequencing of the content with the end-user. Overall the sequencing of the content was comprehensive. However, further clarification concerning the development of the slide portfolio in relationship to

the ChanceStar was necessary. It wasn't clear 'where' the slide portfolio was being sent to and 'why'.

The Presentation of the Content

The author verified the presentation of content with the end-user. Jessica mentioned the following points:

- The illustration of Gel or Gesso on the surface was unclear to Jessica. She wanted to know how you could see the Gel or Gesso.
- Jessica would have liked to have some reference material for the colour mixing exercises.
- When selecting 'yes or no' it should state 'yes or no' to have a show.

Interface Design

The author questioned the end-user concerning the interface design. Jessica enjoyed the surprising aspect of the image being created by the computer when answering the colour mixing questions. Jessica indicated that she would like to have some control over the artwork that is being produced, such as a menu providing the user with various options to modify the colour or texture of the artwork.

Visual Design

The author questioned the end-user concerning the graphics and fonts presented in the storyboard. Jessica expressed the view that the graphics illustrated in the storyboard appeared interesting. She emphasized that the graphical display should have a lot of 'pizazz'. Jessica found the text easy to

read.

Gaming Concept

The author asked the end user about whether she felt motivated to play the game . Jessica revealed that she would like to be entertained once the activities are successfully completed at various stages throughout the game, as well as at the end of the game (e.g., spinning newsprint headlines claiming fame and fortune).

Opinions/Suggestions

- The game should be out of the user's hands at the end, thus the user should be able to sit back and reap the rewards.
- This game would provide teenagers with a great opportunity to learn about the visual arts, instead of playing games where characters on the screen kill each other.
- This game would probably be helpful for learning about producing, documenting, and exhibiting artwork.

Table 3. Critical Modifications to the S/G
Design Based on the Storyboard Evaluation

| Main Features | Reason | Comments for Prototype Design |
|---|--|--|
| Role of the 'Dealer' | There are different types of dealers | Instead of presenting the role of the dealer as being the main promoter of the artist's work, the notion of the dealer would be included as part of the results of the ChanceStar. |
| Role of the 'Agent' | There are different ways to promote an artist's work | Instead of identifying the agent as being the main buyer and seller of art, the notion of the agent would be included as part of the results of the ChanceStar. |
| Illustration of the 'Earth' located within the 'ChanceStar' | Travelling shows don't always occur | The use of the earth to illustrate the notion of a 'travelling show' may be used as a result, but it wouldn't be appropriate to have it present at all times. |

Table 3 reveals three main features of the simulation game that were modified for the development of the prototype, due to the results of the storyboard evaluation.

Prototype Evaluation

A rapid prototype was produced in order for the author to quickly view and assess certain gaming features that were considered critical for the design of the simulation game. Two experts (i.e., a media expert, a studio art/art education expert) reviewed and evaluated the prototype. As well, two focus groups each consisting of three end-users participated in the prototype evaluation.

Expert Evaluation of the Prototype

Two experts evaluated the prototype. Initially, the media expert tried out the prototype on a Power Macintosh, and he completed a questionnaire in the computer lab at Concordia University (Montreal, Que.). As well, the expert reviewed and provided feedback concerning the documentation to be used for the end-user evaluation of the prototype. Following the completion of the questionnaire, the author interviewed the expert (held in her office at Concordia University, Montreal, Que.). The results of the media expert's evaluation of the prototype are illustrated in Tables 4 and 5 (to view Questionnaire 2 see Appendix J). The responses to Questionnaire 2 have been interpreted from a sliding scale, 0-6, ranging from 'not at all' to 'very much', thus the terms '-adequate, adequate, and adequate +' are used to describe the results.

Table 4. Questionnaire Results - Media Expert Evaluation

| Questionnaire 2 S/G Characteristics | Response | Questionnaire 2 S/G Characteristics | Response |
|--|--|---|---|
| USER INTERACTION Effectiveness of instructions for user Encouraged/permitted to learn through manipulation Interaction promotes learning | Adequate + Adequate Adequate | COLOUR, GRAPHICS, AND SIMULATION Colours and graphics add to effectiveness of instruction Graphics portray intended object/idea Graphics have appropriate quality Appropriateness of graphics for target audience | Adequate ++ Adequate ++ Adequate + Adequate |
| FEEDBACK Feedback is motivational Use of cues/prompts after wrong response Unnecessarily attractiveness of negative feedback | Adequate + - - Adequate Not at all | EASE OF USE User can independently operate program Instructions and help avenues at appropriate locations Glossary is effective Help function is effective Sufficient amount of user support materials Support materials are effective | Adequate ++ Adequate ++ Adequate ++ Adequate |
| BRANCHING Branches appropriately present Branches appropriate for audience Branches accommodate individual differences | Adequate Adequate + NR | OBJECTIVES Objectives are clearly stated Objectives are appropriate to the medium Satisfactory completion of the program will result in fulfillment of the objectives | Adequate ++ Adequate ++ Adequate ++ |
| TYPES OF CONTROL User's control over program Control features effectively designed | - Adequate Adequate + | | |
| SCREEN DISPLAYS Appropriateness of text size, font, and case Screens free from grammar, spelling, and punctuation errors | Adequate ++ Adequate | | |
| Appropriateness of amount of material presented at one time Material is clear and easy to read Spacing is appropriate for clarity Smooth transition between screens Appropriate amount of time for user to read and absorb information | Adequate +++ Adequate +++ Adequate +++ Adequate ++ Adequate ++ | | |

Table 5. Questionnaire Results - Experts' Evaluation of Main S/G Screens

| | | |
|---|--|--|
| <p>The Game Menu</p> <p>Art Expert: The exhibition spaces listed on pop up menu are appropriate for target audience</p> <p>Media Expert: The layout and navigation is good. The colour and text is fair. The graphics are poor.</p> | <p>The Warehouse Gallery (exterior)</p> <p>Art Expert: The graffiti wall is interesting for the target audience, but it needs more writing and design to make it really 'funky'</p> <p>Media Expert: The layout and navigation is good. The colour is fair and the graphics are poor</p> | <p>The Warehouse Gallery (Interior)</p> <p>Art Expert: The images shown in the warehouse are very attractive for the target audience. Sculpture pieces may be added to the foreground.</p> <p>Media Expert: The layout and navigation is good. The colour is fair and the graphics are poor</p> |
| <p>The Studio Environment</p> <p>Art Expert: The art studio is very attractive for the age level of the target audience. The icons should be moved down, thus making them predominant.</p> <p>Media Expert: The layout, text, and navigation is good. The colour is fair. The graphics are poor.</p> | <p>The Simulation of Preparing the Stretcher & Canvas</p> <p>Art Expert: The procedure for building a stretcher, stretching and grounding a canvas, and preparing art materials is accurate and appropriate for the level of the target audience.</p> <p>Media Expert: The layout, text, navigation, and sound is good. The colour is fair. The graphics are poor. The pace is excellent.</p> | <p>The Colour Exercise</p> <p>Art Expert: The colour mixing exercise is helpful for the target audience, in terms of learning about colour theory. The location of the exercise is in proper sequence in relationship to the other gaming activities.</p> <p>Media Expert: The layout, colour, text, and navigation is good. The graphics are fair.</p> |
| <p>The Portfolio Selection</p> <p>Art Expert: The images in the portfolio 'Lunar Scapes' and 'Psychedelics' are appropriate for the target audience (i.e. they are colourful and experimental). The portfolio 'Still Life Studies' is appropriate as well (i.e. they can relate to Neo-Classical). The portfolio 'Rural Scapes' requires changing (i.e. like Van Gogh).</p> <p>Media Expert: The layout, navigation, colour, text, buttons for portfolios 1-4 are good</p> | <p>The ChanceStar</p> <p>Art Expert: The ChanceStar is a suitable gaming feature for the target audience. The design and colour is great. Music could make it even more enjoyable</p> <p>Media Expert: The layout, colour, and text is good. The text is fair.</p> | <p>Title Screen - 'ArtLife'</p> <p>Art Expert: The title screen is very attractive for the target audience.</p> <p>Media Expert: The layout, colour, graphics, and text is good</p> |

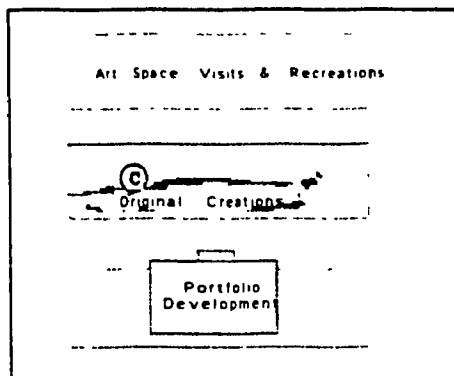


FIG. 1 THE GAME MENU SCREEN

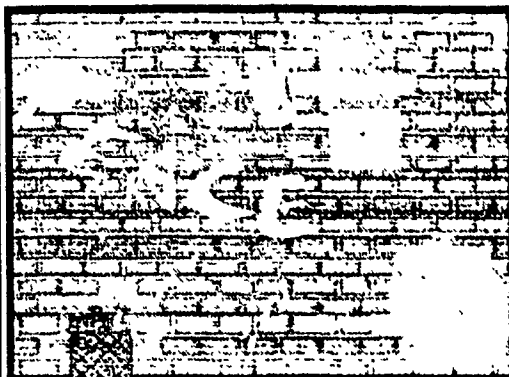


FIG. 2 THE EXTERIOR WAREHOUSE GALLERY

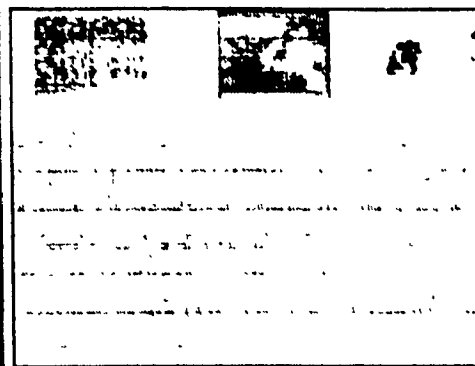


FIG. 3 THE INTERIOR WAREHOUSE GALLERY

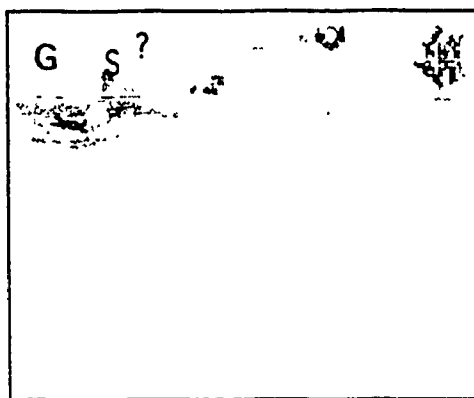


FIG. 4 THE STUDIO ENVIRONMENT SCREEN

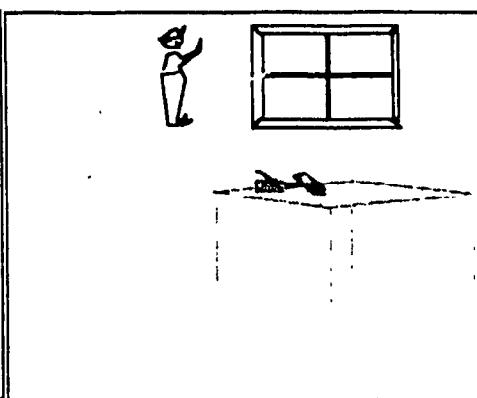


FIG. 5 THE SIMULATION SCREEN OF PREPARING STRETCHER & CANVAS

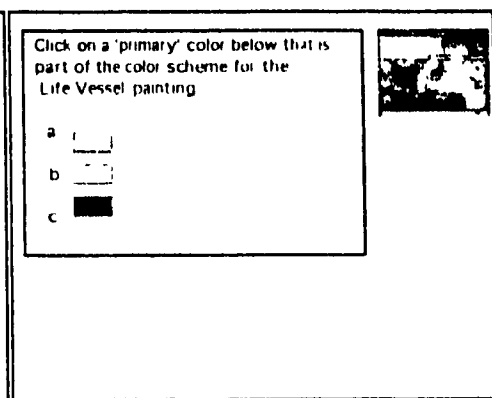


FIG. 6 THE COLOUR EXERCISE SCREEN

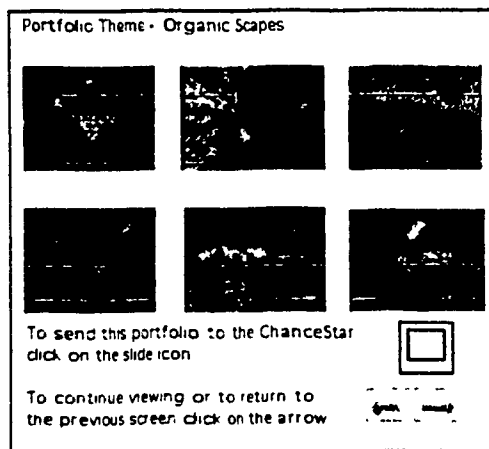


FIG. 7 THE PORTFOLIO SELECTION SCREEN

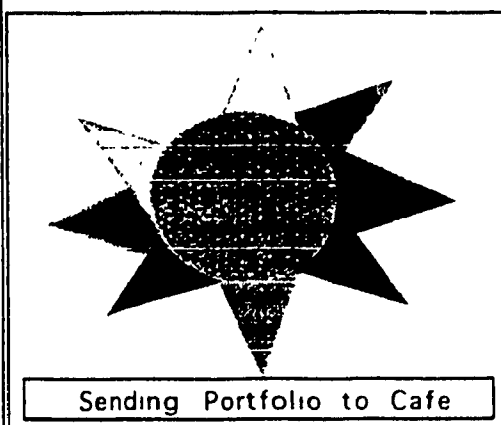


FIG. 8 THE CHANCESTAR SCREEN

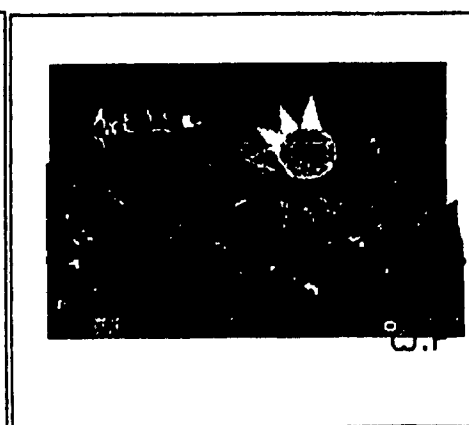


FIG. 9 THE TITLE SCREEN

Media Expert's Evaluation

The results of the media expert's evaluation reveal certain strengths and weaknesses of the prototype. The strengths indicated in Table 4 are the following:

- The material is clear and easy to read
- The spacing is appropriate for clarity.
- The amount of material presented at one time is appropriate.
- The objectives are appropriate to the medium.
- The completion of the program will result in fulfilment of the objectives.

Aspects of the prototype design which require further consideration and development are the following:

- The design requires the provision for more control, interaction, and manipulation by the user.
- Cues/prompts after wrong responses need to be designed and located throughout the simulation game.
- Text screens need to be corrected for spelling, grammar, errors, and punctuation (see the text field for the museum on the ChanceStar screen).
- The help function needs improvement.
- The graphics need to be more appropriate for the target audience. Table 5 indicates which of the main simulation game screens require modification (see Figures 1-9). Overall, the graphics of the 'Game Menu' screen, the 'Warehouse Gallery' screens, the 'Studio Environment' screen, the 'Simulation of Preparing the Stretcher & Canvas', and the 'Colour Exercise', require modification in order

for them to appeal to the target audience.

The media expert's responses to the open-ended questions (see Appendix H) are the following:

- The 'navigation' characteristics of the prototype are adequate. The colour requires more contrast so that the user can more readily identify the object or button to be clicked on the screen.
- The images are too sketchy and require more contrast. The 'help' and glossary menus, as well as the 'buttons' need to be highlighted
- A quiz following the simulation segment would be useful.
- Content to be included may be the 'selling' of artwork. The concept of people placing value to your work could be additional content for the simulation game
- A 'gaming feature' to include may be the concept of the user carrying his portfolio along with him throughout the game. A button named 'your portfolio' could allow the user easily to click and access his portfolio at any given time

Studio Art/Art Education Expert's Evaluation

The studio art/art education expert reviewed the prototype on a Macintosh LC 520, and he completed a questionnaire at the author's studio. As well, the expert reviewed and provided feedback concerning the documentation to be used for the end-user evaluation of the prototype. Following the completion of the questionnaire, the author interviewed the expert. The results of the studio art/art education expert's evaluation of the prototype are in Tables 5 and 6 (to view Questionnaire 1 see Appendix I). The responses to Questionnaire 1 have been interpreted from a sliding scale (i.e. 0-6 ranging from 'not at all' to 'very much'), thus the terms '-adequate,

Table 6. Questionnaire Results - Studio Art/Art Education Expert Evaluation

| Questionnaire 1 S/G Characteristics | Response | Questionnaire 1 S/G Characteristics | Response |
|--|--------------|---|-------------|
| ANTECEDENT CONDITIONS Requires preparation & prior learning | Not at all | OPERATIONAL STRATEGY Strength of the gaming element | Adequate + |
| Appropriate for multi-cultural population | Adequate | Replication of the studio environment | Adequate ++ |
| RATIONAL AND OBJECTIVES Promotes cognitive outcomes in relationship to s/g objectives | Adequate ++ | Outcomes dependent upon player's skills and capabilities | Adequate |
| Promotes affective outcomes concerning an artists's career | Adequate ++ | Outcomes dependent upon chance factors | Adequate |
| Motivates users to become involved in studio art processes | Adequate +++ | Active involvement of participants | Adequate ++ |
| CONTENT Comprehensiveness of support documentation | Adequate + | | |
| Opportunity for Increasing knowledge/understanding of the production, documentation, and exhibition of artwork | Adequate ++ | | |
| Opportunity for user to make decisions | Adequate + | | |
| Concepts represent the role/activities of an artists in 'real life' | Adequate +++ | | |
| Strategies available to user match those to 'real life' | Adequate ++ | | |

adequate, and adequate +' are used to describe the results.

The results of the studio art/art education expert's evaluation indicate specific strengths and weaknesses of the prototype. The highlighted strengths of the prototype design indicated in Table 6 are the following:

- The concepts of the simulation game represent the role and activities of an artist in 'real life'.
- The simulation game motivates users to become involved in studio art practices.

Aspects of the simulation game which require further development and consideration are the following:

- The appropriateness of the simulation game for the multicultural characteristic of the target population requires further research and development.
- The design of the simulation game requires more outcomes that are dependent upon the player's skills and capabilities

Table 5 indicates which of the main simulation game screens require modification (see Figures 1-9). The 'Warehouse Gallery (exterior)' needs more graffiti, and the 'Warehouse Gallery (interior)' requires more art pieces. The icons located in the 'Studio Environment' need to be lowered. Music could be added to the 'ChanceStar Screen'.

The studio art/art education expert's responses to the open-ended questions (see Appendix H) are the following:

- The availability of the glossary should be more obvious to the user
- The images/graphics are interesting. They are 'handled' well.
- The structure of the simulation game content is clear.

- The younger teens will have a problem with some of the vocabulary. This is where the use of the glossary will be most critical.
- The text displayed for communicating the content may be introduced verbally.
- There are no irrelevant gaming features in the prototype.
- The user would probably need to have some interest in the arts in order to remain interested or motivated to play the game.
- This simulation game should be very helpful in terms of teaching/informing the target audience about the production, exhibition, and documentation of artwork.

Focus Group Evaluation of the Prototype

Two focus groups, each consisting of three end-users, were formed in order to assess the characteristics of the prototype as well as knowledge acquisition. The end-users' evaluation of the prototype occurred in the home of the author

The participants of Focus Group 1 who reviewed the characteristics and appeal of the game, were initially asked to review the documentation concerning the prototype. Following the review of the documentation, each participant tried out the prototype. The participants then completed a questionnaire (to view Questionnaire 3 see Appendix K).

The results indicated by the end-users are revealed in Table 7. The questionnaire was divided into three main sections: documentation, visual aspects, and navigation. A Likert scale was used for the users to record their responses (i.e., 1 Disagree 2 Slightly Disagree 3 No Opinion 4 Slightly Agree 5 Agree) Note that the items followed by an asterisk are negatively phrased to avoid response bias. These items were converted to a positive

direction, thus consistent with the other questions for the purpose of providing mean scores.

The mean score for the 'clarity of the documentation' is 4, the mean score for the 'effectiveness of the visual aspects' is 4.4, and the mean score for the 'ease of navigation' is 3.3. It is evident that the features used for 'navigating' throughout the prototype need to be modified. The highlighted strengths illustrated in Table 7 are the following:

- The documentation is basically clear.
- The graphics of the Portfolio screen, the Exterior Warehouse screen, and the Studio Environment screen are attractive.
- The text sizes for the Colour Exercise screen are appropriate.
- The colours of the Studio Environment, and the Game Menu are attractive.

The highlighted weaknesses illustrated in Table 7 are the following:

- The buttons/menus of the Game Menu screen are not very useful
- The buttons/menus of the Colour Exercise screen are not very useful
- The Help Menu isn't very useful.

The participants of Focus Group 2 received a post-test (view Appendix L), thus information concerning knowledge acquisition and the appeal of the prototype was acquired. The participants were initially asked to review the documentation concerning the prototype. Following the review of the documentation, each participant tried out the prototype. The participants then completed the post-test. The results of the post-test are revealed in Table 8. Areas of concern are the following:

- The concept of a colour scheme appears to be unclear to the end-users, thus

further definition is required.

- The concept of a monochromatic colour scheme appears to be unclear to the end-users, thus further definition is required.
- The concept of a tint appears to be unclear to the end-users, thus further definition is required.

Author's Observations of the End-Users

The author observed the users' while they tried out the prototype. Her observations are listed below:

- The simulation is effective.
- The meaning and function of the chancestar is clear.
- The meaning and function of the game icon is clear.
- The text of the exterior warehouse gallery screen does not remain long enough on the screen.
- The button located on the stretcher is not obvious to the user.
- The sound for the review screen is too quick.
- The user tries all of the three options for the colour exercise in order to get it correct. The amount of 'tries' needs to be limited.
- The portfolio screen isn't clear to the user in terms of what to do and where to go.
- The menu for selecting the venue for sending the portfolios isn't comprehensible to the users. As well, they have difficulty manipulating the mouse with the pull down menu.
- The pull down menus for the glossary and help, as well as for the main menu

are not apparent. The user didn't access them during the prototype trial.

- The label button located in the gallery isn't obvious enough for the user to identify it.
- It isn't clear to the users when to click after reading the text in order for them to continue playing the game, as a result they either don't have enough time to read the text or they have too much idle time.

End-Users' Comments from the Debriefing Sessions

Following the end-users' completion of a questionnaire/post-test, the author held a debriefing session (see Appendix H) with each user in order to further investigate and discover the strengths and weaknesses of the prototype. The end-users revealed the following points:

- The portfolio selection screens and the simulation screens are the most interesting out of all the graphics/images.
- The chancestar screen is the least interesting out of all the graphics/images.
- The content is clear.
- There are no irrelevant gaming features in the prototype.
- There isn't enough access to the contents of the gallery.
- This simulation game would be helpful to teach people about the visual arts.
- The help feature wasn't noticeable.
- The prototype is sometimes too slow and at certain locations there isn't enough time to read the text on the screen.

End-User's Suggestions for the Further Development of this Simulation Game

The end-users made the following suggestions:

- The user can play the role of the art critic.
- Have various role play's available to the user throughout the simulation game.
- The user can alter the colours of the artwork.
- The user can mix and match images in order to create their portfolio.
- Instead of using the 'ChanceStar', have the committee members pop up on the screen.
- Show the picture being built or produced

The end-users' attitudes concerning the usefulness of computers in education were elicited. As well, their degree of interest in educational computer games was recorded. Table 9 reveals that the end-users basically are not very interested in playing educational computer games, though, they view educational computer games as being an effective tool for learning (to view Questionnaires 3 and 4 see Appendix K and Appendix L) In response to the question concerning which kind of computer platform the end-user is familiar with, it was an equal split between the PC/clone and the Macintosh platform.

The end-users' responses to questions concerning their opinions of the prototype are revealed in Table 10. It is clear that the end-users generally enjoyed playing the simulation game. They felt that they had learned some things concerning the production of paintings. As well, the end-users felt that the simulation game would be helpful in terms of learning about the production, documentation, and exhibition of artwork.

Table 8. Frequency of end-users' responses to questions concerning knowledge of s/g/content

| Questionnaire 4 Question # | n = 3 | Correct | Incorrect |
|-------------------------------|-------|---------|-----------|
| 09 | 3 | 3 | |
| 10 | 3 | | 3 |
| 11 | 3 | 2 | 1 |
| 12 | 3 | 3 | |
| 13 | 3 | 2 | 1 |
| 14 | 3 | 3 | |
| 15 | 3 | 2 | 1 |
| 16 | 3 | 2 | 1 |
| 17 | 3 | 3 | |
| 18 | 3 | 3 | |
| 19 | 3 | 3 | |
| 20 | 3 | 3 | |
| 21 | 3 | 2 | 1 |
| 22 | 3 | 3 | |
| 23 | 3 | 2 | 1 |
| 24 | 3 | 3 | |
| 25 | 3 | 1 | 2 |
| 26 | 3 | 2 | 1 |
| 27 | 3 | 1 | 2 |
| 28 | 3 | 3 | |

Table 9. Frequency of end-users' responses to questions concerning attitudes on computers

| Attitudes | n=6 | Not at all | A little | Average | Very Much |
|--|-----|------------|----------|---------|-----------|
| Interest in educational computer games | 6 | | 2 | 4 | |
| View educational computer games as a learning tool | 6 | | | 1 | 5 |

Table 10. Frequency of end-users' responses to questions concerning opinions of the prototype

| Opinions | n=6 | Disagree | | | | | Agree | |
|---|-----|----------|---|---|---|---|-------|--|
| | | 1 | 2 | 3 | 4 | 5 | | |
| Enjoyed playing the s/g | 6 | | | | 2 | | 4 | |
| *Didn't learn anything about making paintings | 6 | 4 | 2 | | | | | |
| S/G will be helpful for teaching art production | 6 | | | | 1 | | 5 | |
| *S/G will not be helpful for teaching how artwork is documented | 6 | 5 | 1 | | | | | |
| S/G will be helpful for teaching how artwork is exhibited | 6 | | 1 | | 2 | | 3 | |
| Learned alot about the production, documentation, and exhibition of artwork | 6 | | 2 | | | | 4 | |

Discussion

The formative evaluation of the storyboard and the prototype have proved to be useful in terms of providing the author with a wealth of information that may be used to improve the simulation game design.

The storyboard evaluation allowed the author to verify with the experts and the end-users the overall gaming concept, as well as the critical features of the simulation game. The studio art/art education expert's evaluation aided in terms of verifying the accuracy, scope, depth, and sequencing of the content. As well, the suggestions and opinions of the studio art/art education expert were noted

The interview technique proved to be valuable, as the open-ended questions posed by the author provided a context for the expert, where he could elaborate on the weaknesses and strengths of the simulation game before the development of the prototype had begun (Flagg, 1990). Verifying the language level as well as the age level of the target audience was critical at the storyboard phase, as certain concepts were not suitable for the higher age level of the target audience. The expert recommended lowering the age range as he felt the simulation game would be more useful to teenagers rather than to those over 21 years of age.

The media expert's review of the storyboard aided the design of the simulation game in terms of verifying the effectiveness of the interface design, the visual aspects, as well as the gaming features and concepts. One main disadvantage with using a storyboard for illustrating computer based instruction is that it is difficult to emulate the functionality of the computer (Flagg, 1990),

nevertheless the evaluation of the storyboard proved to be useful to the author, as it allowed her to map out her ideas, as well as to establish and verify the overall gaming concept. The expert's opinions and suggestions were noted by the author. As well, the open-ended questions allowed the expert to elaborate on the various characteristics depicted in the storyboard. Suggestions concerning methods for prompting the user, as well as for the representation of the content were very useful.

Two end-users' reviewed the storyboard. One-to-one evaluations were conducted by the author, thus permitting the author to obtain the users' feedback prior to the development of the prototype (Flagg, 1990). The author 'walked' through the storyboard with the end-users', asking them questions, as well as noting their suggestions and opinions. The end-users' evaluation of the storyboard proved to be helpful in terms of detecting the weaknesses and strengths of the gaming concept, as well as verifying the sequencing, depth, and presentation of content. In reference to the advantage of using one-to-one evaluations (Flagg, 1990; Dick & Carey, 1990), it proved to be useful as the end-users' feedback was used as input for the development of the prototype. Overall the storyboard provided the experts and the end-users, as well as the author with a 'platform', in which the simulation game could be primarily viewed and discussed.

It was evident that the role of the agent versus the role of the dealer wasn't very clear to the end-users. As well, the amount of information concerning gaining points should be limited, otherwise the surprise features of the game would be detected at a premature stage in the game, thus the end-

users' would lose motivation to discover the features of the game (Malone, 1981).

As noted by Crookall (1988), having the sufficient resources to develop educational software demands the input of various experts. The author was limited in her abilities to program the features of the prototype, thus the complexity and sufficient functionality of the prototype was at risk during the development phase. A programmer was brought into the team for the further development of the prototype.

Two experts evaluated the prototype (i.e. an expert in multi media development and an expert in studio art/art education), which proved to be very useful. Questionnaires were used to detect the strengths and weaknesses of the prototype. As well, interviews were conducted, which consisted of open-ended questions, thus aiding the author to identify the precise location of the strengths or weaknesses. The author was able to obtain suggestions and ideas from the experts that may be used for the future development of the simulation game.

Two focus groups were formed for the evaluation of the prototype. One focus group completed a questionnaire. The use of a questionnaire helped to detect the extent to which the gaming characteristics were attractive to the end-users. In reference to the advantages of using debriefing sessions noted by Arenson (in Patterson & Block, 1987), utilizing debriefing sessions aided the author in terms of allowing her to explore at a deeper level the problems and the strengths of the prototype. The end-users were able to elaborate, thus providing the author with greater insight concerning their needs. The users

gave the author valuable ideas and solutions for the further design and development of the simulation game.

The end-users' difficulty due to not knowing when to 'click' throughout the trial of the prototype was at certain instances cumbersome during the evaluation. The author had to inform the user concerning when to 'click' in order for the user to proceed, therefore the validity of the post-test results is in question, as it was difficult to assess knowledge acquisition due to the users having difficulty with navigating the prototype. However, the main purpose for the prototype evaluation was to detect the weaknesses and strengths of the simulation game, rather than to evaluate its effects for knowledge acquisition.

The evaluation in terms of the end-user's appeal of the prototype reveals that the computer simulation game would be a suitable tool for learning. It may be unlikely as to whether they would use the computer simulation game as a tool, unless the end-users of the target population had an initial interest in the visual arts. The end-users overall claimed that the computer is a good tool for learning, but most of them declared that they rarely play educational computer games. As well, they find them to be somewhat disinteresting.

Evaluative Comments/Suggestions for Improvement

The following comments and suggestions concerning the prototype and its improvements are representative of the main strengths and weaknesses revealed by the end-users and the experts during the prototype evaluation. Also included are the comments and suggestions mentioned by various Educational Technologists.

Evaluative Comments

- The portfolios are interesting.
- The Warehouse gallery (interior) is nice.
- The Simulation is fun.
- It isn't clear when to click in order to proceed.
- It would be interesting to witness the committee as they review the user's portfolio.
- There isn't always enough time to read the text
- It is difficult for the user to know where he is located within the s/g.
- It is misleading to have the Glossary under the Help title.
- The cartoon characters require more contrast in relationship to the background.
- More artwork could be shown in the Warehouse Gallery.

Suggestions for Improvement

Visual Design

- The rendering of the cartoon characters should be 'funky' in relationship to the rest of the graphics on the screen.
- A Warehouse Gallery may consist of three dimensional artwork as well as having two dimensional pieces.
- The Warehouse Gallery (exterior) should have a lot more graffiti on the wall.

Navigation

- Text stating 'when you are finished click here' next to the button is necessary in order for the user to know how to proceed
- The Help, Glossary, and Quit should be rolled into one icon, and should be located on the main area of the screen, where it can be easily accessed
- A map revealing the gaming environments available to the user should aid the user in terms of orienting her throughout the game. As well, the user should be able to track her path throughout the game, thus permitting her to know where she is located at any given time.

ID

- Instead of having the user read the text on the screen, a narrator should voice the text.
- The various user levels of the overall simulation game in relationship to the content can be clearly identified by linking the progression of the content in terms of its complexity, thus the end-user can build a knowledge base that may be applied to the gaming activities/exercises from one level to the next
- Feedback should be provided concerning the user's overall experience. As well, immediate feedback that is specific to the user's efforts would be helpful (e.g., results of the user's application to the ChanceStar verses the user's score). Explain why or why not the user received such a result

Conclusion

Numerous realizations surfaced throughout the execution of this project. A combination of the standard ISD methodology and rapid prototyping were utilized for the design and development of this simulation game, thus several of the lessons learned during the course of this project relate to the methodology employed.

The advantage to rapid prototyping (i.e., the quick mock up of screens in order to view, assess, and modify the design of the prototype as it is being developed), enabled the formative evaluation of the prototype to be carried out early in the project. It would have been difficult to evaluate and ultimately improve the design concepts with the sole application of conventional development tools such as storyboards and scripts, since the interactive aspects of gaming and simulation software cannot be replicated in versions sketched on paper.

The main drawback to rapid prototyping is that it can lead to endless iteration of the design process without allowing for effective closure. An admixture of the rapid prototyping methodology and the conventional ISD approach provided some protection against this eventuality, as the aspects applied from ISD established some boundaries that limited the prototyping activities.

The application of ISD allowed the author to cover in part certain necessary phases of the analysis and design process. In particular, it permitted the author to investigate the learner's needs. As well, the establishment of tentative behavioral objectives, an element of conventional ISD, prior to the

development of the storyboard and prototype was effective, as it established the overall criteria required for the formative evaluation. The project began with a tentative outline of behavioral objectives, which adhered to the standard ISD approach. These objectives then became the basis for the development of the prototype.

The combination of the rapid prototyping method and ISD was particularly valuable for both the author and end-users given their limited experience with computer simulation and gaming products. The recommendations of Andrew & Goodson (1980) concerning the difficulties with using one model or approach for all design efforts is apparent, as designing educational software requires an iterative approach, in order to capture the strengths and to rectify the weaknesses of the product as it is being developed.

Crookall (1988) emphasizes the advantages of having the appropriate expertise involved throughout the design and development phases of the educational software. Due to having insufficient resources, the author had to do without having the expertise of a programmer available to her on a regular basis. Although a programmer participated in the development phase, it would have been very useful to have had his input on a continual basis right from the outset of this project.

Rapid prototyping proved to be a useful tool for refining the design of the simulation game, as the author had no experience in multi-media development at the outset of the project. The two requirements for rapid prototyping identified by Tripp & Bichelmeyer (1990) are modularity and plasticity. The prototype was designed to have various gaming environments, thus allowing

the author to easily design and change its features. As well, the structure of the prototype may be quickly altered in the future at a minimal expense.

The approach used for the design and development of this simulation game was for the most part successful, as the author's main goal was to develop a prototype in which critical features of the simulation game could be evaluated, and this was accomplished. The formative evaluation of the storyboard as well as the prototype proved to be helpful in terms of obtaining insight concerning the strengths and weaknesses of the simulation game, as well as acquiring suggestions and ideas for its further development.

The advantages noted by Crookall (1980) and DiBlasio (1983), concerning the use of the computer as an instructional medium are apparent. The computer was selected as the appropriate medium for representing the contents of the subject matter, because it allows the user to quickly manipulate and observe many aspects of the visual arts in one location at a given moment.

In the event of proceeding with the design and development of this simulation game, one recommendation for further research is that a learner analysis be conducted in order to capture the preferences of the multi-cultural characteristics of the target population. Such research would aid the designer in determining gaming features that would ultimately cater to the tastes of the target population. In reference to the requirements of the Canadian Arts Community that are revealed in a review of the Federal Policies for the Arts in Canada (Schafer & Fortier, 1989), further research may be conducted to determine how simulation and gaming may be applied in order to foster the publics' interest in the visual arts

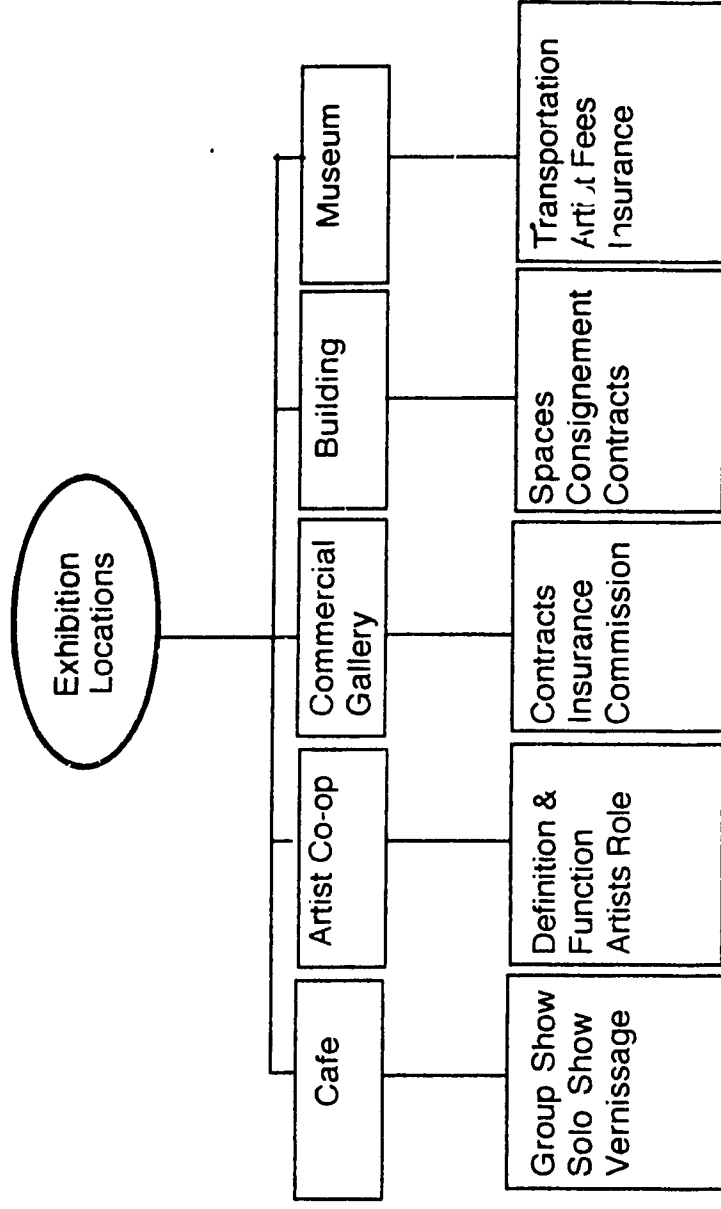
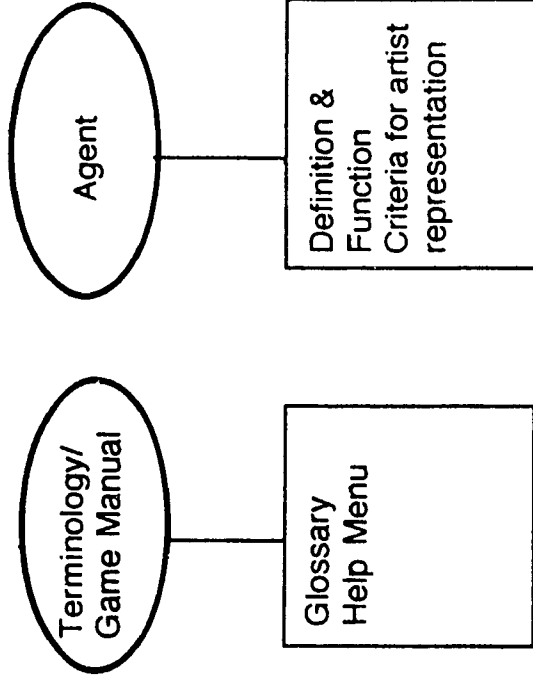
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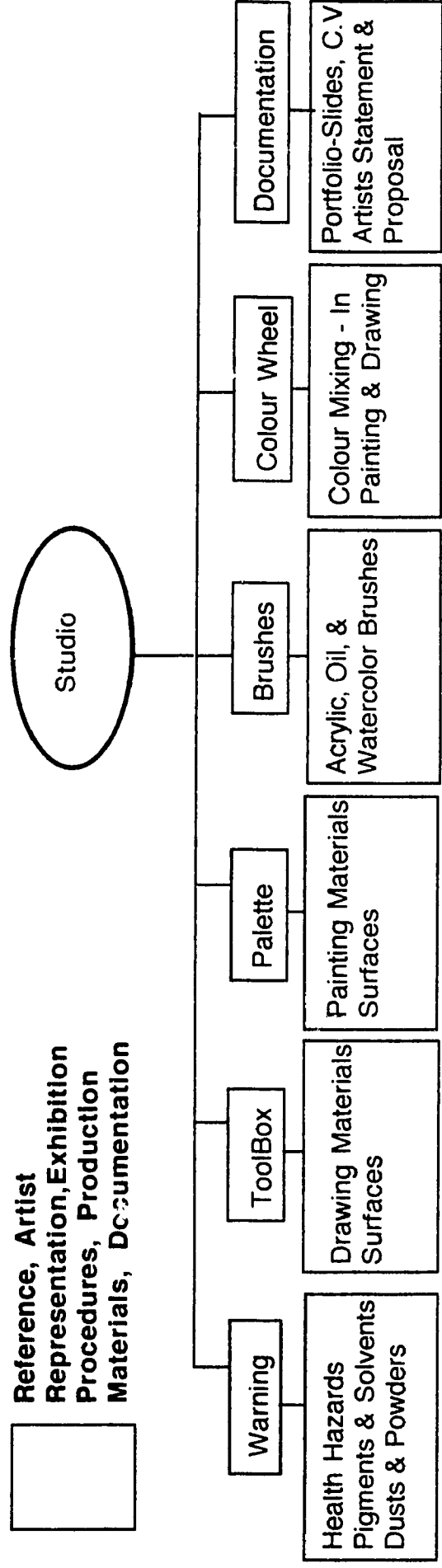
Appendix A: Content Structure



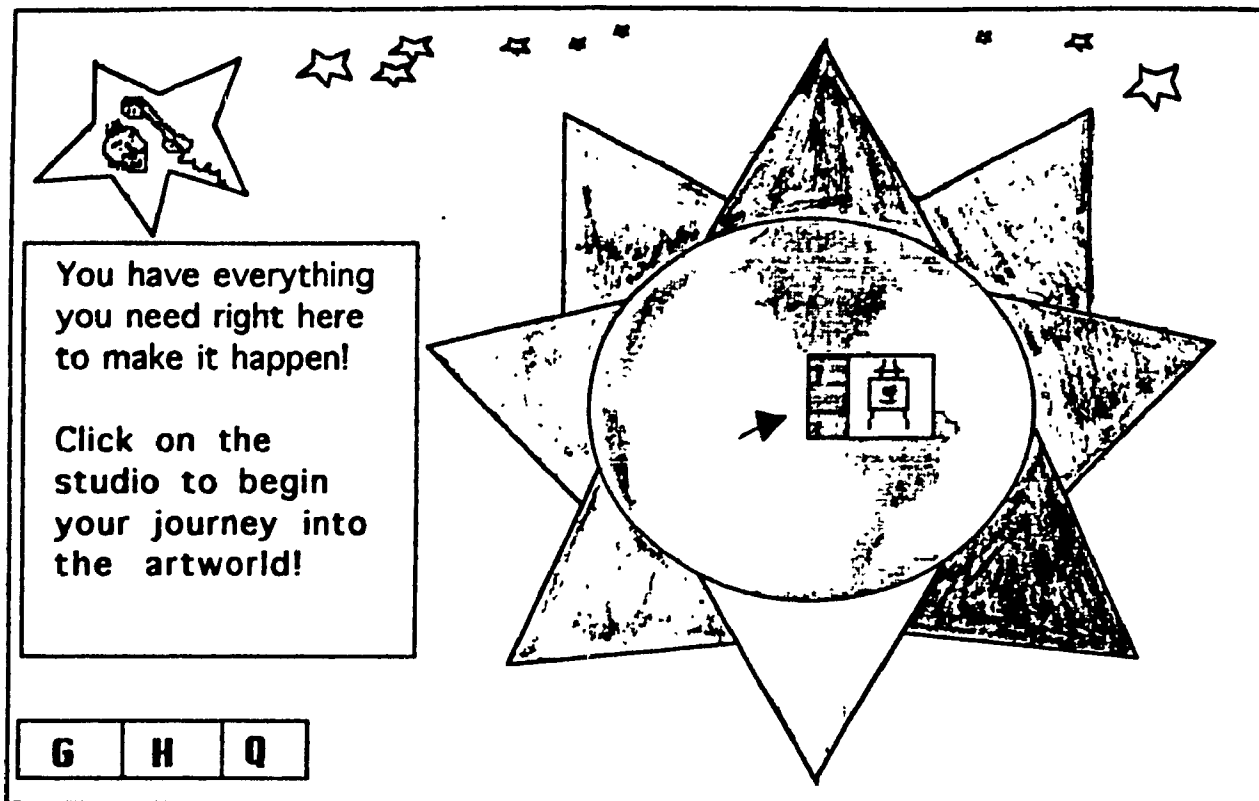
○ Main Components

□ Exhibition Locations/Hazards, Tools & Materials

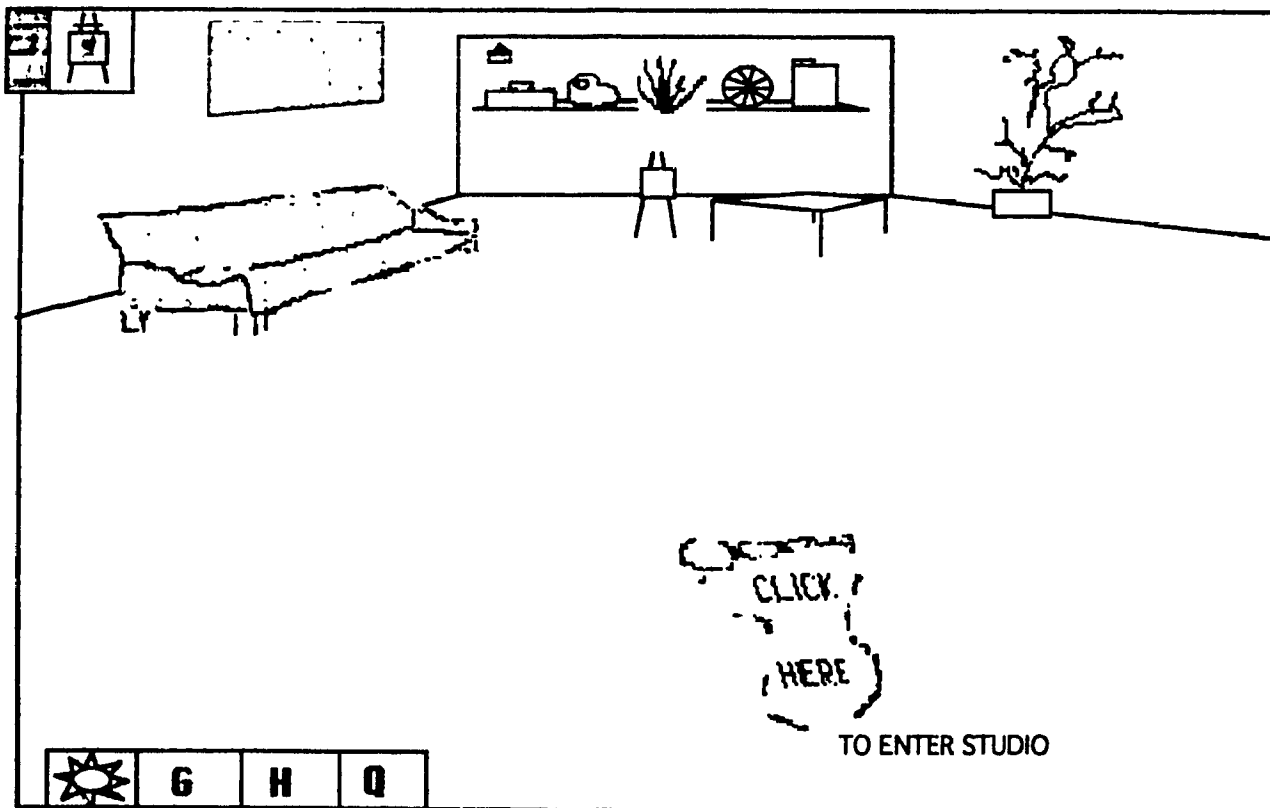
□ Reference, Artist Representation, Exhibition Procedures, Production Materials, Documentation



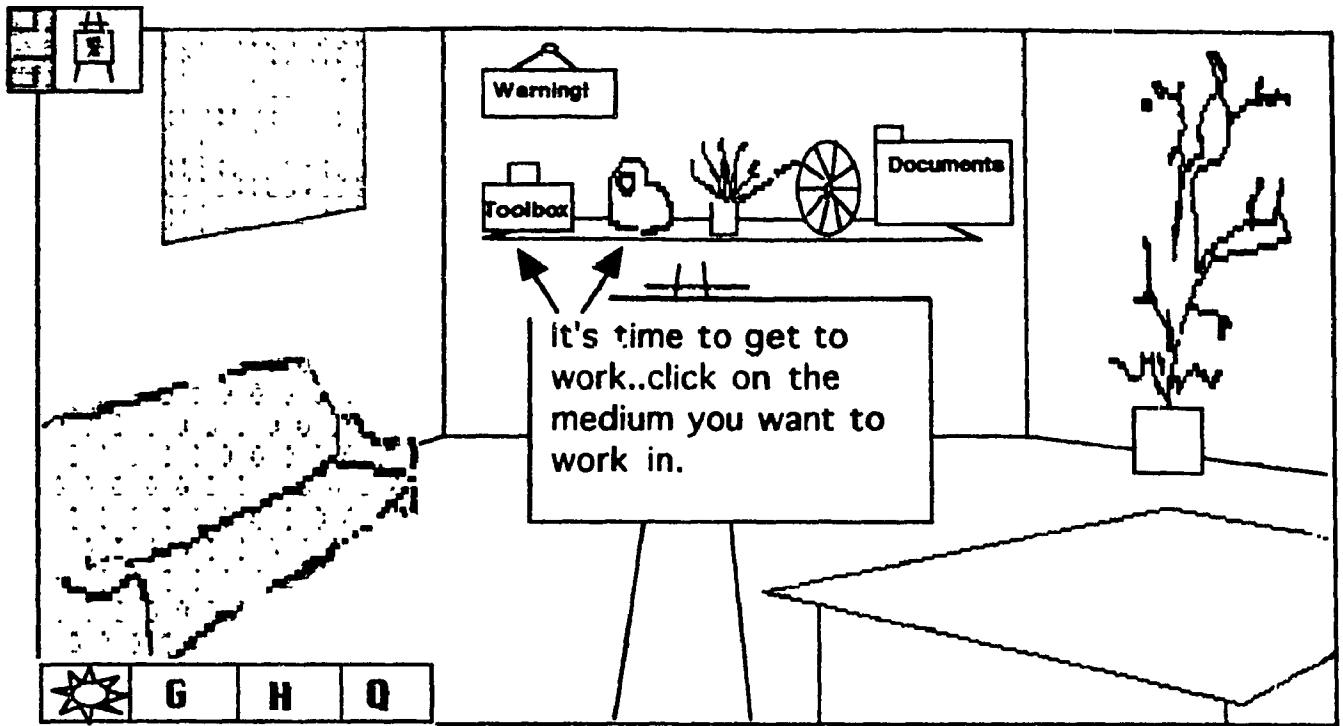
Appendix B: Initial Storyboard



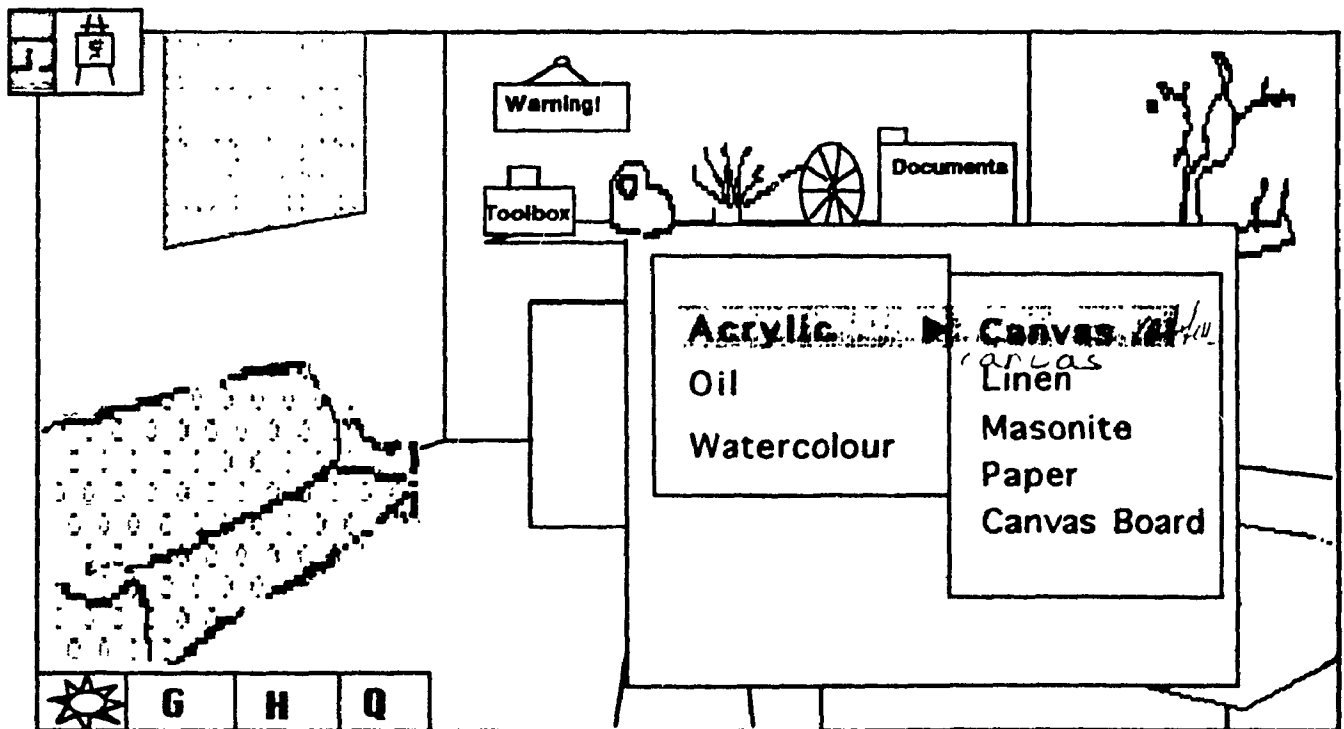
- MAIN MENU, and STAR - BUTTONS: AGENT, STUDIO



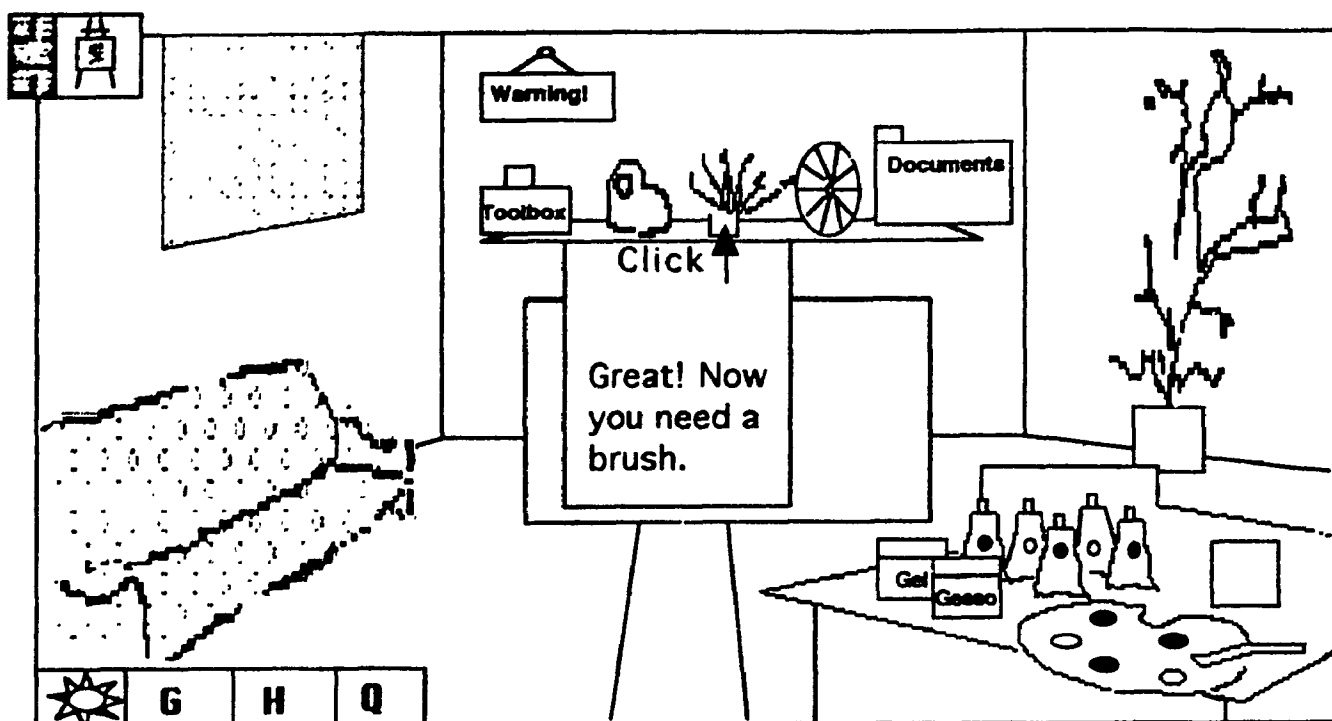
OPENING OF STUDIO SPACE, BUTTONS: FOOTPRINT



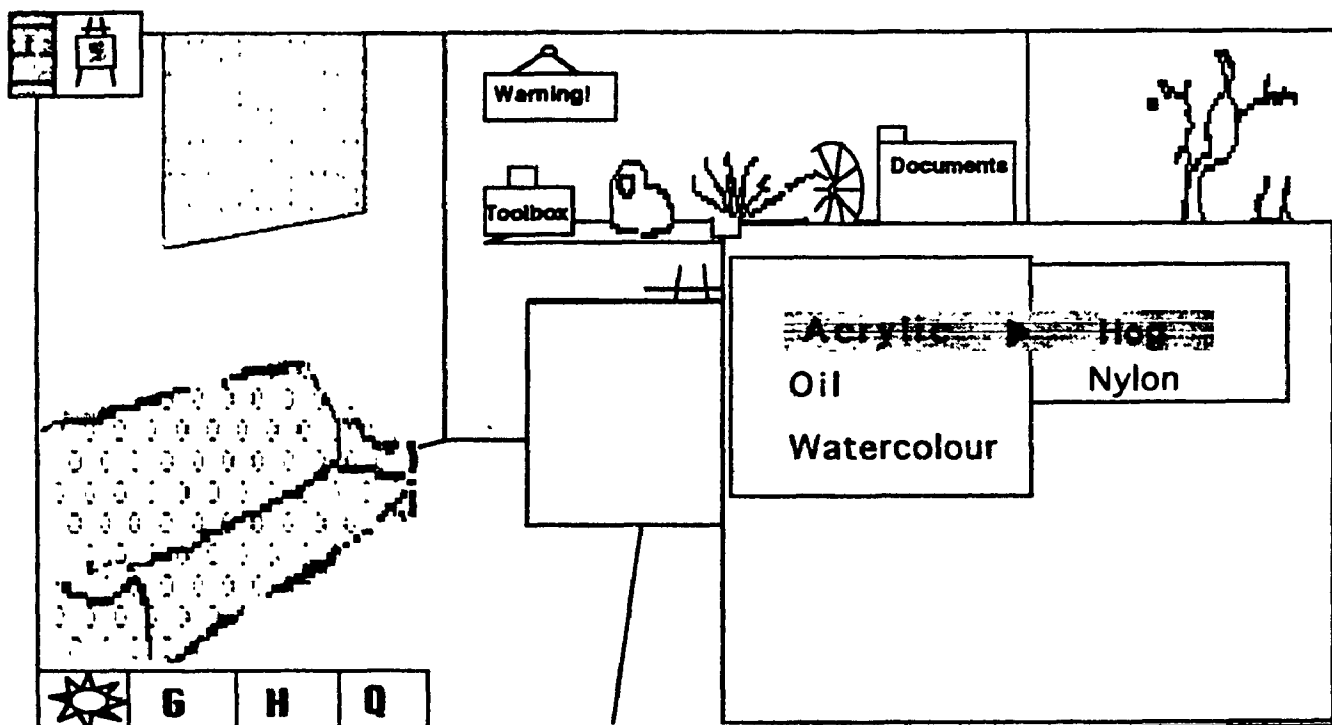
STUDIO SPACE: BUTTONS - Warning Health Hazards - For Exploration
 - Toolbox - Drawing Tools
 - Palette - Painting Tools
 - Brush - Brushes
 - Documentation - Portfolio Slides, C.V (scoring)



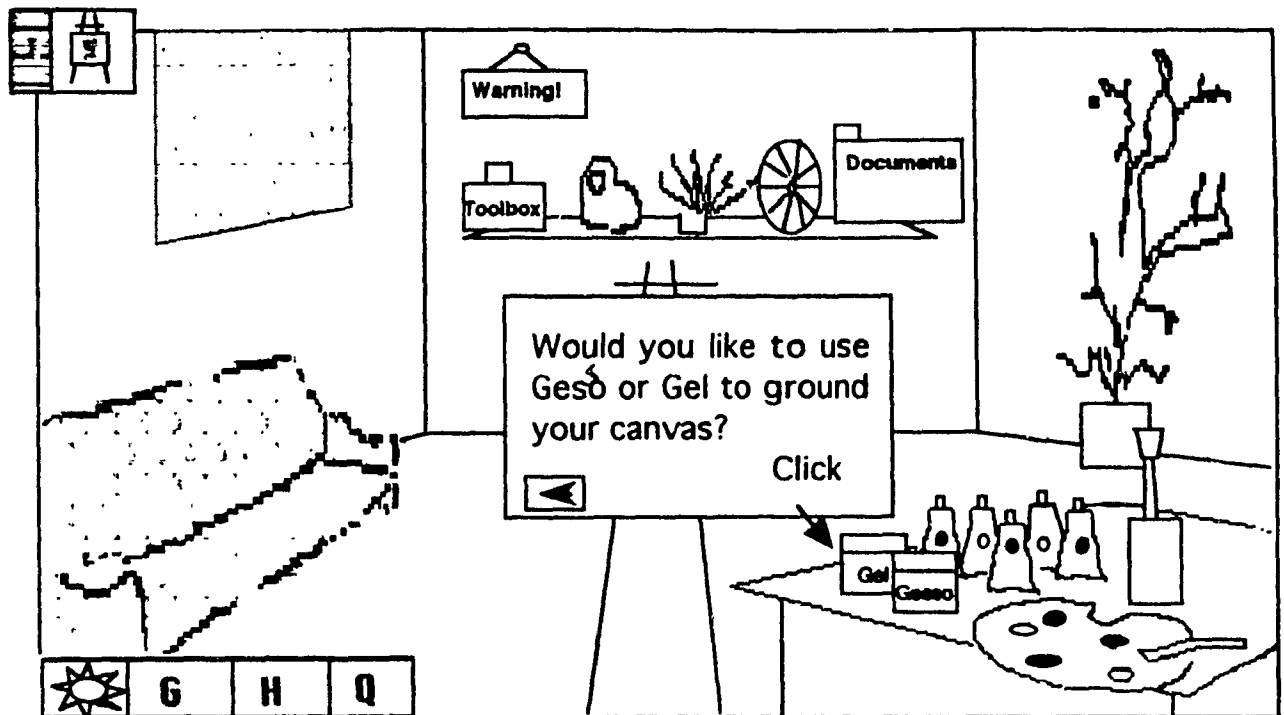
Palette - Painting Menu



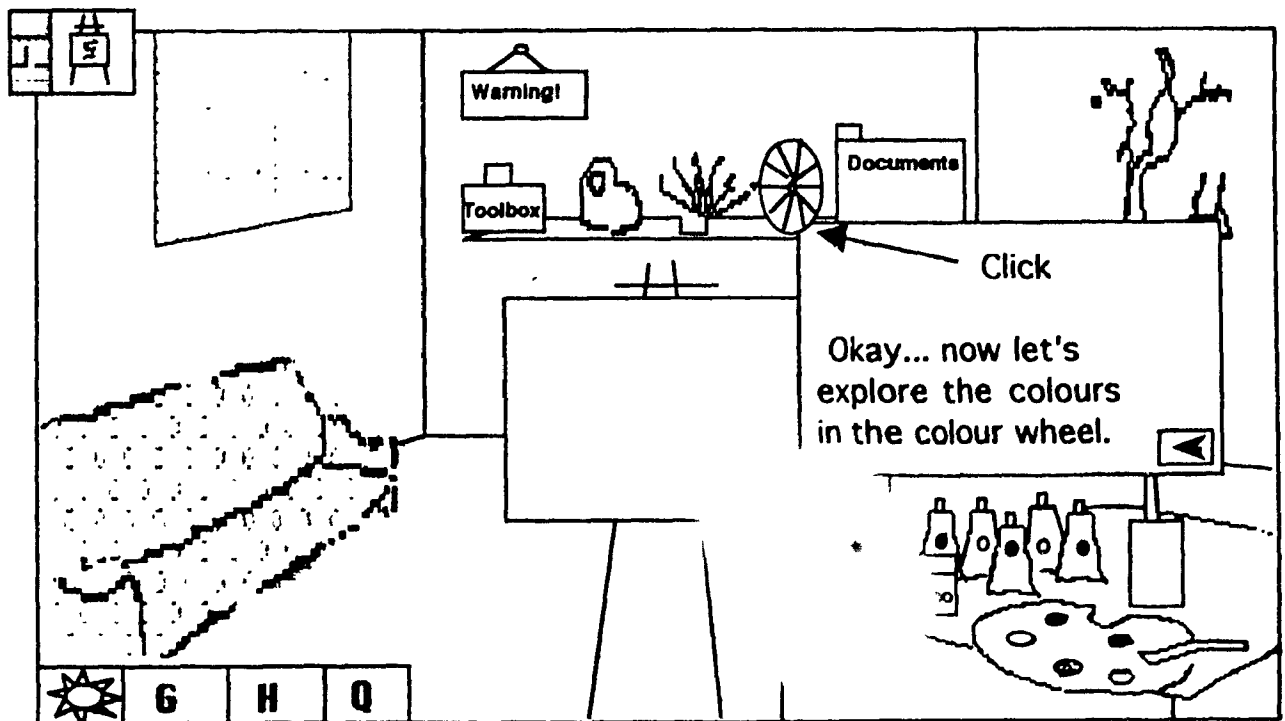
Painting Tools Pop UP - Choosing Brush.



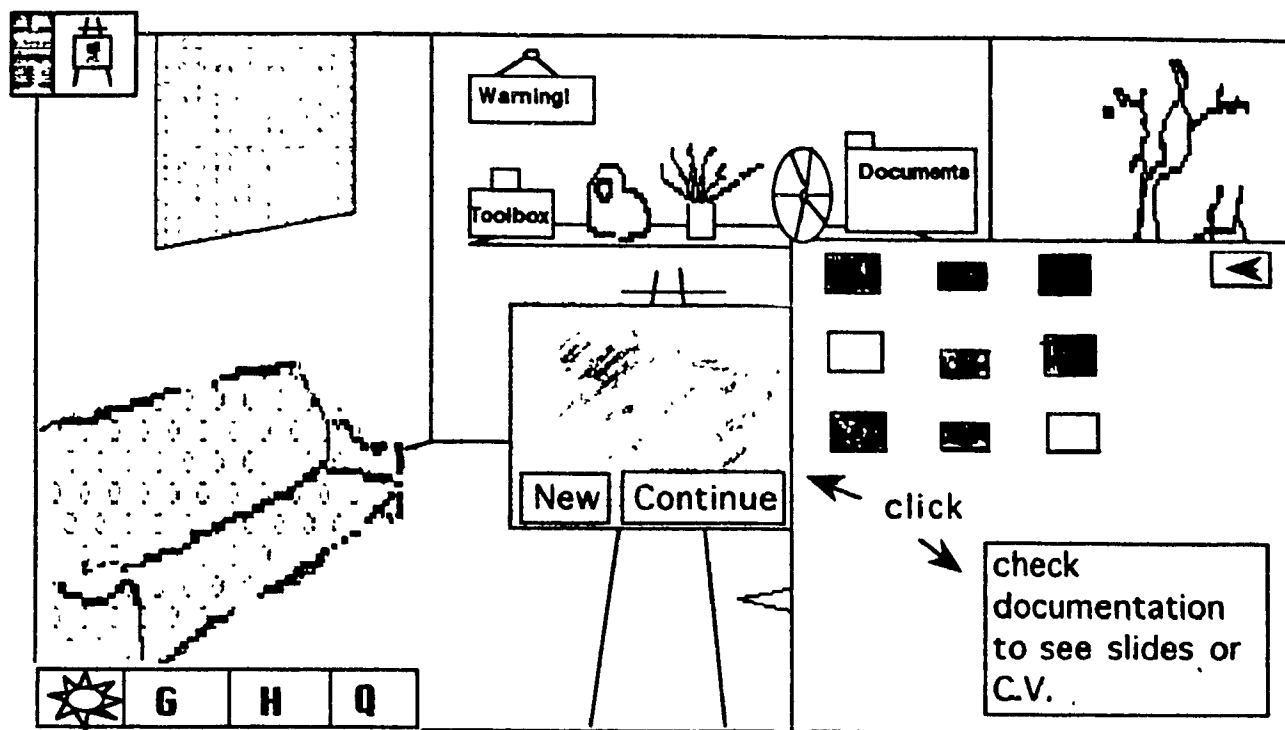
Brush Menu



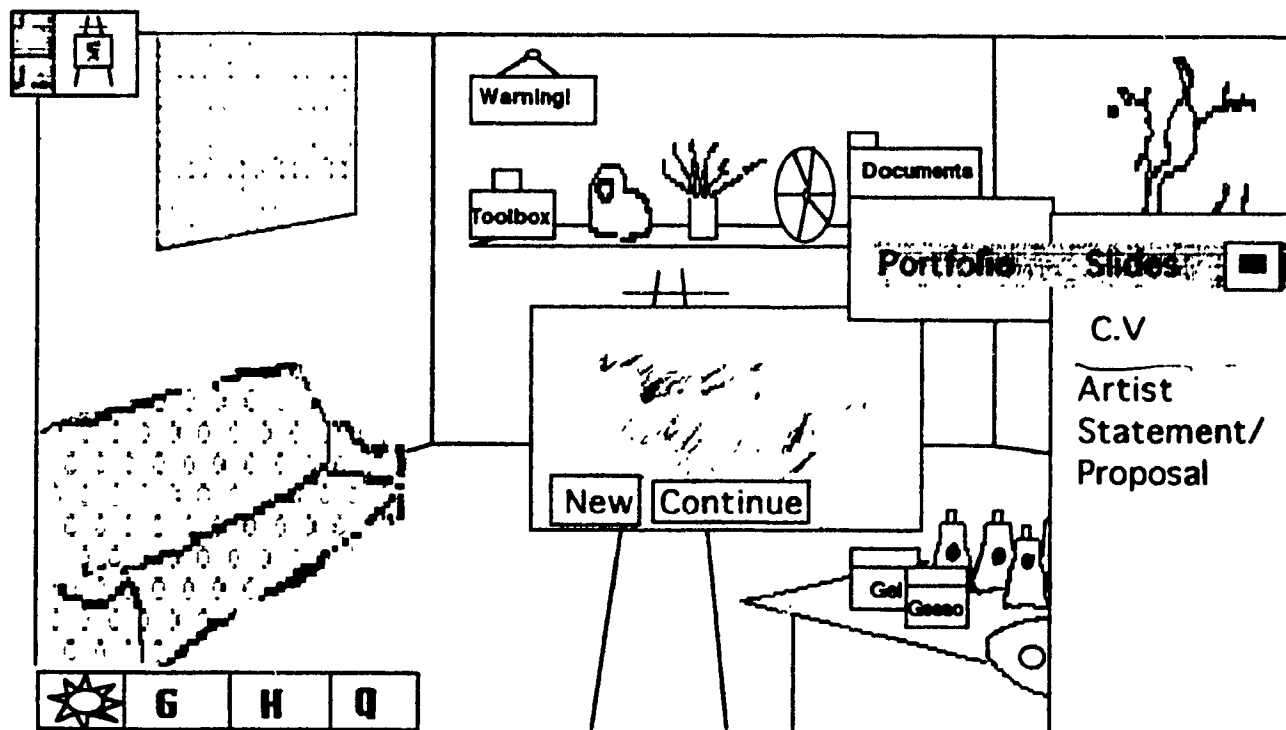
Grounding of canvas provides a way out



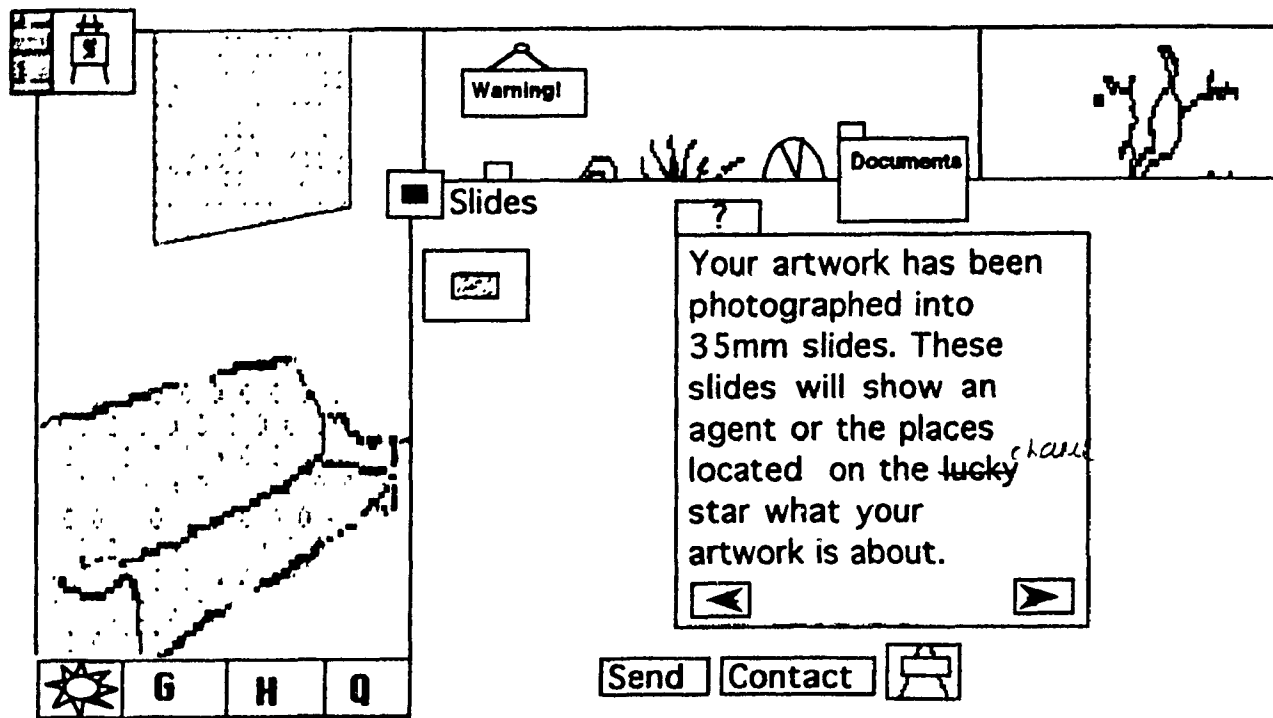
Canvas is coated with ground Gel - If Gesso - would be wt. - Colour mixing exercise



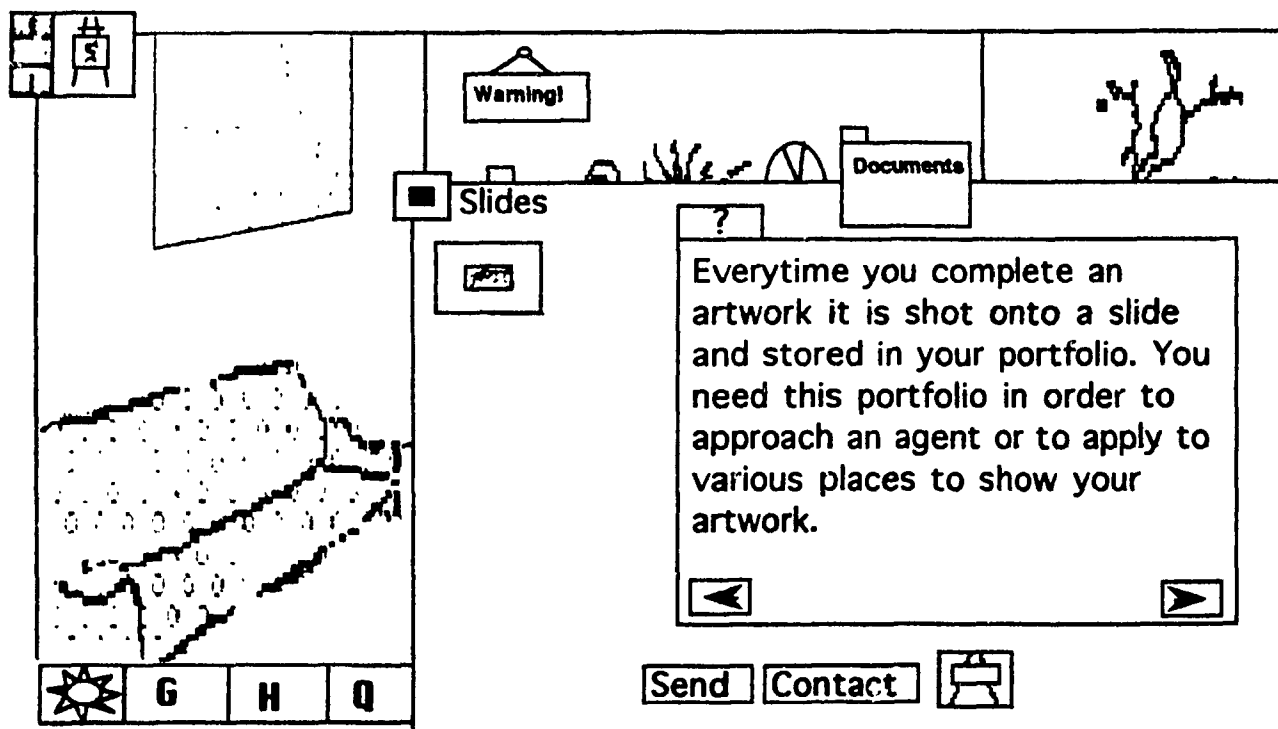
Colour Exercise is completed - artwork is documented into a slide format, New - can create other kind of work Continue - keeps same format for more artworks.



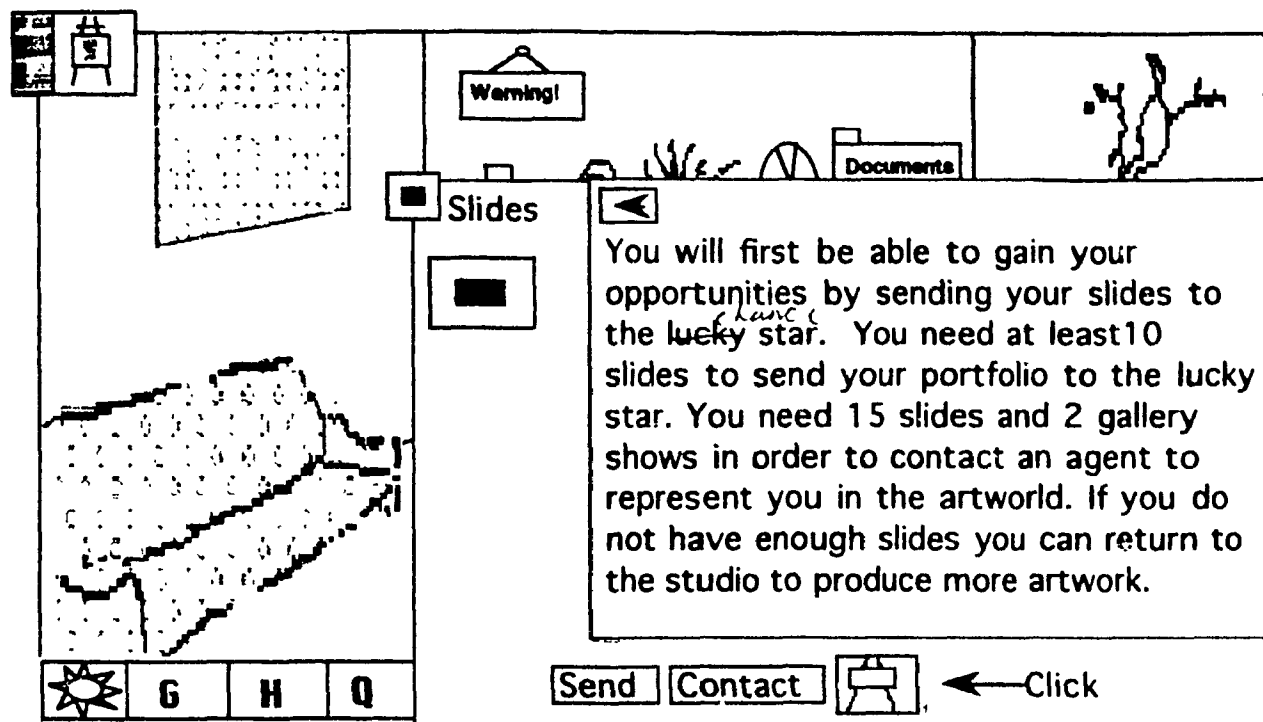
Checking Documentation - Slides for sending & contacting.
 - C.V. for score of shows.
 - Artist Statement & Proposal - Explor.



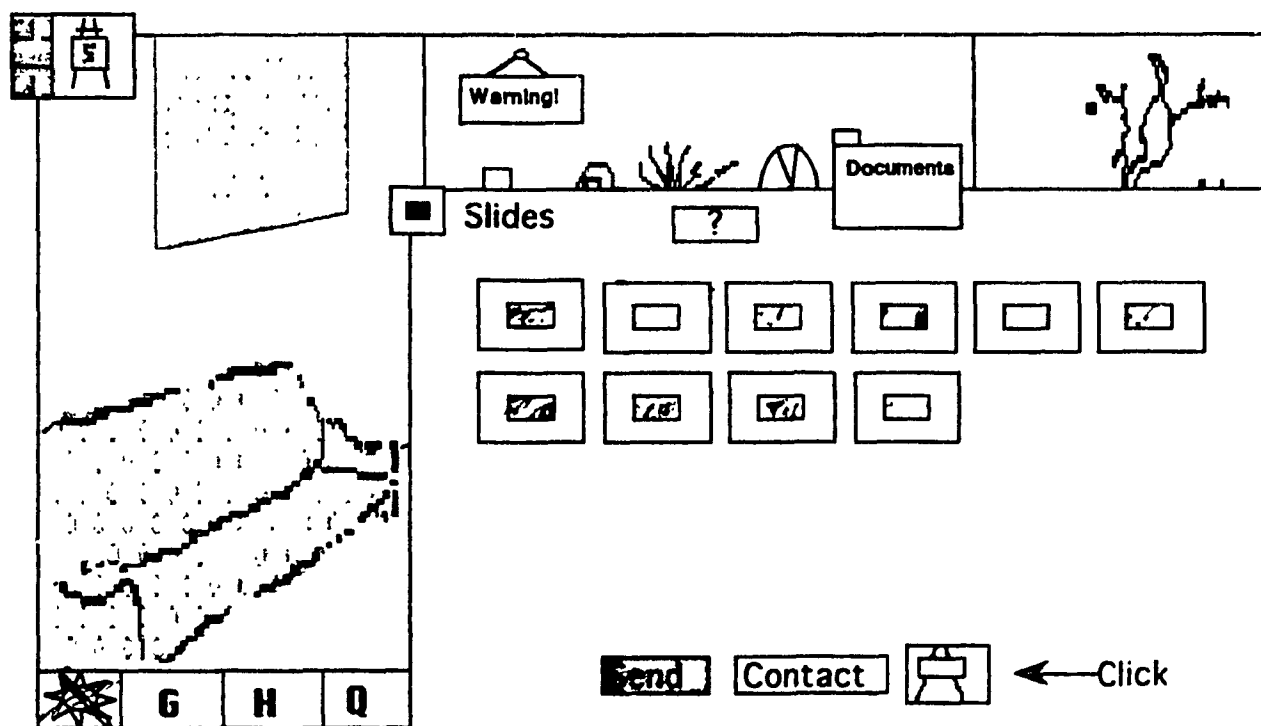
Info about use of slides Image is stored onto a slide



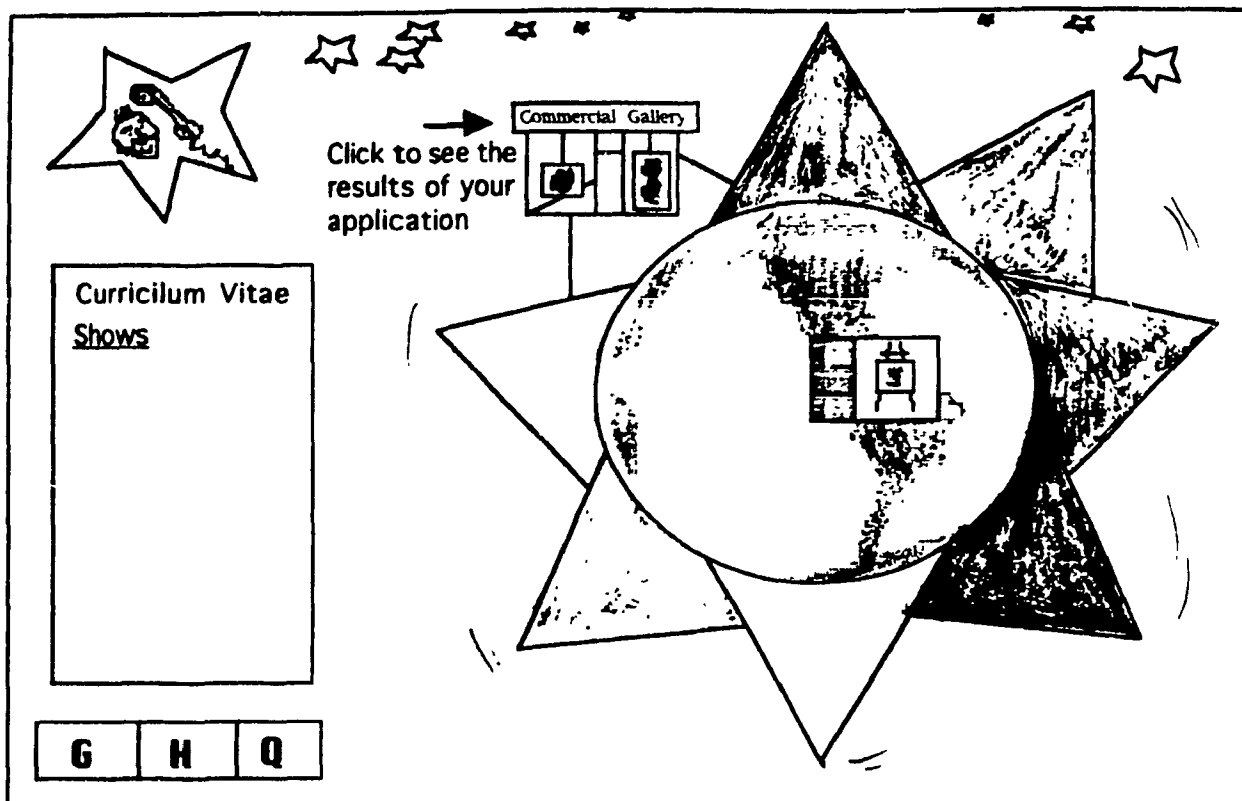
Help menu continues



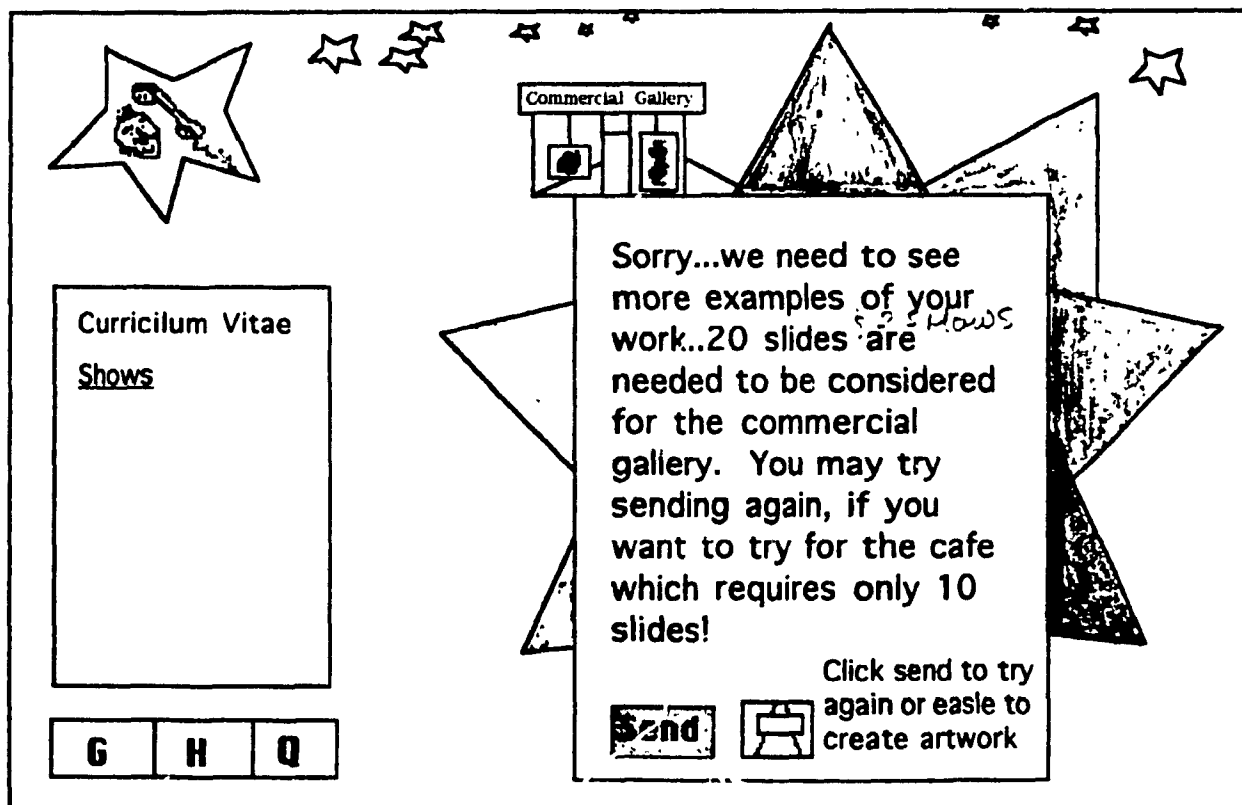
Criteria for sending slides



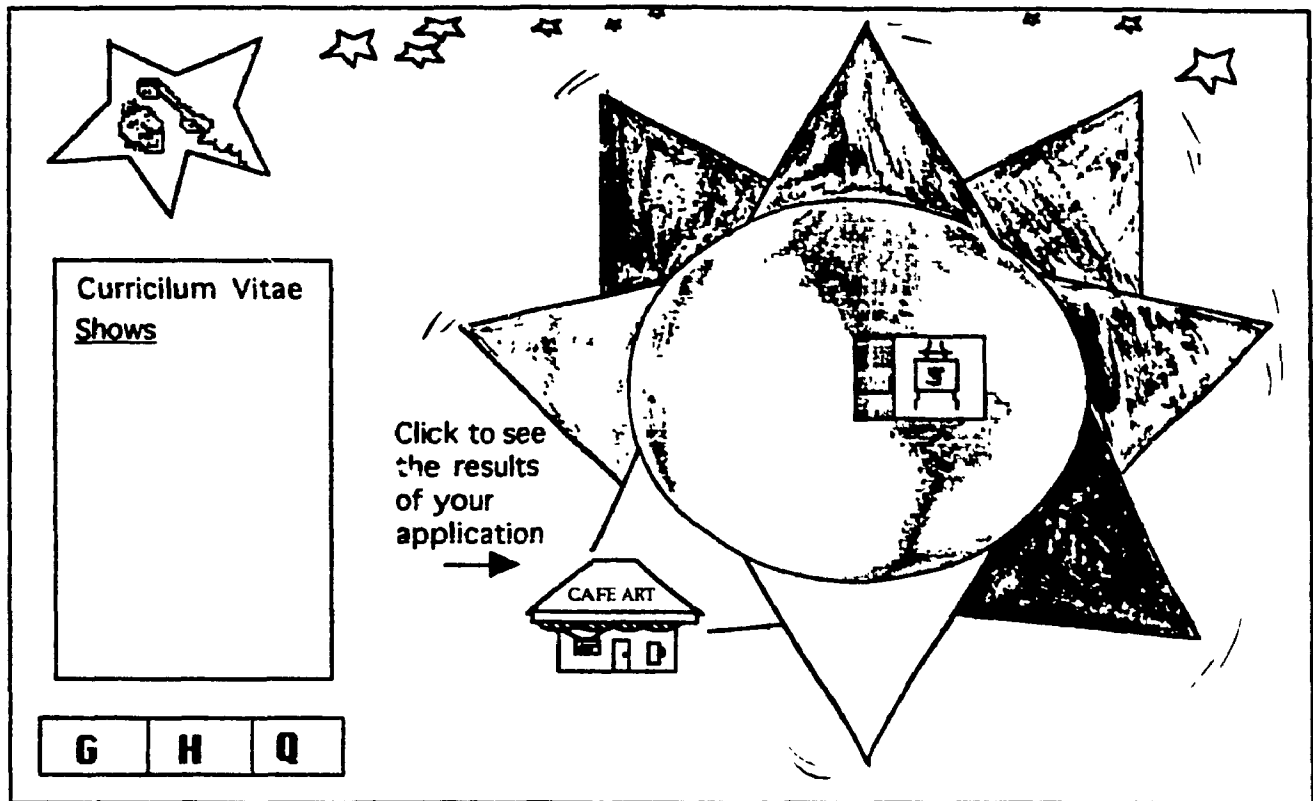
Once 10 artworks are produced they are then documented in 35 mm slides. Sending these slides to Locations in order to show your artwork (the lucky star)



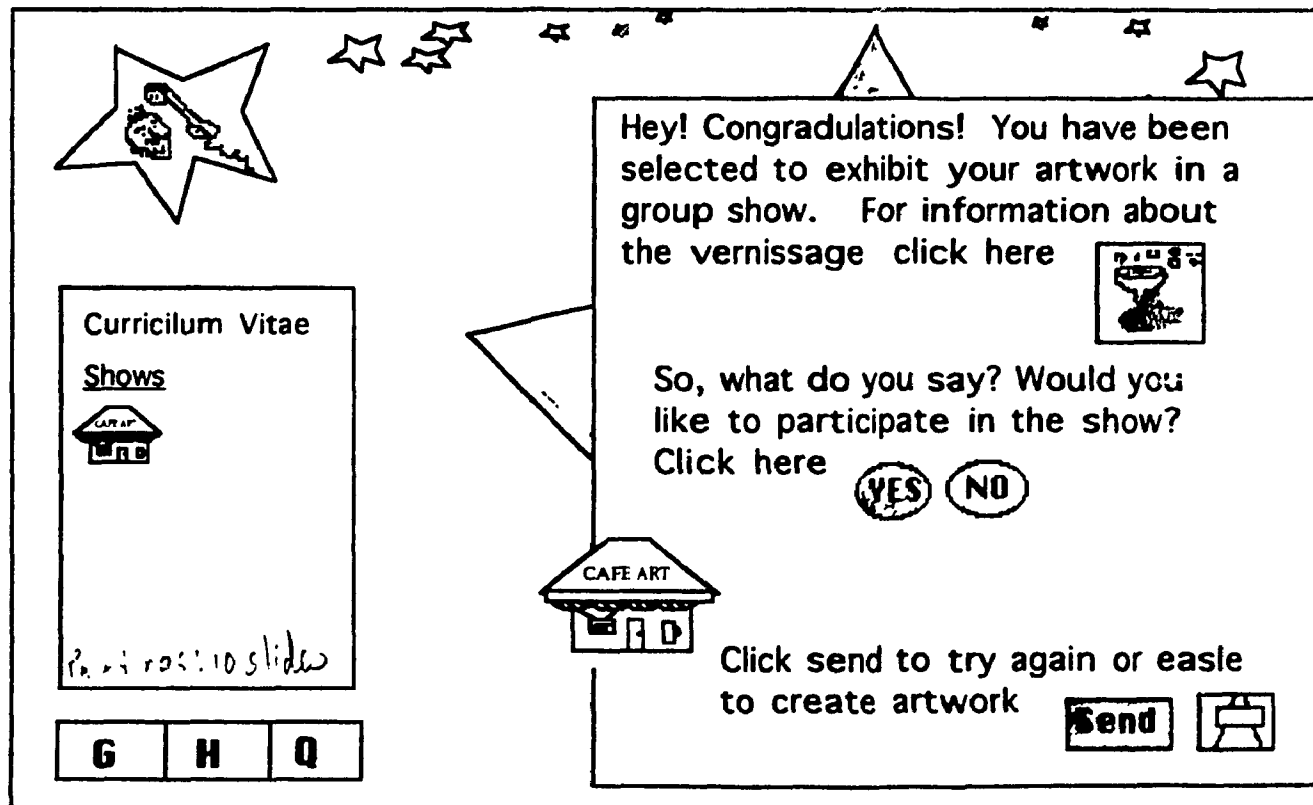
STAR spins and a location pops up. The CIV. Records the shows. Click location.



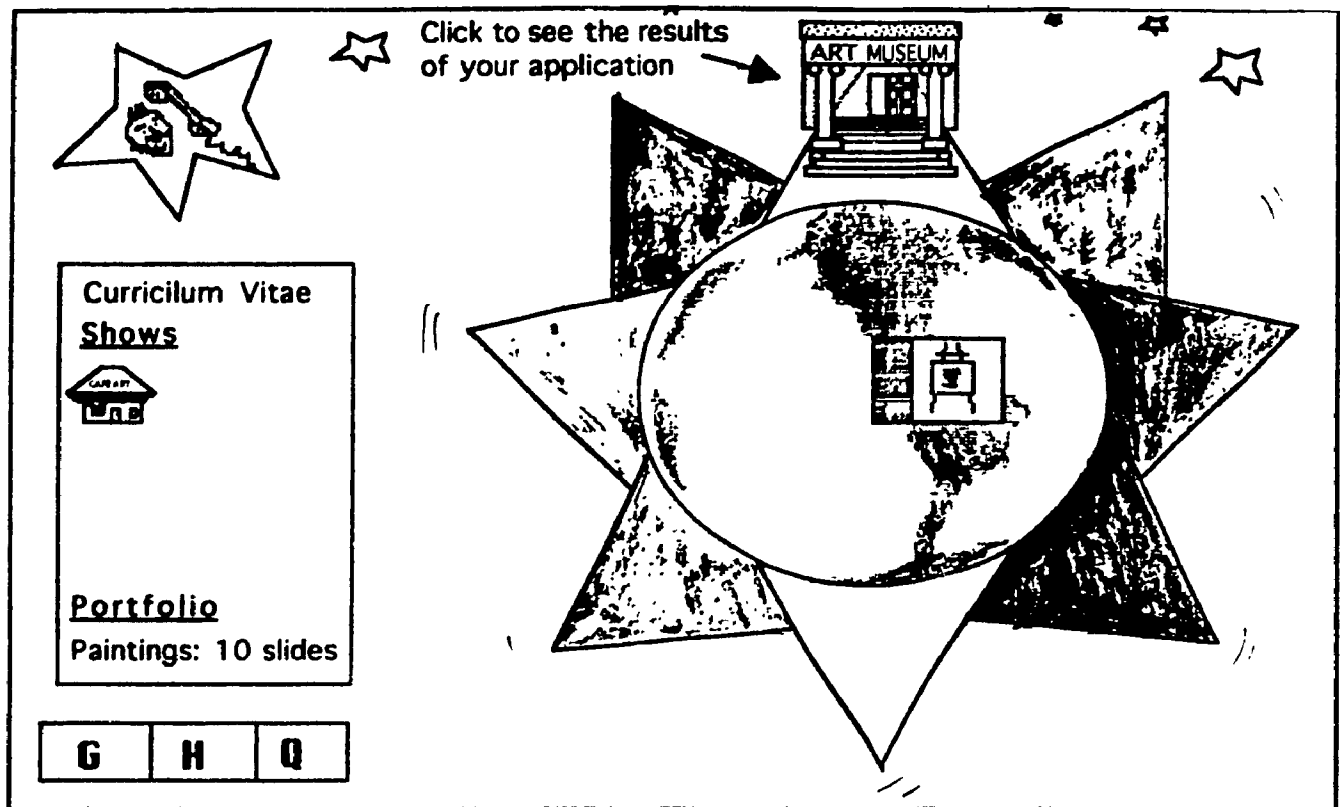
If not enough slides - refuses application. Option is to send or create.



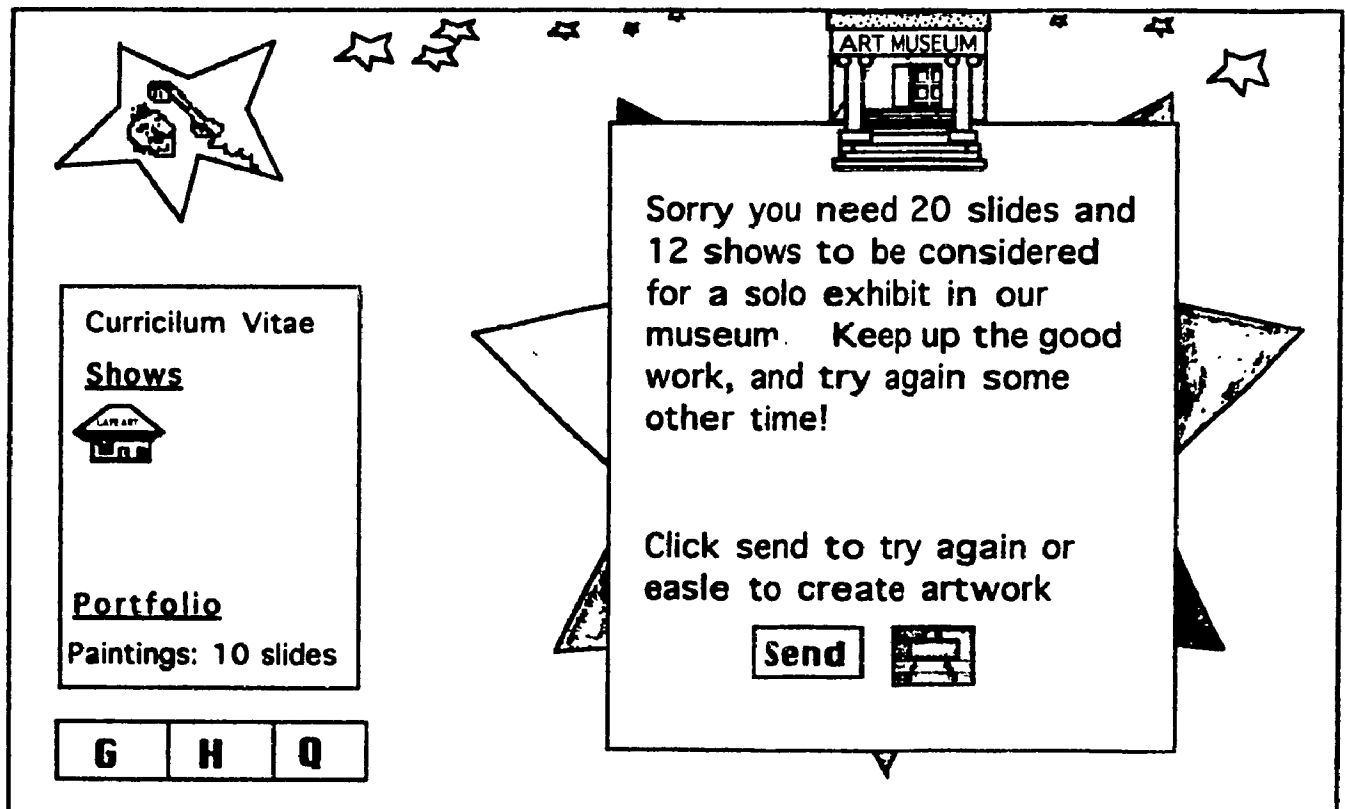
STAR spins, loads or cage.



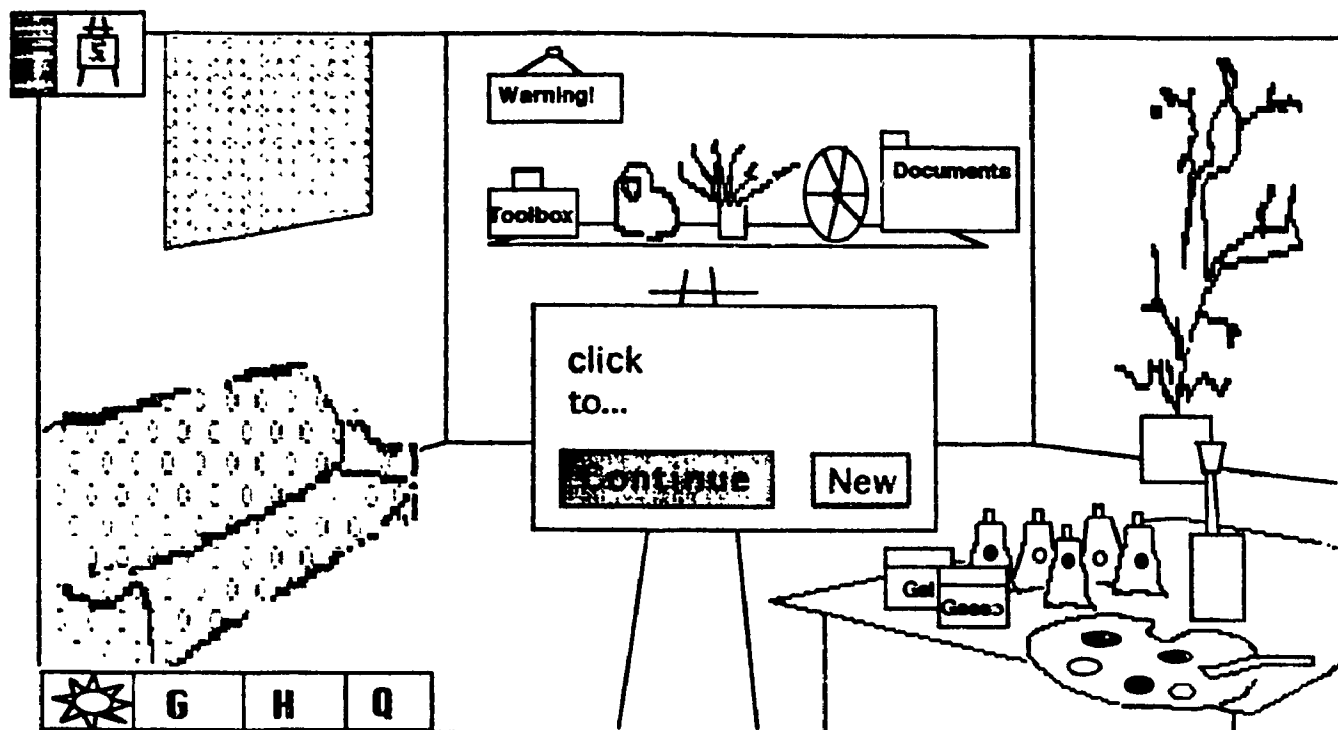
Portfolio meets requirements. Check is given
Vernissage to explore C.V. records score what user
is selected location particip. or C.V.



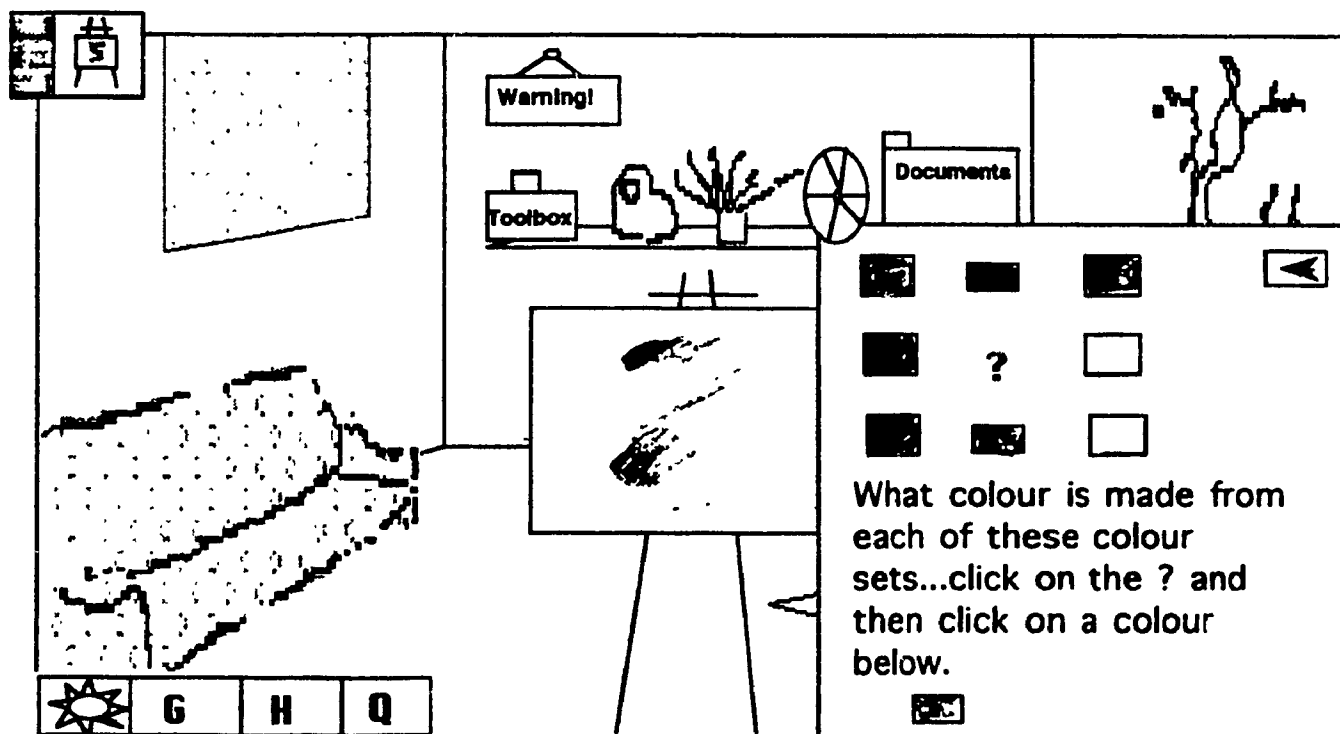
STAR = plus . Click on Museum .



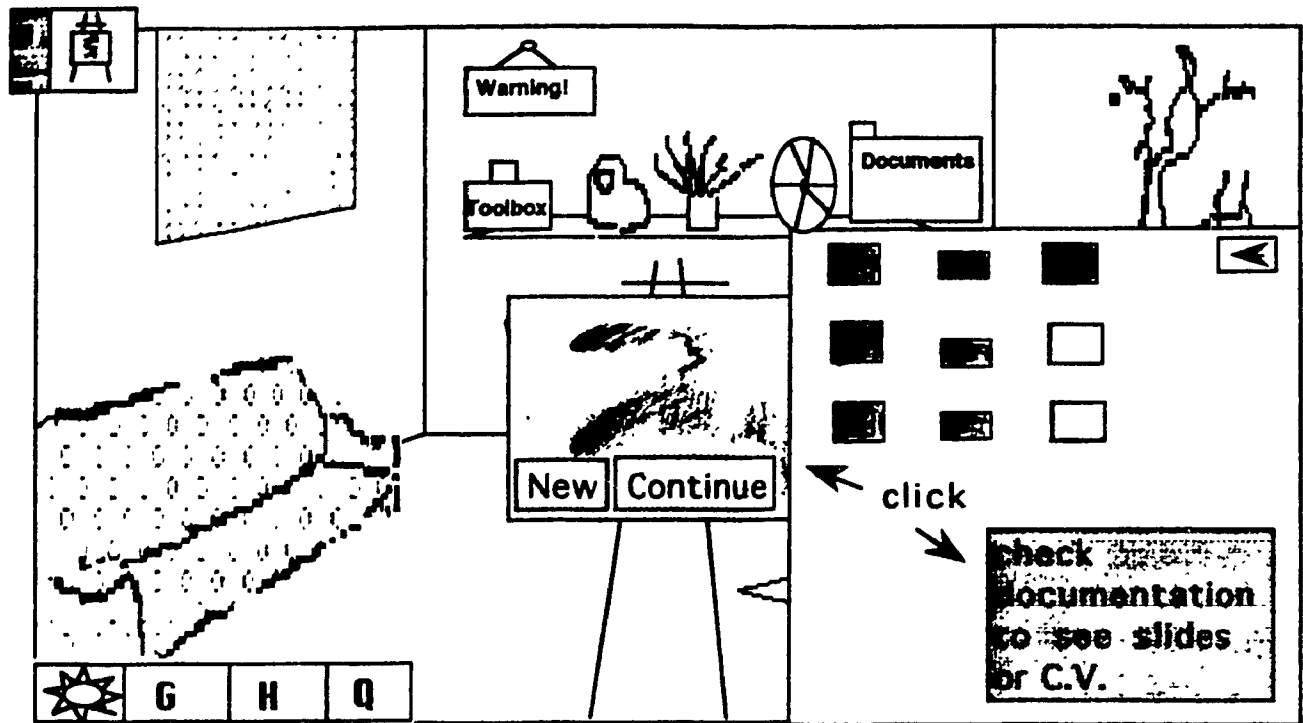
Not enough slides Portfolio doesn't meet requirements.
OPTION TO SEND to try again or to produce more artwork.



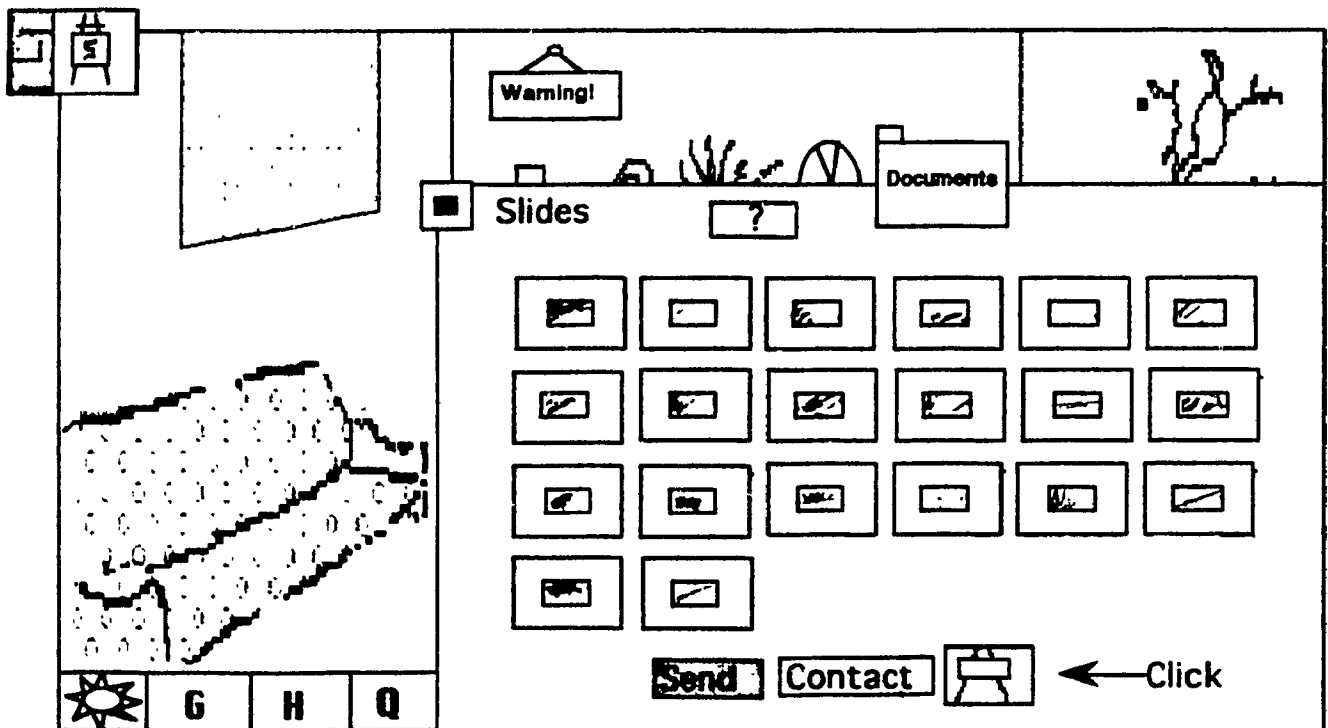
Return to Studio. Choose to continue producing with previous selection or to choose new materials.



Colour exercise creates artwork. Colour pops up on canvas.

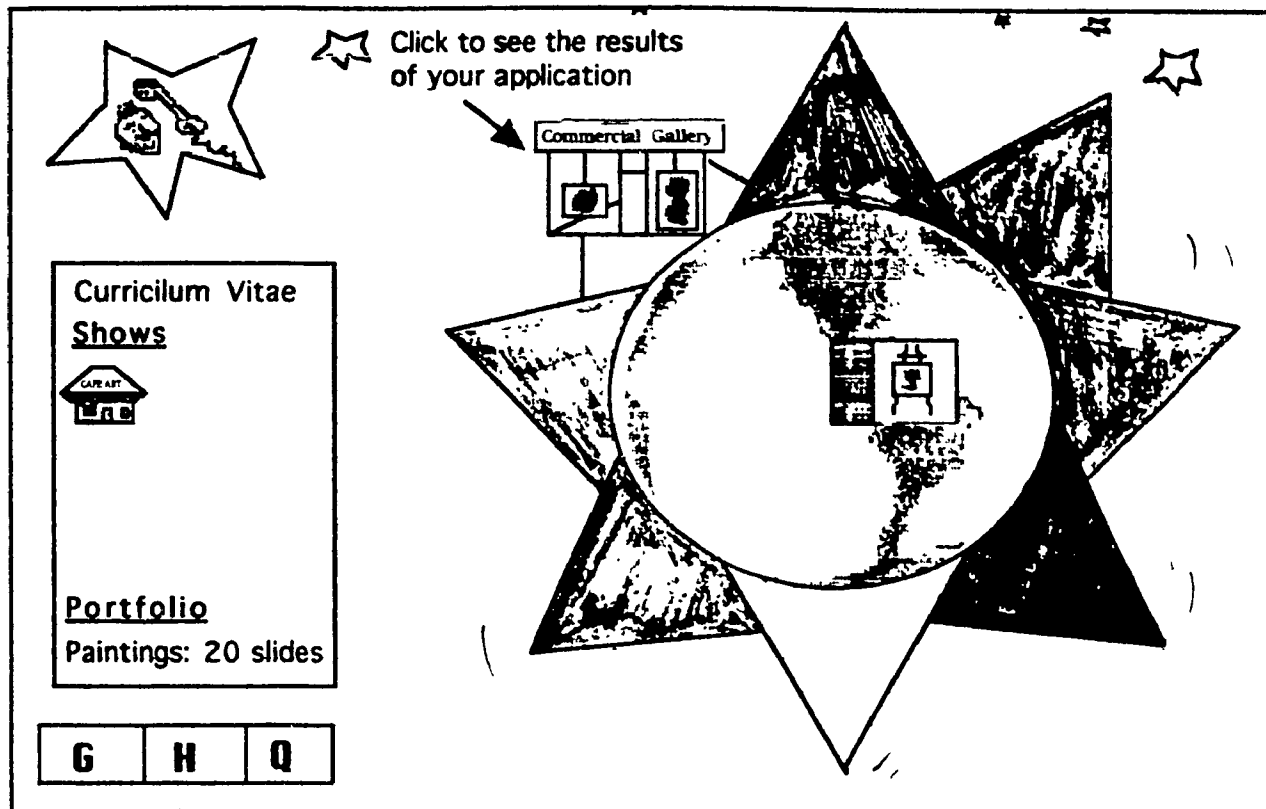


COLOUR exercise IS COMPLETED. CHOICE to produce more artwork or to check documentation. (i.e. to use Portfolio for applications)

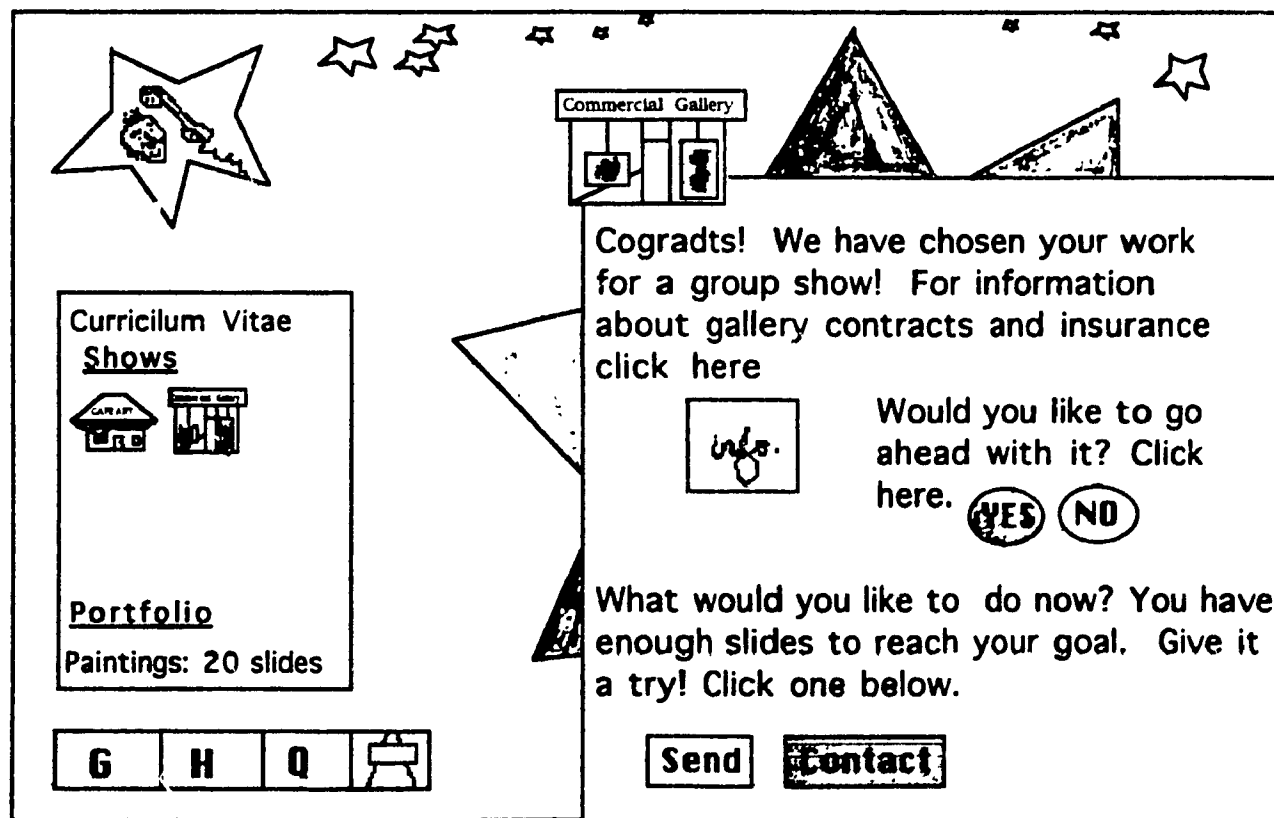


An example of 20 slides produced. User chooses to send Portfolio to change star.

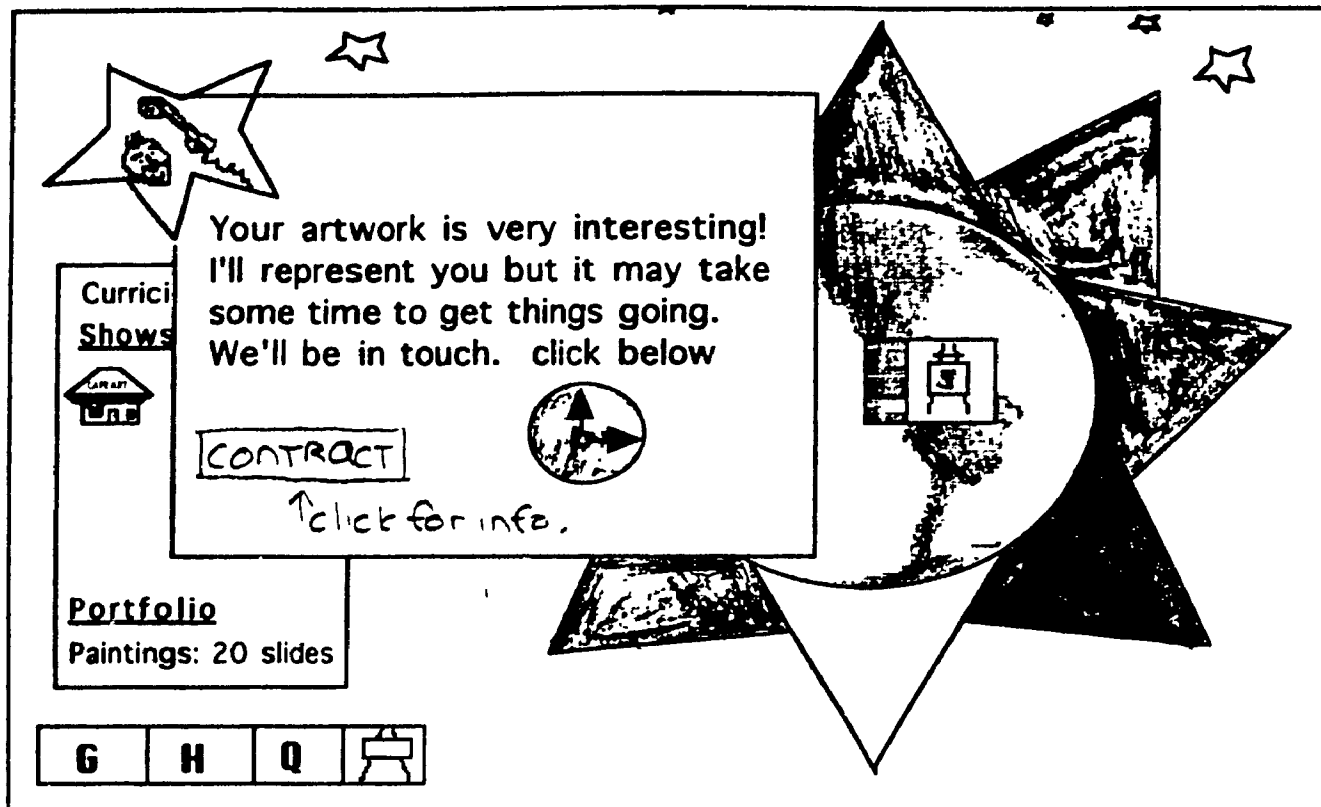
N.



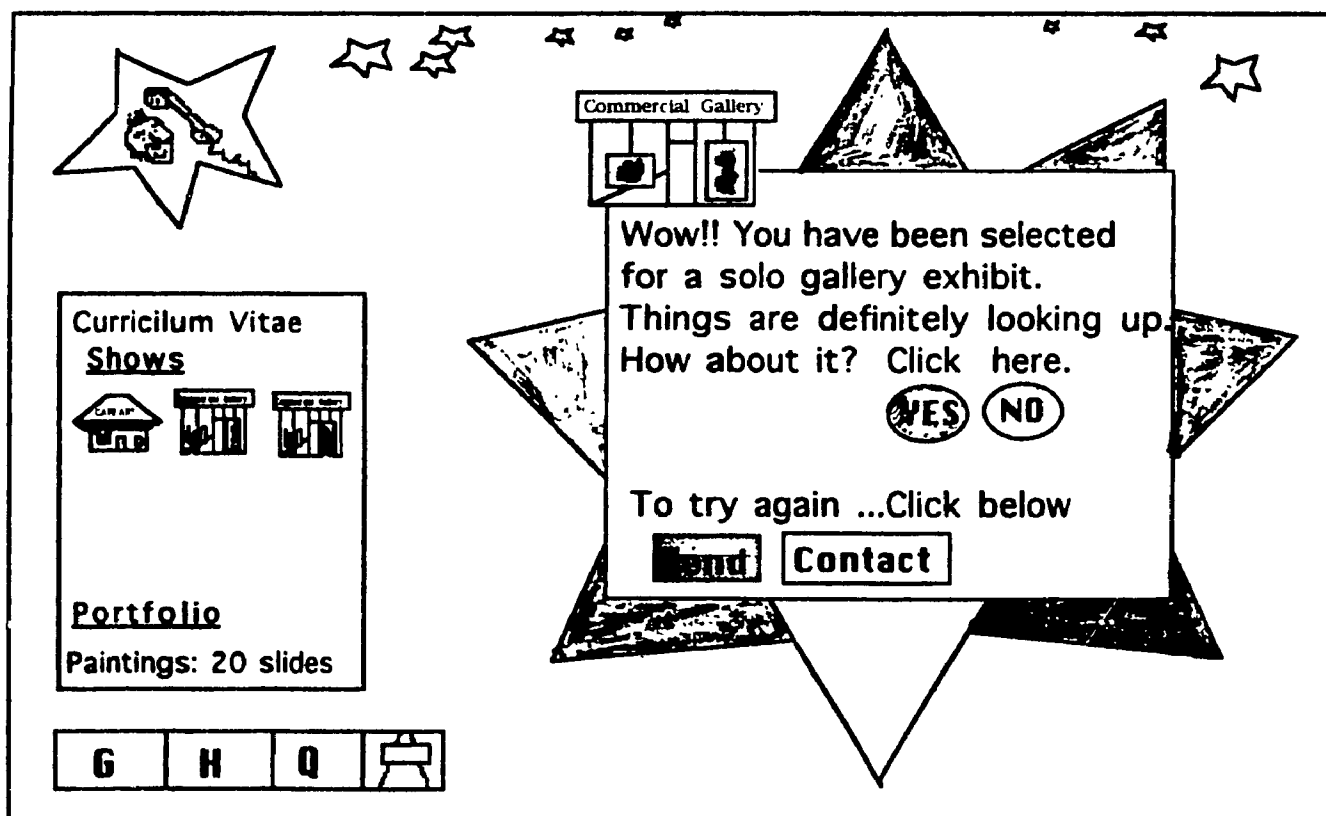
STAR SPINS. LANDS IN Commercial Gallery.



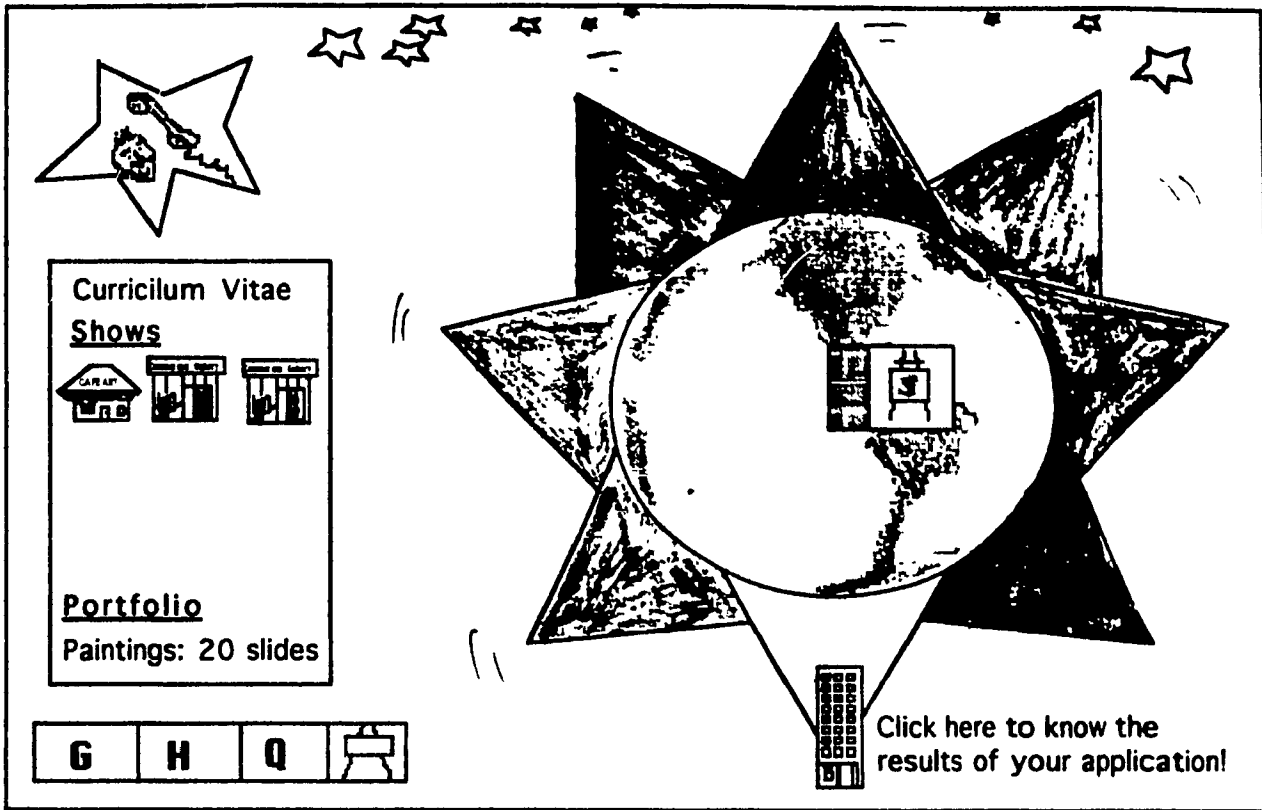
Portfolio Requirements were met. Info(Button) on contracts & insurance (exploration). Option to user to send or contact agent. Once 20 slides are produced, no more slides are necessary.



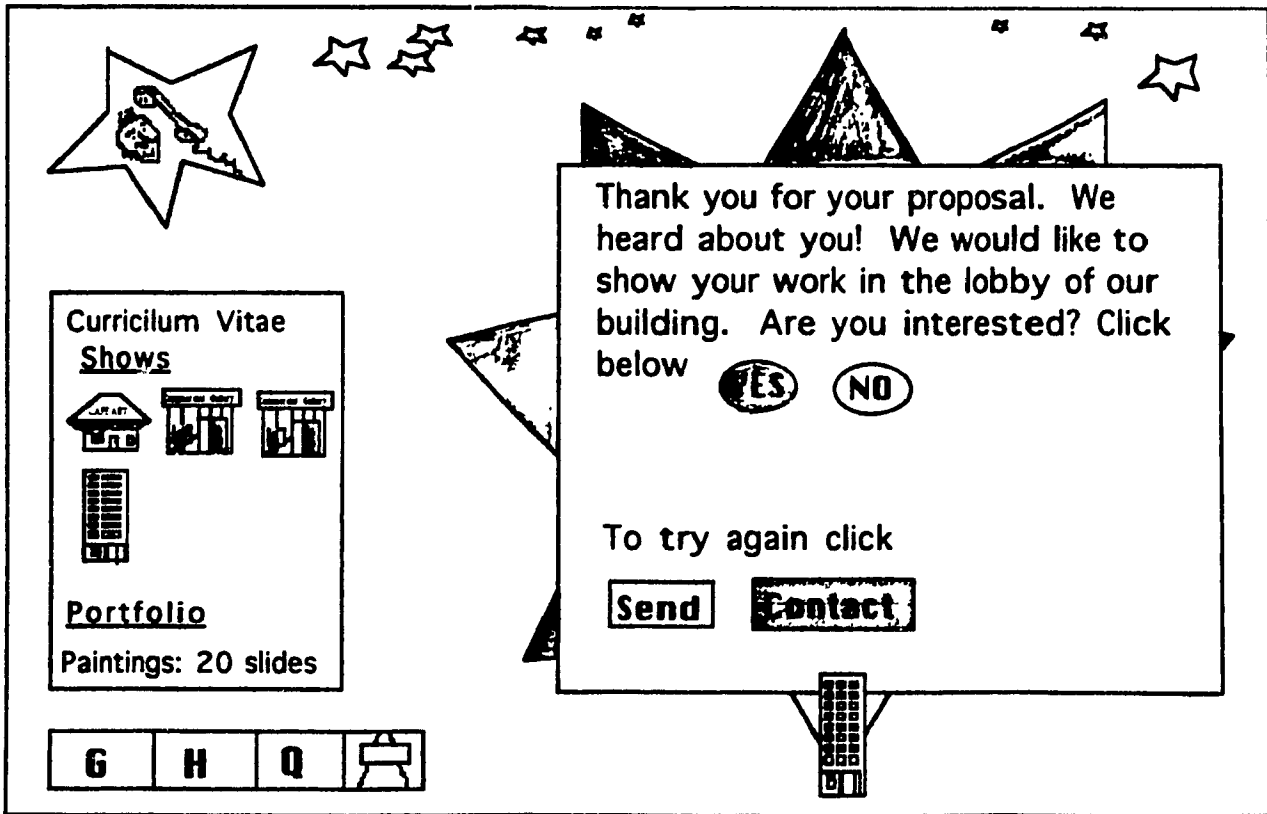
AGENT IS CONTACTED, and accepts to represent you.
click TICKS to represent time factor.



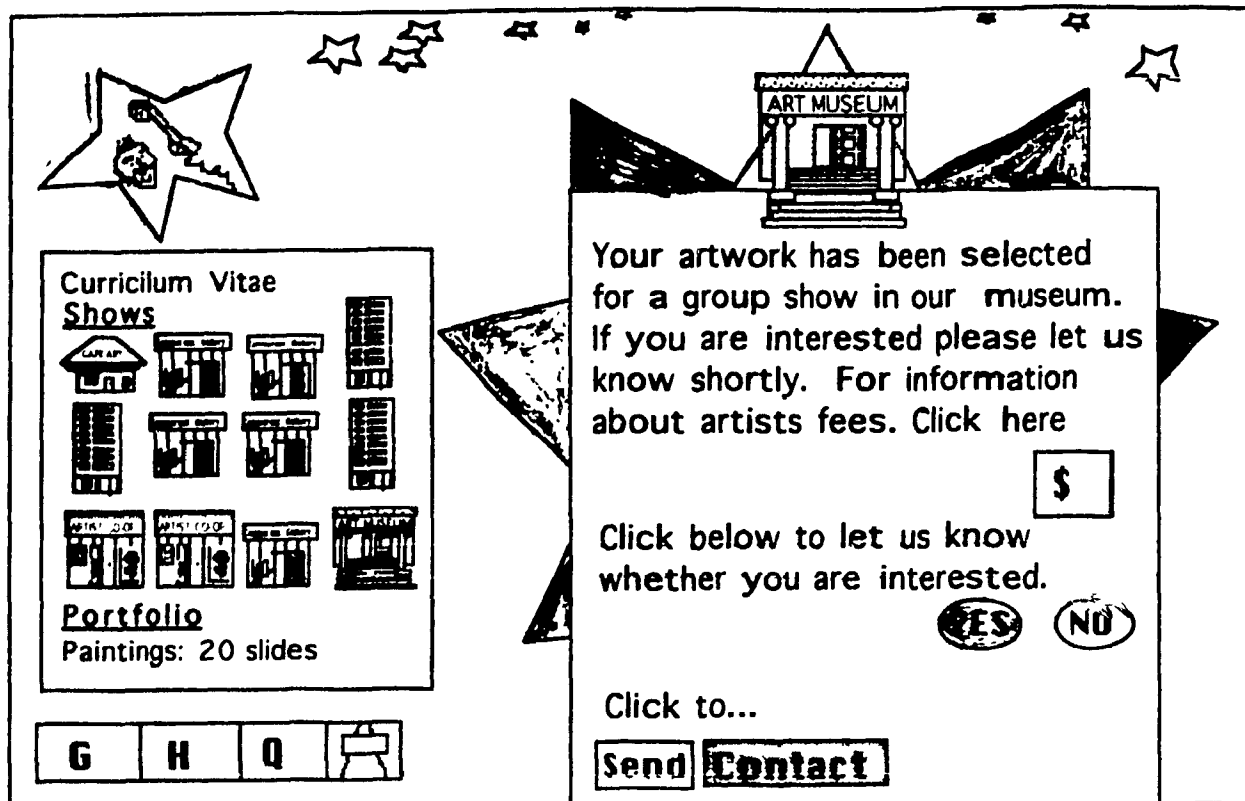
STAR FIASHES



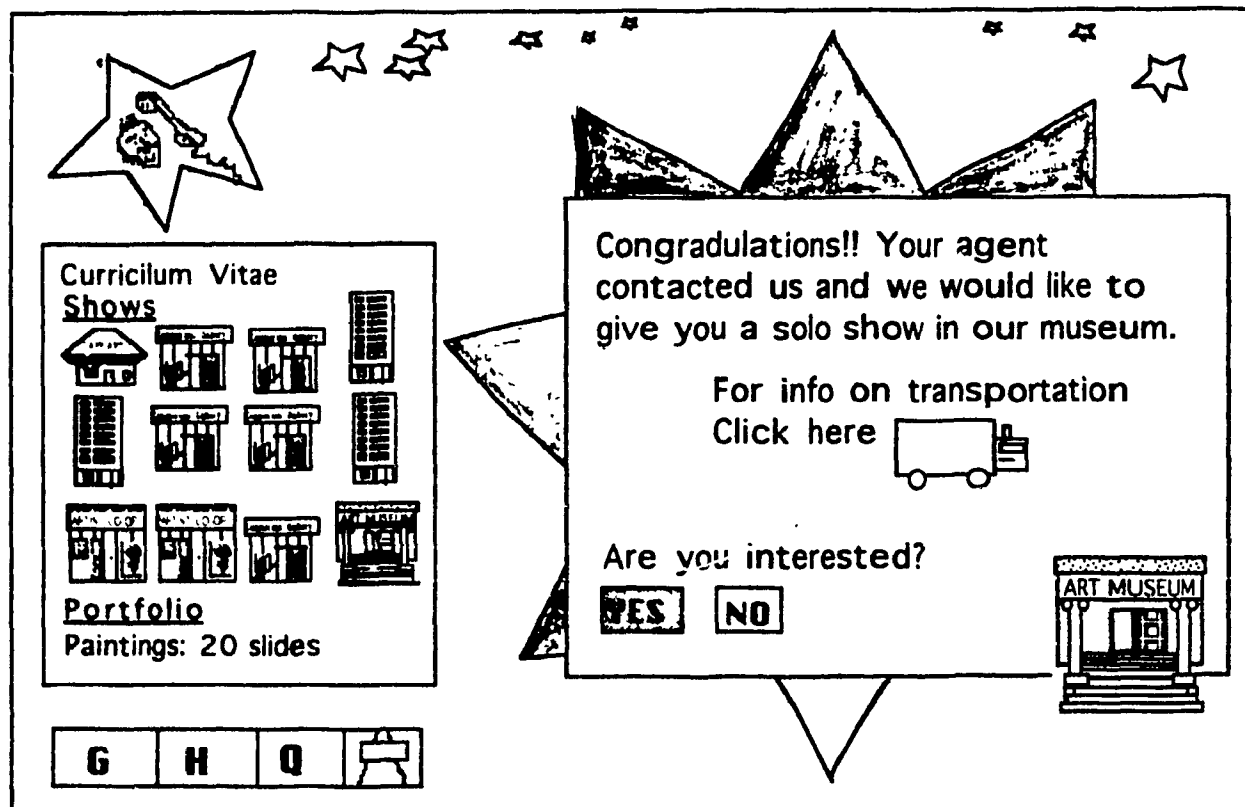
This time the portfolio is sent, Star Spins.



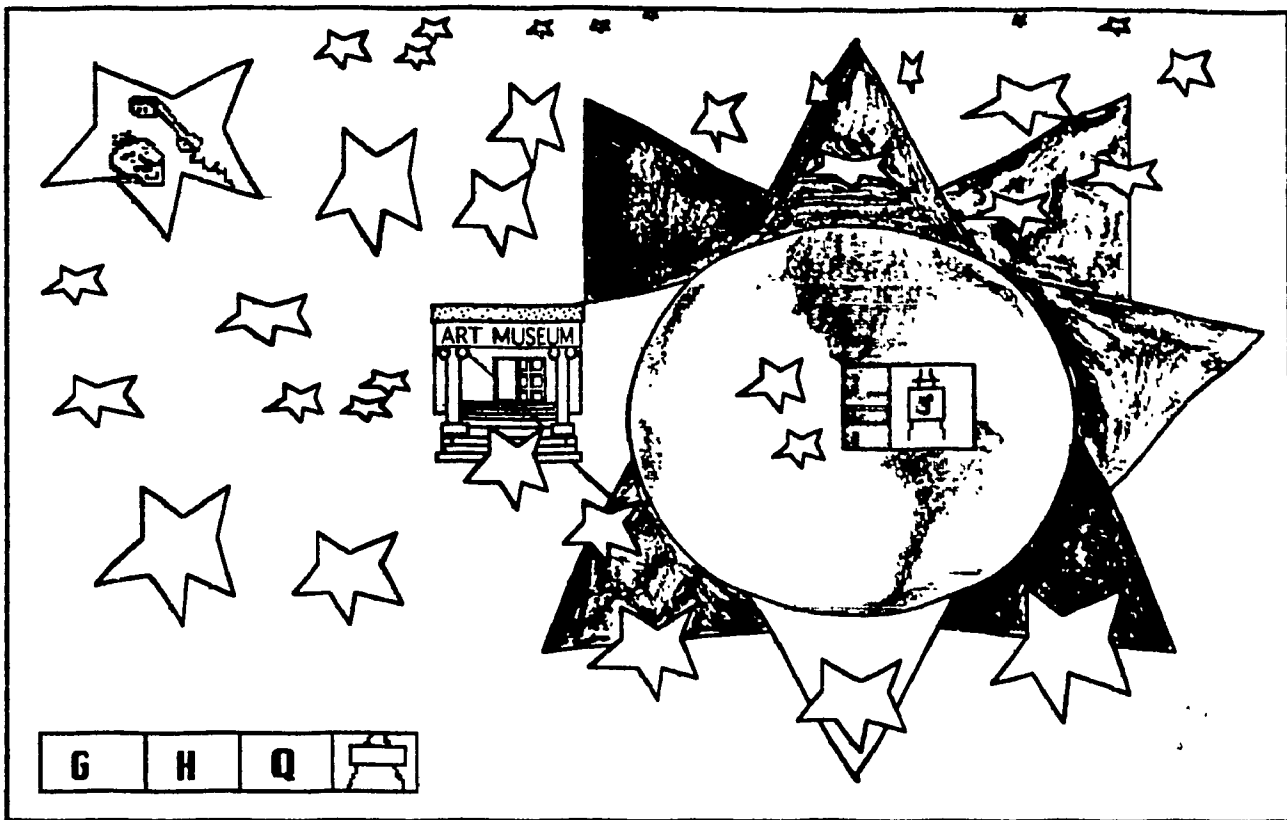
User chooses to contact agent.



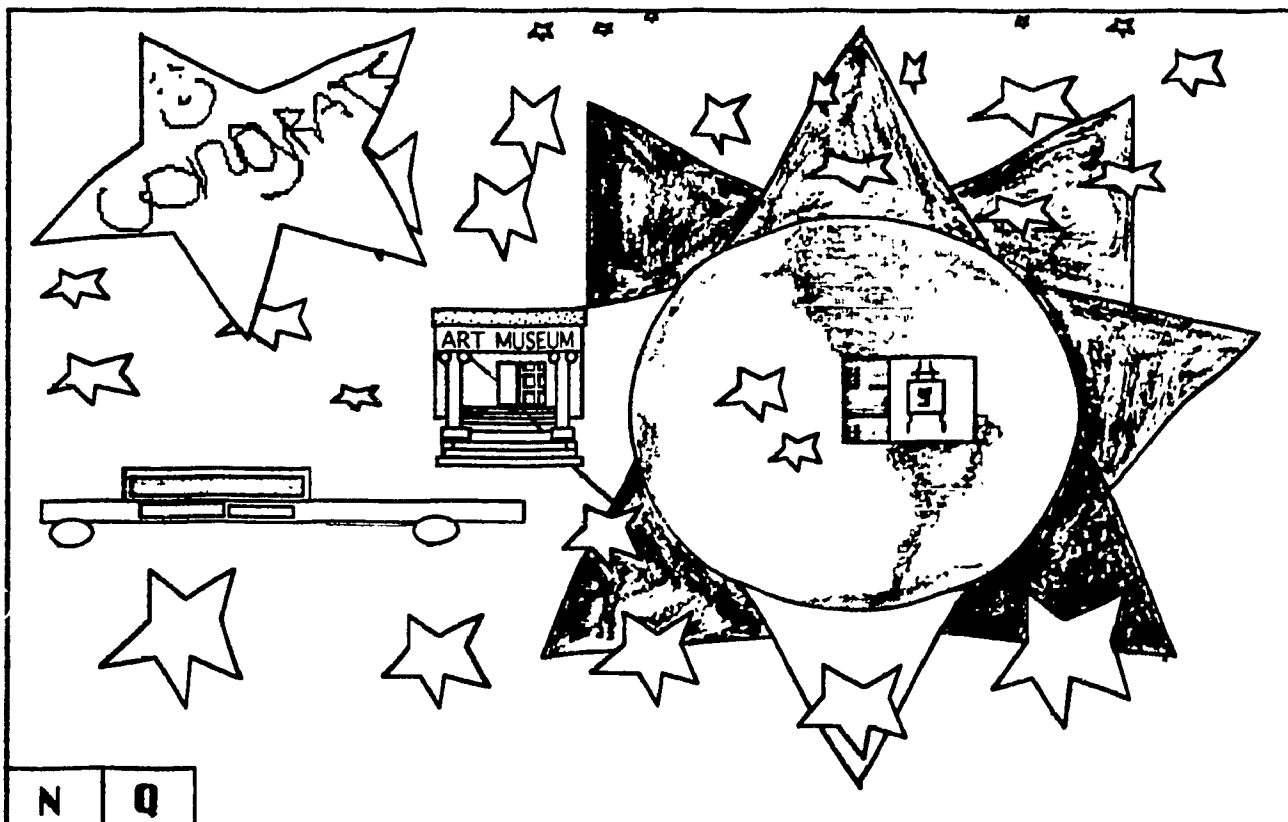
STAR FLASHES. Another show is given. User Contact agent again. Agent lights up & blinks.



Agent lights up and blinks, Star Flashes.
INFO or Transportation Button).



STAR SPINS - The player row WON the game.



stars fall & imo pull up.

Appendix C: Consent Form

Dear Student/Parent,

April 1, 1995

A prototype of a computer simulation game is presently being developed for Visual Arts Education. This prototype is being developed as a component for a thesis project in the Educational Technology Program at Concordia University (Montreal, Que.).

A formative evaluation of the prototype will be conducted in order to ensure the quality of the product. I am requesting your participation in this evaluation of the prototype, as your input will make a valuable contribution to the development of this simulation game. Please acknowledge that all of the information obtained throughout the evaluation process will maintain anonymous and confidential.

If you agree to participate in this evaluation please note that you will be initially asked to try out the prototype. Following the prototype trial, you will be asked to complete a questionnaire or post-test. A brief interview will occur afterwards in order to discuss various aspects of the prototype.

Your participation and opinions will be crucial for the successful development of this game. It would be very much appreciated.

Sincerely,

Julia Feldman

I (name)_____ hereby accept to participate
in the evaluation process as outlined above.

(Please note that if you are under 18 years of age you must ask a
legal guardian to sign this request form)

Date_____ Signature_____

**Appendix D: Storyboard Evaluation-
Open Ended Questions for Experts and End Users**

Storyboard Evaluation - Open Ended Questions for Media Expert

1. How motivating/challenging is the 'gaming concept'?
Please elaborate on the effectiveness of the gaming concept/features.
2. How effective is the 'interface design' (i.e. Artlife Menu, glossary, help, quit icons, visual layout, prompting, navigation menus and buttons)?
3. How attractive is the 'visual design' (i.e. graphics, font)?
4. What do you like the most about the game?
5. What do you like the least about the game?
6. Do you find the game interesting?
7. Can you suggest any ideas for the further design of this game?

Storyboard Evaluation - Open Ended Questions for Studio Art/Art Education Expert

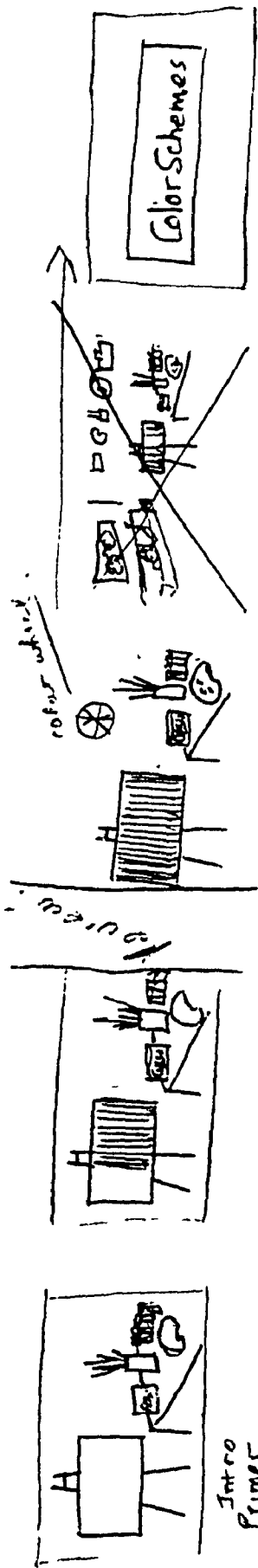
1. Please verify the 'accuracy of the content' (i.e. scripts and glossary).
2. Is the 'scope' of the content appropriate for the target audience?
3. Is the 'language level' appropriate for the target audience?
4. Is the 'presentation of the content' attractive?
5. Is the 'sequencing of content' effective for 'learning'?
6. How motivating/challenging is the 'gaming concept'?
Please elaborate on the effectiveness of the gaming concept/features.
7. What do you like the most about the game?

8. What do you like the least about the game?
9. Do you find the game interesting?
10. Is this game helpful in terms of learning about producing, documenting, and exhibiting artwork?
11. Can you suggest any ideas for the further design of this game?

Storyboard Evaluation - Open Ended Questions for End-Users

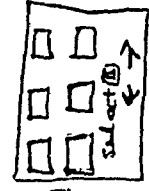
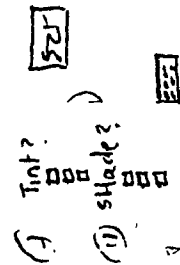
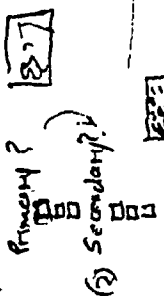
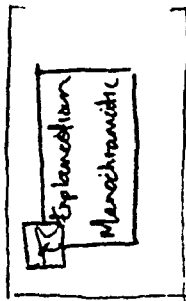
1. Is the 'scope' of the content adequate?
2. Is the 'language level' appropriate for the comprehensive?
3. Is the 'presentation of the content' attractive?
4. How motivating/challenging is the 'gaming concept'?
Please elaborate on the effectiveness of the gaming concept/features.
5. How useful is the 'interface design' (i.e. Artlife Menu, glossary, help, quit icons, visual layout, prompting, navigation menus and buttons)?
6. Is the 'sequencing of content' appropriate?
7. Is the visual design interesting (i.e. graphics, fonts)?
8. What do you like the most about the game?
9. What do you like the least about the game?
10. Do you find the game interesting?
11. Would you play this game?
12. Is this game helpful in terms of learning about producing, documenting, and exhibiting artwork?
13. Can you suggest any ideas for the further design of this game?

Appendix E: Thumbnail Sketches for the Prototype



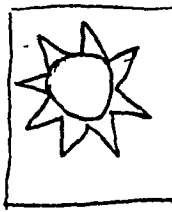
Intro Colors
Mixing for Color Palette
Gaming Exercise

①



Portfolio Selection

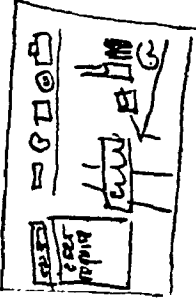
②



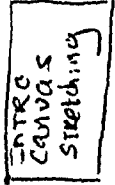
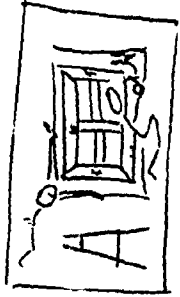
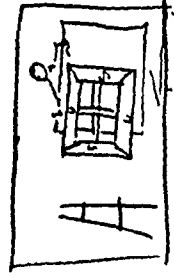
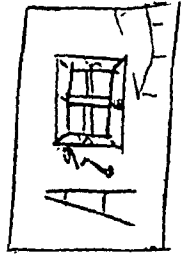
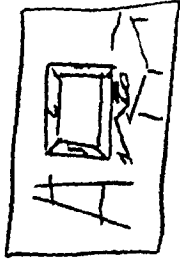
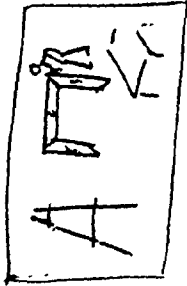
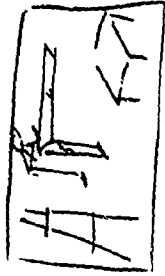
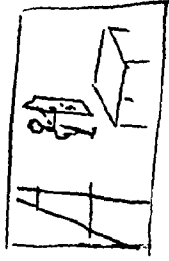
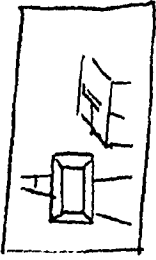
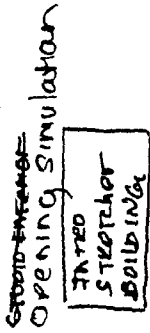
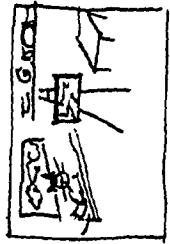
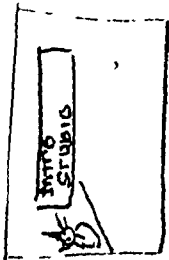
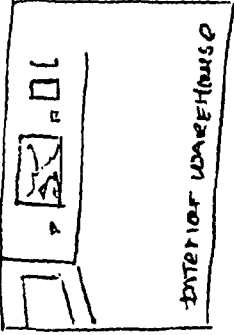
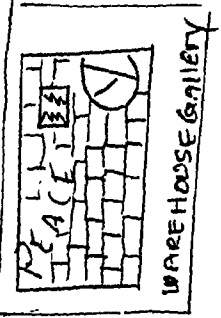
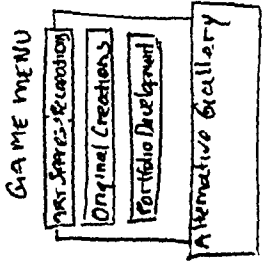
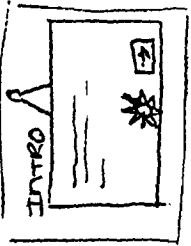
User will have
e.g. 4 chances
to get stars



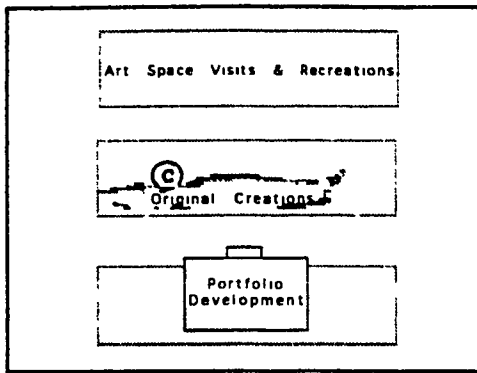
Return Studio
Score is revealed



portfolio 2 goes to ch s. win.
lose.



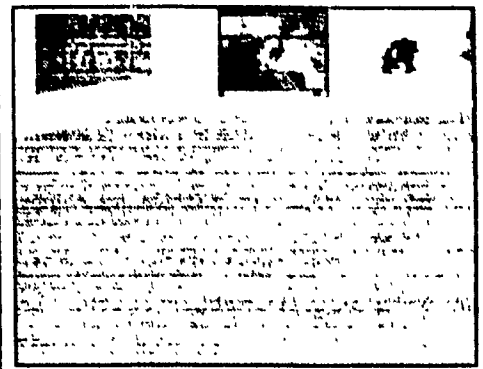
Appendix F: Screen Examples of the Prototype



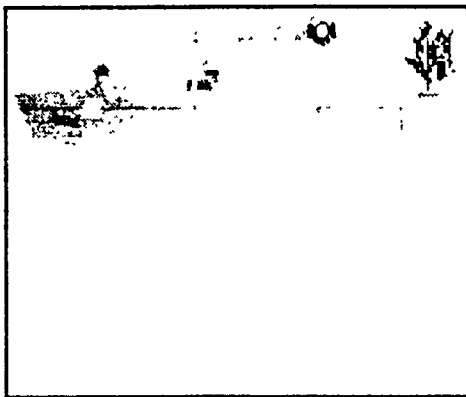
THE GAME MENU SCREEN



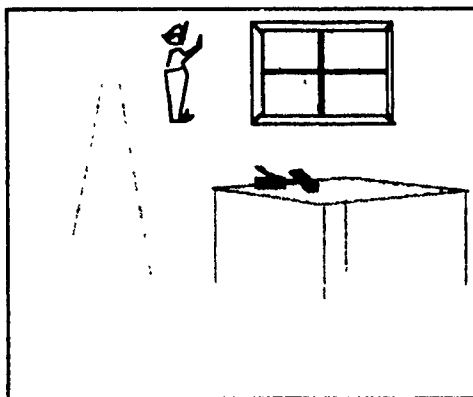
THE EXTERIOR
WAREHOUSE GALLERY



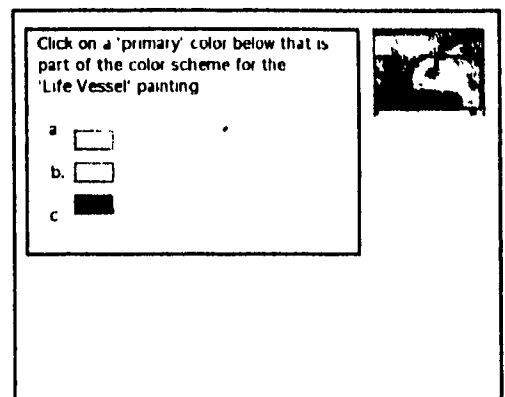
THE INTERIOR
WAREHOUSE GALLERY



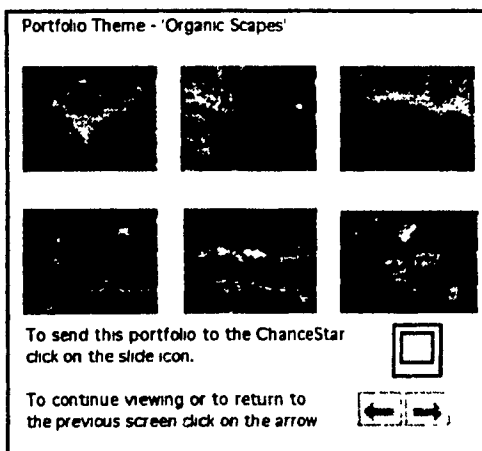
THE STUDIO ENVIRONMENT
SCREEN



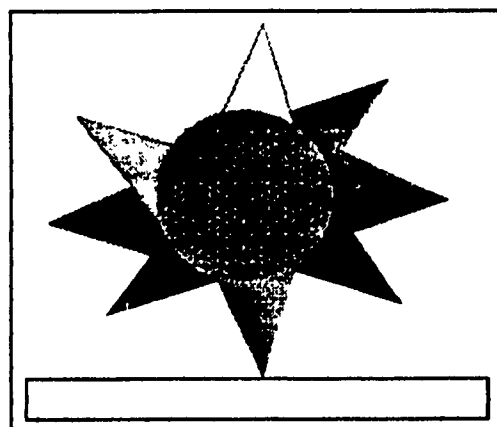
THE SIMULATION SCREEN OF
PREPARING STRETCHER &
CANVAS



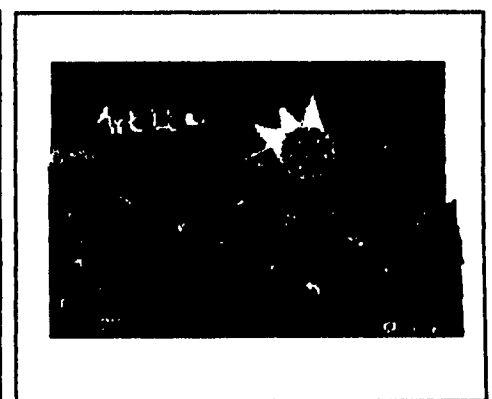
THE COLOUR EXERCISE SCREEN



THE PORTFOLIO SELECTION
SCREEN

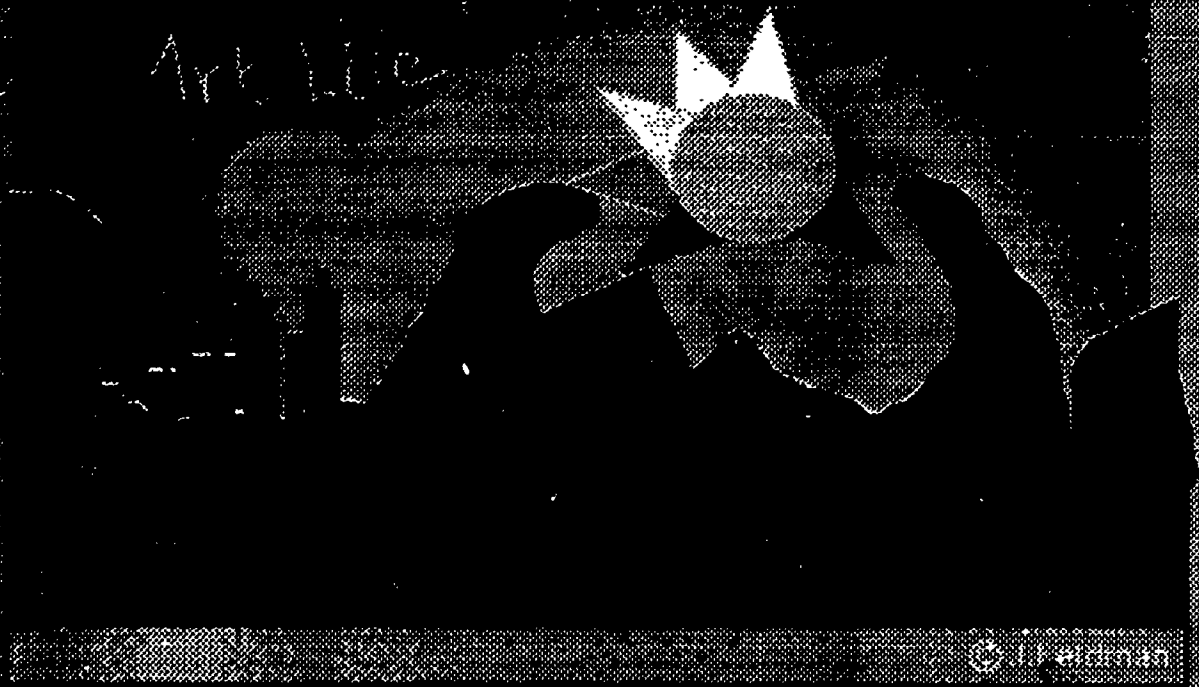


THE CHANCESTAR SCREEN



THE TITLE SCREEN

Art. 11c



© J. Keldman

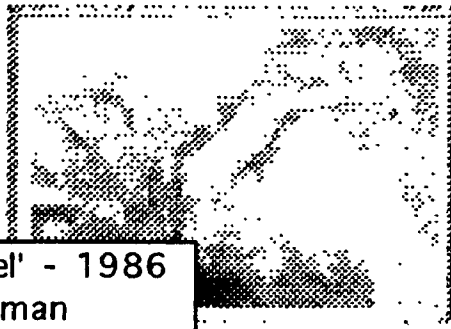
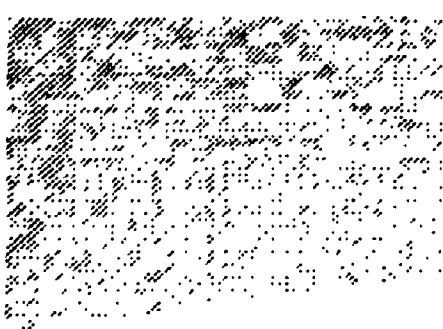
Allright!!!!
Welcome to ArtLife!

Your ultimate goal is to exhibit your artwork in a public museum, and guess what?

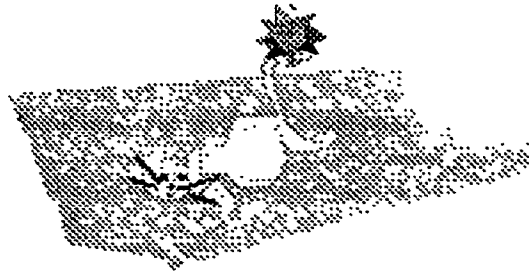
It's going to be an utterly super experience!
Playing 'ArtLife' is full of the ups & downs of an artist's career.

To know more about 'ArtLife' click on the arrow,
or to jump right into the action click on the
color wheel!

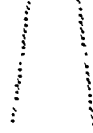
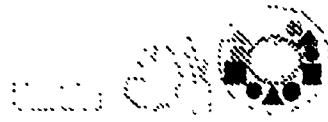




'Life Vessel' - 1986
Julie Feldman
Acrylic on canvas
5' x 6'

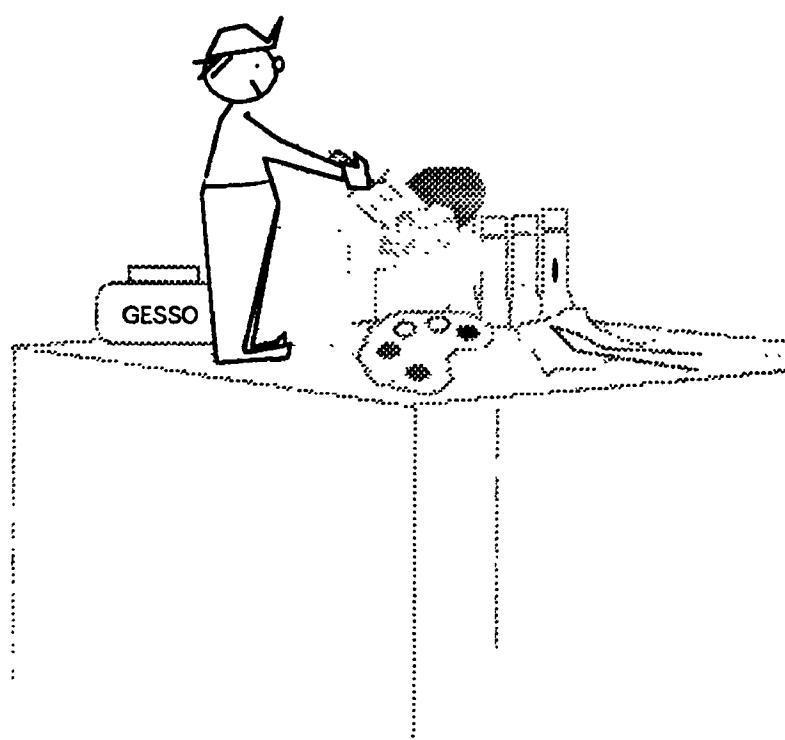


2. 4/



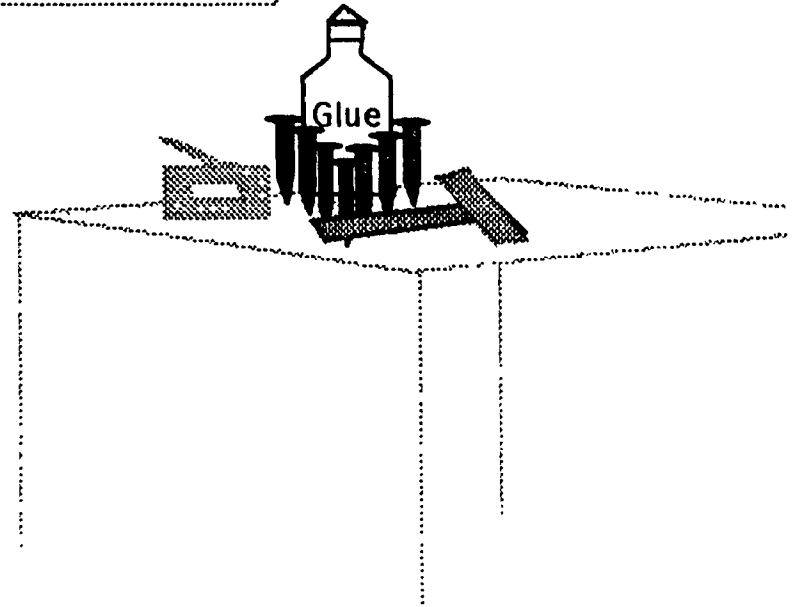
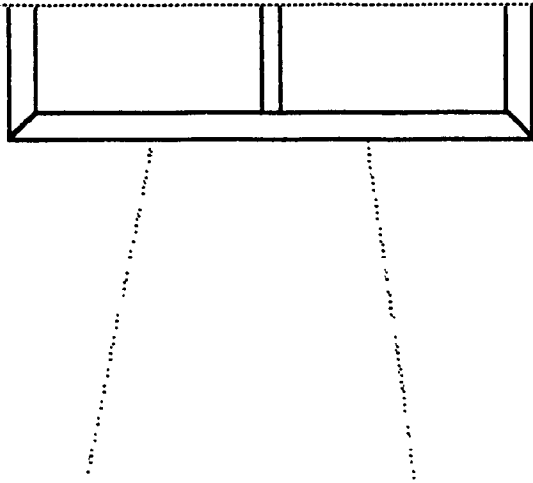


11

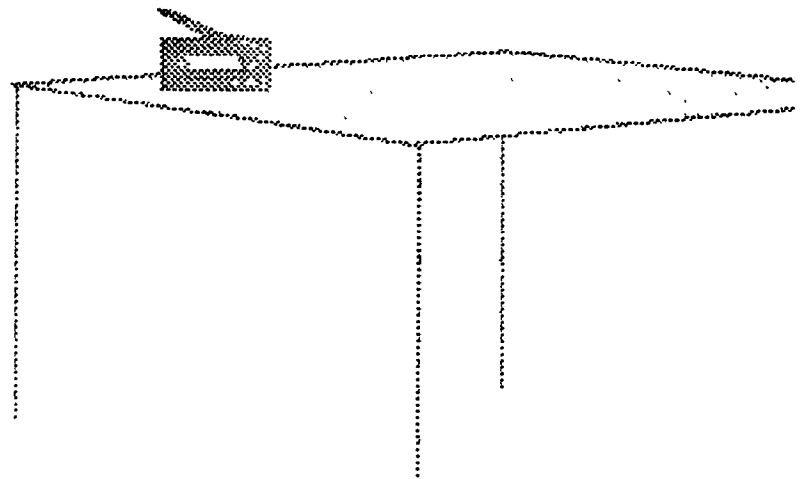
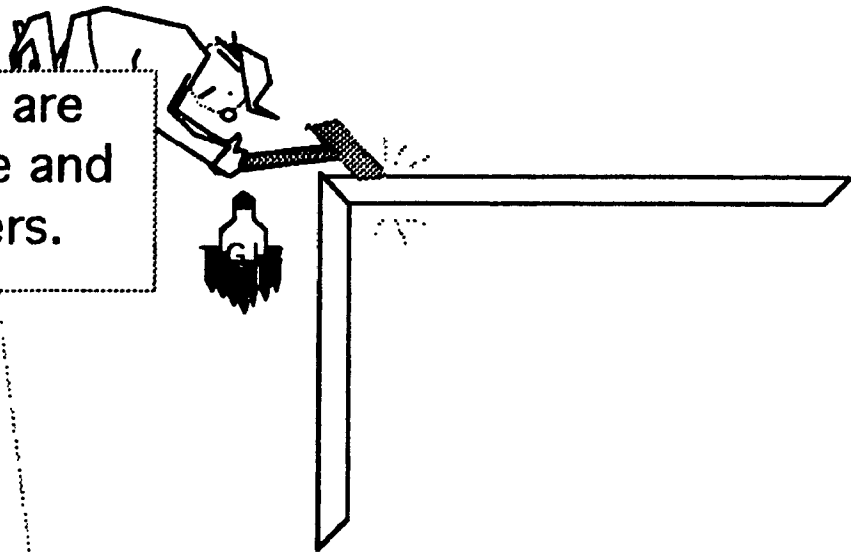


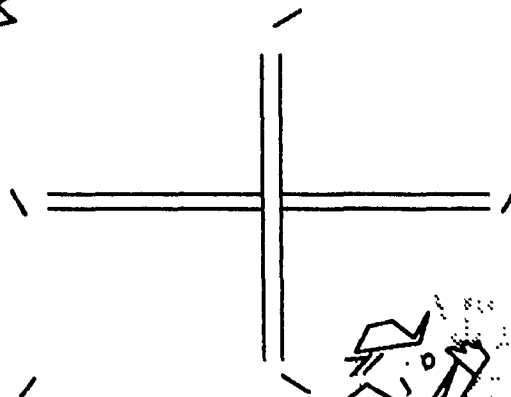
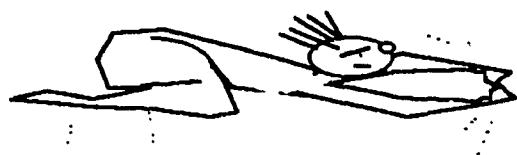
In order to stretch our canvas we will first need to make a stretcher.

A stretcher is made out of bars of wood (usually pine). Glue, nails, and a hammer are required to attach the bars of wood.



The bars of wood are attached with glue and nails at the corners.

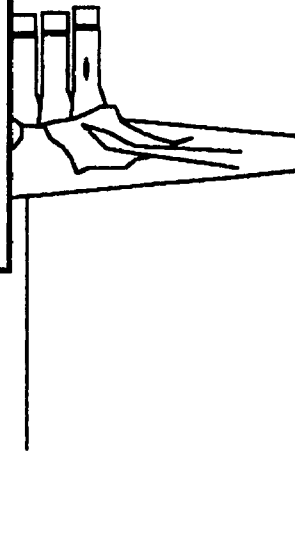




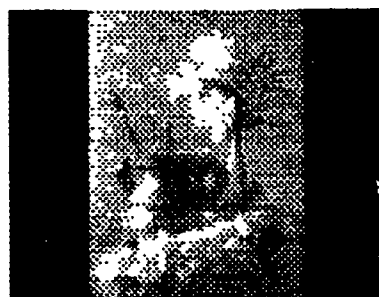
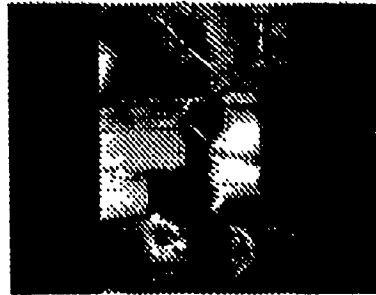
Preparing the stretcher and canvas for painting can be a lengthy procedure. Let's review the process!

- First, you build the stretcher. Remember, if the size of the stretcher exceeds 2.5 ft, a cross bar is required.
- Second, the canvas is then stretched/stapled onto the back of the stretcher.
- Third, the canvas is grounded/coated with a primer (acrylic gel or gesso).

Now, you're ready to mix your colors for your colour palette!



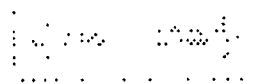
Portfolio Theme - 'Still Life Studies'



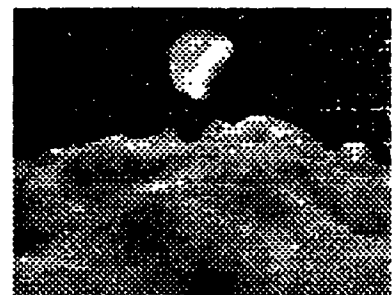
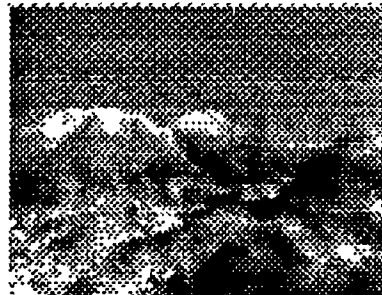
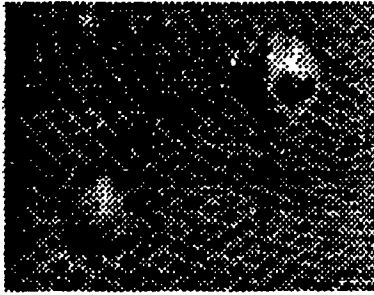
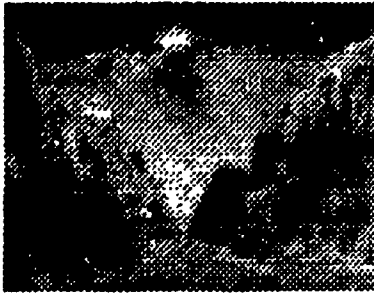
To send this portfolio to the ChanceStar
click on the slide icon.



To continue viewing or to return to the
previous portfolio click on the arrow.



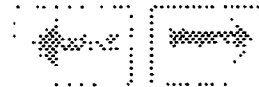
Portfolio Theme - 'Organic Scapes'



To send this portfolio to the ChanceStar
click on the slide icon.



To continue viewing or to return to
the previous screen click on the arrow.





The art critics reviewed your last show. Unfortunately, you didn't receive a good review. Give it another try the next time around!

There are various classifications of colors.

Primary Colors

The set of three basic hues from which all other colors can be mixed; in reflected colors, yellow, red, blue.

Hues produced by combining two primary hues; in reflected colors, orange, violet, green.

Intermediate Colors

Hues produced by the mixture of adjoining Primary and Secondary colors.

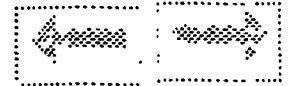
Complementary Colors

A mixture of complementary colors. These colors are diametrically opposite each other on the standard color wheel.

A pure color mixed with white.

Shade

A pure color mixed with black.



Acrylic Paint

Acrylic paint consists of 'acrylic' which is a water-based synthetic medium .



Click and hold down button to select from menus

Art Space Visits & Recreations

Original Creations

Portfolio
Development



Appendix G: Documentation for Expert/End User Evaluation

'ArtLife' Documentation for the prototype

'ArtLife' is a simulation game designed for the general public (i.e., between the ages of 14yrs and 21yrs old). This game may be of interest to those who would like to know more about the visual arts. For example, users may want to know how paintings and drawings are produced and documented, as well as where artwork may be exhibited.



Goals of the 'ArtLife' game

The main goal of **'ArtLife'** is to exhibit your artwork in a public museum. This is quite an achievement for a visual artist.

Naturally, you will first have to establish your credibility. In order to get plenty of exposure, you will have initially to exhibit your artwork in many different places, such as in cafe's and commercial buildings.

You will experience the risk factors that visual artists face each day, such as the subjective opinions of committee members and the public at large.



The 'Game Menu'

The **'Game Menu'** has 3 different main options.

1. Art Space Visits & Recreations
2. Original Creations
3. Portfolio Development

Only the first option **'Art Space Visits & Recreations'** is available to you.



Option 1 - Art Space Visits & Recreations

In 'Art Space Visits & Recreations' you will be able to view artworks on exhibit in various locations. As well, you will be able to discover different techniques and materials that are used to produce a selected painting or drawing.

There are different art spaces to visit, such as a café or an Alternative Gallery. For the purposes of the prototype, the Alternative Gallery will be the only location that is 'active' or accessible.

When you visit the Alternative Gallery you will see various artworks on exhibition. You will then be able to select an artwork in this art space in order to discover techniques & materials that are used to create this specific artwork.



The Studio Space

Once you select an artwork you will be located in the studio space. The studio is where you will be able to discover techniques & materials that are used to create a particular piece of art.

In order for you to understand how an artwork is produced or created, various activities and exercises will be available to you. As you play the game, follow the instructions in the rectangle window.

Once you have completed certain activities and exercises you will have the opportunity to select a portfolio of images (i.e., artwork) to send to the 'ChanceStar'.

Portfolio Selection

In order to exhibit your artwork in various places you will first need a 'portfolio of artwork'. As you will complete an exercise activity you will be granted the opportunity to select a portfolio of artwork. This portfolio will be sent to the ChanceStar.

The ChanceStar

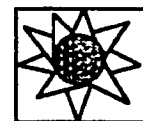
The ChanceStar is a feature of the game that has the places and opportunities you will require in order to play 'ArtLife'. Depending on your previous experience, you will have access to certain opportunities. For example, you may be offered to exhibit your artwork in a public museum. Access to this opportunity will depend on whether you have previously exhibited your artwork in commercial galleries.

Playing the Game

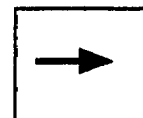
To start the game:

1. Click on the application icon titled 'ArtLife'.
2. The title window of the game will show up and then you will see the 'Introduction' screen.
3. Read the text on the 'Introduction' screen.
4. Select the icon for the game menu or the arrow for information on the 'Introduction' screen. When you will click on the game menu icon you will see the 'Game Menu' screen.

This is the icon to access the 'Game Menu' screen.



The arrow leads you to information about 'ArtLife'.





Playing the Game Cont'd

To start the game:

(4 cont'd.)

Note that the 'Arrow' icon will only allow you to access information concerning the objectives of the game, as any other information will not be active or available to you at this time.



5. Once you have reached the game menu screen, you will be guided throughout the game. Follow the instructions on the screen. The instructions are indicated by the text placed in the rectangle on the screens of the game.

Getting around 'ArtLife':

Menu Bar

As you will play the game you will notice a menu bar located at the top of the screen.

This menu bar has the following three pull down menus:
File Help Recent Exhibitions

* When you click on 'File' you have the option to 'Quit' the game.

* When you click on 'Help' you have the option to access the 'Color Chart' or the 'Glossary'. Note that the option 'Gaming Info.' is inactive, meaning this option is presently unavailable to you.

* When you click on 'Recent Exhibitions', you have the option to view your score.



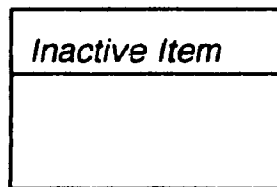
'Getting around 'ArtLife' Cont'd.

Arrows

Arrow icons will allow you to go forward or backward as you play the game.



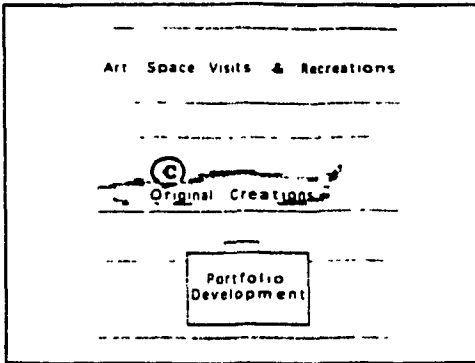
Inactive Menu Items



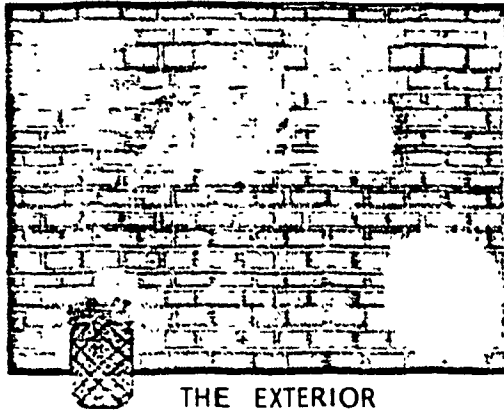
An inactive menu item means that the item on the menu is not accessible to the user.

When to 'Click'

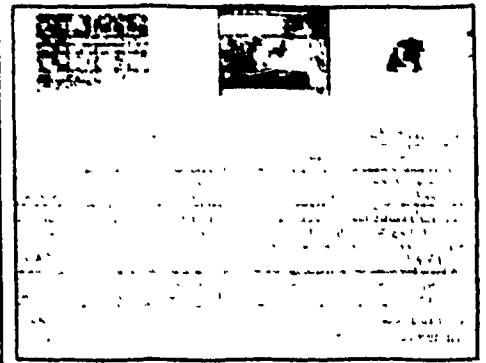
If you have completed reading the text in the rectangles on the screen and there is no further action taking place, you may have to click anywhere on the screen in order to continue playing the game.



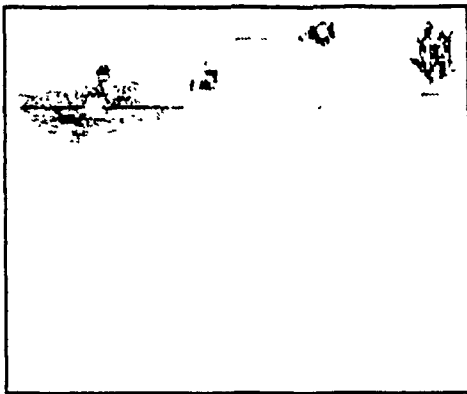
THE GAME MENU SCREEN



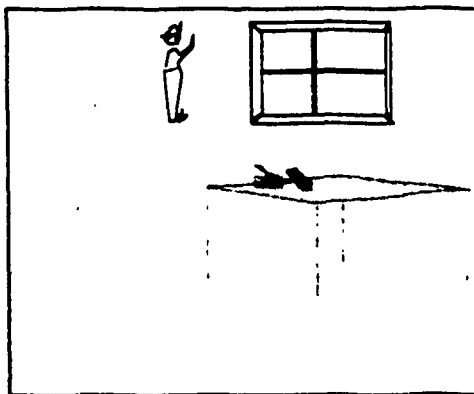
THE EXTERIOR
WAREHOUSE GALLERY



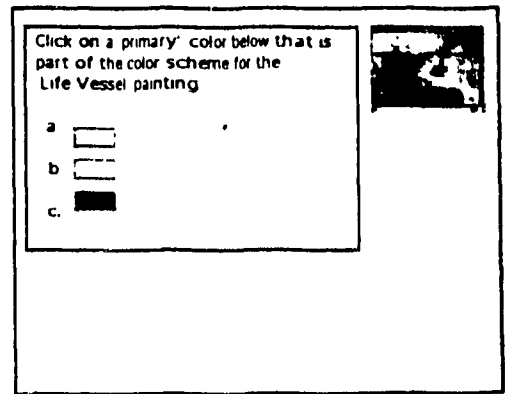
THE INTERIOR
WAREHOUSE GALLERY



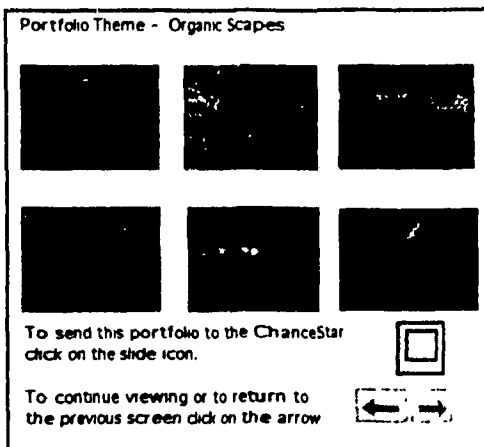
THE STUDIO ENVIRONMENT
SCREEN



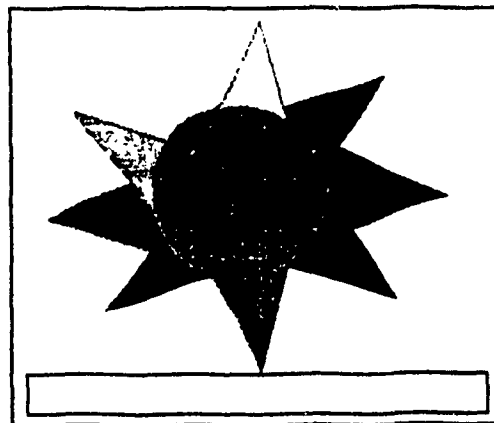
THE SIMULATION SCREEN OF
PREPARING STRETCHER &
CANVAS



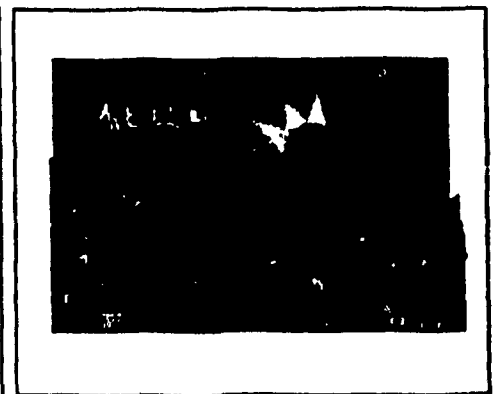
THE COLOUR EXERCISE SCREEN



THE PORTFOLIO SELECTION
SCREEN



THE CHANCESTAR SCREEN



THE TITLE SCREEN

**Appendix H: Prototype Evaluation -
Open Ended Questions for Experts and End Users**

Prototype Evaluation - Open Ended Questions for Experts and End Users

1. Are there any major problems with the navigational aspect of the prototype?
2. Are the images/graphics interesting for the target audience (14yrs-21yrs)?
3. Overall, is the structure of the s/g clear?
4. Can you see any other content concerning the production, exhibition, documentation of artwork that may be included in the s/g?
5. Can you suggest any gaming features that may be included in the further development of the s/g?
6. Are there any irrelevant gaming features in the prototype?
7. Is the game interesting?
8. Is the s/g helpful for teaching/informing the target audience (14yrs-21yrs) about the production, exhibition, documentation of artwork?

**Appendix I: Questionnaire 1 - Studio Art/Art Education
Expert Evaluation**

Questionnaire 1

This questionnaire is to be completed by a subject matter expert in the field of Studio Art/Art Education for the evaluation of the prototype titled 'ArtLife' (an educational computer simulation game).

General Instructions

Please read the documentation that is included with the prototype. Then try out the prototype, and, in order to respond most efficiently to the questions, please review the game while completing the following questionnaire. Thank you for participating in this evaluation.

Off- line Documentation

Please place a check mark beside one of the conditions stated below that best describes the support documentation for end users.

Poor ____ Fair ____ Good ____ Excellent ____

Antecedent Conditions (Requirements)

1. Circle the lowest age group that will most likely comprehend the the level of language used.

12-14 years 15-18 years 19-21 years 21 years & over

2. Circle the highest age group for which the level of language is most suitable.

12-14 years 15-18 years 19-21 years 21 years & over

To answer the following questions circle one of the numbers of the sliding scale 0-6.

3. To what extent does the s/g require preparation and prior learning by the participants?

0 1 2 3 4 5 6
not at all very much

4. To what extent is the s/g appropriate to the multi cultural aspect of the target audience (i.e. Canadians between 14yrs-21yrs)?

6 5 4 3 2 1 0
very much not at all

Rationale and Objectives (why)

5. How well does the s/g promote cognitive outcomes (knowledge and understanding) concerning the production, documentation, and exhibition of artwork?

0 1 2 3 4 5 6
not at all very much

6. How well does the s/g promote affective outcomes (attitudes and feelings) concerning the simulation of an artist's career?

| | | | | | | |
|------------------|----------|----------|----------|----------|----------|-------------------|
| 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| very well | | | | | | not at all |

7. To what extent might this s/g motivate students to become involved in the process of producing, documenting, and exhibiting artwork?

0 1 2 3 4 5 6
not at all very much

Content (what)

8. How difficult or complex is the material (support documentation) that must be understood to function in the game?

6 5 4 3 2 1 0
very much not at all

9. To what extent does the s/g increase knowledge or understanding of the the production, documentation, and exhibition of artwork?

6 5 4 3 2 1 0
very much not at all

10. To what extent does the s/g require the student to make many decisions?

| | | | | | | |
|------------|---|---|---|---|---|-----------|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| not at all | | | | | | very much |

11. To what extent do the concepts presented in the s/g (i.e. concerning art production, exhibition, and documentation) represent the role/activities of an artist in 'real life'?

| | | | | | | |
|-----------|---|---|---|---|---|------------|
| 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| very much | | | | | | not at all |

12. How much does the role of the participant correspond to real life?

| | | | | | | |
|------|---|---|---|---|---|-----------|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| none | | | | | | very much |

13. How well do the strategies available to the player in the s/g match those available to the participants in real life?

| | | | | | | |
|-----------|---|---|---|---|---|------|
| 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| very well | | | | | | none |

Operational Strategy (how)

14. How strong is the game element?

| | | | | | | |
|-----------|---|---|---|---|---|-------------|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| very weak | | | | | | very strong |

15. How well does the simulation replicate the studio environment?

| | | | | | | |
|-----------|---|---|---|---|---|------------|
| 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| very much | | | | | | not at all |

16. To what extent is the outcome of the s/g dependent upon the player's skills and capabilities?

| | | | | | | |
|------------|---|---|---|---|---|-----------|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| not at all | | | | | | very much |

23. To what extent does the s/g attract or serve the multi cultural aspect of the target population (i.e. Canadians between 14yrs-21yrs)?
Please explain:

24. What do you like best about this s/g - what are its strong points?
Please explain:

25. What do you like least about this s/g - what are its weak points?
Please explain:

26. What changes can you suggest for improving this s/g?
Please explain:

27. Comments on the S/G Environments, Content,
and Documentation:

Instructions: In order to properly identify the screens listed below, please refer to the attached 'Reference Sheet'. Once you have located the proper screen on the 'Reference Sheet' you may view that specific screen of the s/g on the computer. Note that the screens to be evaluated are in proper sequence in relationship to the computer s/g. If you should have any questions please ask for assistance.

a. The Game Menu

Are the art spaces listed on the pop up menu appropriate to the level of the target audience (14yrs-21 yrs)?

Comments/Suggestions:

b. The Warehouse Gallery (exterior):

How attractive or appropriate is the graffiti wall of the warehouse for the level and multi cultural aspect of the target audience (14yrs-21 yrs)?

Comments/Suggestions:

c. The Warehouse Gallery (interior):

How attractive or appropriate are the images shown in the warehouse gallery for the level of the target audience (14yrs-21yrs)? Comments/Suggestions:

d. The Studio Environment:

How attractive or appropriate is the simulation of the art studio for the level of the target audience (14yrs-21yrs)?

Comments/Suggestions:

To what extent are the icons and graphics in the art studio representative of the art activities in the s/g?
Comments/Suggestions:

e. The Simulation of Preparing the Stretcher & Canvas:

Is the procedure for building a stretcher accurately represented for the level of the target audience (14yrs-21yrs)? Comments/Suggestions:

Is the procedure for stretching and grounding the canvas accurately represented for the level of the target audience (14yrs-21yrs)? Comments/Suggestions:

How helpful is this simulation (preparing the stretcher & canvas) for the target audience to understand the process of preparing painting materials for art production?
Comments/Suggestions:

f. The Colour Mixing Exercise

How useful is the colour exercise for learning about colour theory?

Is the colour exercise in proper sequence to the rest of the simulation activity (building stretcher, stretching canvas, grounding canvas, mixing colours/colour exercise)?

g. The Portfolio Selection

Are the images in the portfolio titled 'Organic Scapes' attractive or appropriate for the target audience (14yrs-21yrs)?
Comments/Suggestions:

Are the images in the portfolio titled 'Rural Scapes' attractive or appropriate for the target audience (14yrs-21yrs)?
Comments/Suggestions:

Are the images in the portfolio titled 'Still Life Studies' attractive or appropriate for the target audience (14yrs-21yrs)?
Comments/Suggestions:

Are the images in the portfolio titled 'Psychedelics' attractive or appropriate for the target audience (14yrs-21yrs)?

Comments/Suggestions:

h. The ChanceStar

Is the ChanceStar a suitable gaming feature for the target audience (14yrs-21yrs)? Comments/Suggestions:

i. The Title Screen

How attractive is the title screen of the game 'ArtLife'? Comments/Suggestions:

j. Presentation of content in Art Spaces & Recreations

How appropriate is the overall sequencing of the content in the s/g (i.e. In 'Art Spaces & Recreations') for the following activities:

1. viewing/selecting artwork on exhibition?
2. performing simulation exercises on art production/preparation of art materials?
3. selecting a portfolio/documentation to send applications for an exhibition?
4. using the ChanceStar gaming element as a means to indicate to the user how the opportunities for exhibiting artwork are attained?

Please explain:

k. Are there any biases indicated throughout the s/g?
Please explain:

L. Post-Test

Please review the post-test and using a red pen indicate any suggestions for improvement (e.g. spelling errors, comments).

Overall, how effective is the post-test? Please explain:

M. Support Documentation

Please review the support documentation for end-users and using a red pen indicate any suggestions for improvement (e.g. spelling errors, comments).

Overall, how sufficient is the support documentation?

Please explain:

**Appendix J: Questionnaire 2 - Media Development
Expert Evaluation**

This questionnaire is to be completed by a media expert in the field of CBT/Multi-media development for the evaluation of the prototype titled 'ArtLife' (an educational computer simulation game).

Please read the documentation that is included with the prototype. Then try out the prototype, and, in order to respond most efficiently to the questions, please review the game while completing the following questionnaire. Thank you for participating in this evaluation.

Please place a check mark beside one of the conditions stated below that best describes the support documentation for end users.

Instructions: For the remaining sections of the questionnaire, circle one of the numbers below that best describes your opinion.

0 1 2 3 4 5 6
not at all very much

6 5 4 3 2 1 0
very much not at all

0 1 2 3 4 5 6
not at all very much

B. Feedback

4. To what extent is the feedback motivational?

6 5 4 3 2 1 0
very much not at all

5. How often are cues/prompts used after a wrong response?

| | | | | | | |
|------------|---|---|---|---|---|-----------|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| not at all | | | | | | very much |

6. To what extent is negative feedback unnecessarily attractive?

| 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|-----------|---|---|---|---|---|------------|
| very much | | | | | | not at all |

7. To what extent is quantitative (summary) feedback provided?

0 1 2 3 4 5 6
not at all very much

8. How effective is the quantitative feedback?

6 5 4 3 2 1 0
very much not at all

C. Branching

9. To what extent are the branches appropriately present?

0 1 2 3 4 5 6
not at all very much

10. How appropriate are the branches to the target audience?

| 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|-----------|---|---|---|---|---|------------|
| very much | | | | | | not at all |

0 1 2 3 4 5 6
not at all very much

12. To what extent does the user have an appropriate amount of control over the programme?

13. To what extent are the control features effectively designed?

E. Screen Displays

6 5 4 3 2 1 0
very much not at all

| 0 | 1 | 2 | 3 | 4 | 5 | 6 |
|------------|---|---|---|---|---|-----------|
| not at all | | | | | | very much |

6 5 4 3 2 1 0
very much not at all

17. To what extent is the material clear and easy to read?

| | | | | | | |
|------------|---|---|---|---|---|-----------|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| not at all | | | | | | very much |

18. How adequate is the spacing for clarity?

| | | | | | | |
|-----------|---|---|---|---|---|------------|
| 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| very much | | | | | | not at all |

19. To what extent is the transition from display to display smooth, well paced and unobtrusive?

| | | | | | | |
|------------|---|---|---|---|---|-----------|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| not at all | | | | | | very much |

20. How appropriate is the amount of time given to the user to read and absorb the information provided?

| | | | | | | |
|-----------|---|---|---|---|---|------------|
| 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| very much | | | | | | not at all |

F. Colour, Graphics, and Simulation

21. To what extent do the colours and graphics add to the effectiveness of the instruction?

| | | | | | | |
|------------|---|---|---|---|---|-----------|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| not at all | | | | | | very much |

22. How much do the graphics effectively portray the intended object/idea?

| | | | | | | |
|-----------|---|---|---|---|---|------------|
| 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| very much | | | | | | not at all |

23. To what extent do the graphics have appropriate quality and clarity?

| | | | | | | |
|------------|---|---|---|---|---|-----------|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| not at all | | | | | | very much |

24. How appropriate are the graphics for the target audience (14yrs-21yrs)?

| | | | | | | |
|-----------|---|---|---|---|---|------------|
| 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| very much | | | | | | not at all |

G. Ease of Use

25. To what extent can the intended user easily and independently operate the program?

| | | | | | | |
|------------|---|---|---|---|---|-----------|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| not at all | | | | | | very much |

26. To what extent are the instructions/help avenues at appropriate points in the program?

| | | | | | | |
|-----------|---|---|---|---|---|------------|
| 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| very much | | | | | | not at all |

27. How effective is the glossary?

| | | | | | | |
|------------|---|---|---|---|---|-----------|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| not at all | | | | | | very much |

28. How effective is the help function?

| | | | | | | |
|-----------|---|---|---|---|---|------------|
| 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| very much | | | | | | not at all |

29. To what extent are sufficient user support materials available (i.e. documentation about the s/g)?

| | | | | | | |
|------------|---|---|---|---|---|-----------|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| not at all | | | | | | very much |

30. How effective are the support materials (documentation about the s/g)?

| | | | | | | |
|-----------|---|---|---|---|---|------------|
| 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| very much | | | | | | not at all |

H. Objectives

31. To what extent are the developer's objectives clearly stated?

| | | | | | | |
|------------|---|---|---|---|---|-----------|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| not at all | | | | | | very much |

32. How appropriate are the objectives to the medium?

| | | | | | | |
|-----------|---|---|---|---|---|------------|
| 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| very much | | | | | | not at all |

33. To what extent will the satisfactory completion of the program result in fulfilment of the objectives?

| | | | | | | |
|------------|---|---|---|---|---|-----------|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| not at all | | | | | | very much |

I. Evaluative Comments

34. What do you like best about this s/g - what are its strong points?
Please explain:

35. What do you like least about this s/g - what are its weak points?
Please explain:

36. What changes can you suggest for improving this s/g?
Comments/Suggestions:

37. Screens of the Game/Questionnaires/Documentation

Instructions: In order to properly identify the screens listed below, please refer to the attached 'Reference Sheet'. Once you have located the proper screen on the 'Reference Sheet' you may view that specific screen of the s/g on the computer. Note that the screens to be evaluated are in proper sequence in relationship to the computer s/g. If you should have any questions please ask for assistance.

Please place a check mark in the appropriate box and comment on the following screens of this s/g:

| <u>a. The Game Menu</u> | <u>Poor</u> | <u>Fair</u> | <u>Good</u> | <u>Excellent</u> |
|-----------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Layout | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Colour | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Graphics | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Text | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Navigation (menus, buttons) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Comments/Suggestions? | | | | |

| <u>b. The Warehouse Gallery (exterior)</u> | <u>Poor</u> | <u>Fair</u> | <u>Good</u> | <u>Excellent</u> |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| Layout | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Colour | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Graphics | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Text | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Navigation (menus, buttons) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Comments/Suggestions? | | | | |

| <u>c. The Warehouse Gallery (interior)</u> | <u>Poor</u> | <u>Fair</u> | <u>Good</u> | <u>Excellent</u> |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| Layout | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Colour | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Graphics | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Text | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Navigation (menus, buttons) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Comments/Suggestions? | | | | |

| <u>d. The Studio Environment</u> | <u>Poor</u> | <u>Fair</u> | <u>Good</u> | <u>Excellent</u> |
|----------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Layout | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Colour | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Graphics | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Text | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Navigation (menus, buttons) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Comments/Suggestions? | | | | |

| <u>e. The Simulation of Preparing the stretcher & canvas</u> | <u>Poor</u> | <u>Fair</u> | <u>Good</u> | <u>Excellent</u> |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| Layout | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Colour | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Graphics | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Text | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Pace (timing between graphics) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Navigation (buttons) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Sound | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Comments/Suggestions? | | | | |

| <u>f. The Colour Exercise</u> | <u>Poor</u> | <u>Fair</u> | <u>Good</u> | <u>Excellent</u> |
|--------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Layout | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Colour | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Graphics (icons glossary/help) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Text | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Navigation (buttons) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Comments/Suggestions? | | | | |

| <u>g. The Portfolio Selection</u> | <u>Poor</u> | <u>Fair</u> | <u>Good</u> | <u>Excellent</u> |
|-----------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Layout | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Colour | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Portfolio Images Screens 1-4 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Text | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Buttons | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Comments/Suggestions? | | | | |

h. The ChanceStar

| | <u>Poor</u> | <u>Fair</u> | <u>Good</u> | <u>Excellent</u> |
|-----------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Layout | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Colour | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Graphics | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Text | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Comments/Suggestions? | | | | |

i. The Title Screen of the game

| | <u>Poor</u> | <u>Fair</u> | <u>Good</u> | <u>Excellent</u> |
|-----------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <u>'ArtLife'</u> | | | | |
| Layout | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Colour | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Graphics | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Title 'ArtLife' | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Comments/Suggestions? | | | | |

j. Questionnaire

Please review the questionnaire for the end-users. Using a red pen make any corrections or comments.

Overall, how appropriate is the questionnaire in relationship to the screens of the s/g? Please explain:

k. Support Documentation

Please review the support documentation for end users and using a red pen indicate any suggestions for improvement (e.g. spelling errors, comments).

Overall, how sufficient is the support documentation?

Please explain:

Appendix K: Questionnaire 3 - Focus Group 1 Evaluation

Questionnaire 3

This questionnaire is to be completed by users of the target population (the general public between 14yrs-21yrs).

Instructions

Thank you for participating in this evaluation. To answer the questions in sections A and B, please place a tick in the appropriate space below.

A. Demographics

1. Age: 14yrs_ 15yrs_ 16yrs_ 17yrs_ 18yrs _ 19yrs _ 20 yrs _ 21 yrs _
2. Sex: M____ F____
3. Maximum level of art education: Grade 6 ____ Grade 7____ Grade 8 ____
Grade 9 ____ Grade 10 ____ Grade 11 ____
Please specify other: _____

B. Previous Experience/Attitudes

4. How often do you play educational computer games?
Very often __ Sometimes __ Seldom __ Never __
5. If you do play educational computer games, what kind of computer platform do you use?
PC/clone ____ Mac ____ Amiga ____
Please specify other: _____
6. How interested are you in educational computer games?
Not at all ____ A little ____ Average ____ Very much ____
7. If yes, where do you play educational computer games?
Home ____ School ____ Community Centre ____ Family or Friends ____
Please specify other: _____
8. To what extent do you think educational computer games are useful, in terms of learning about a subject?
Not at all ____ A little ____ Average ____ Very much ____

C. Documentation

Please refer to the attached documentation, and circle one of the numbers below that best describes your opinion.

9. The description of the 'Goals' of the game is clear.

| | | | | |
|-------|-------------------|------------|----------------------|----------|
| 5 | 4 | 3 | 2 | 1 |
| Agree | Slightly Agree | No Opinion | Slightly Disagree | Disagree |

10. The description of the option 'Art Space Visits & Recreations' in the 'Game Menu' is confusing.

| | | | | |
|----------|----------------------|------------|-------------------|-------|
| 1 | 2 | 3 | 4 | 5 |
| Disagree | Slightly Disagree | No Opinion | Slightly Agree | Agree |

11. The description of the 'Studio Space' is clear.

| | | | | |
|-------|-------------------|------------|----------------------|----------|
| 5 | 4 | 3 | 2 | 1 |
| Agree | Slightly Agree | No Opinion | Slightly Disagree | Disagree |

12. The description of the 'Portfolio Selection' is confusing.

| | | | | |
|----------|----------------------|------------|-------------------|-------|
| 1 | 2 | 3 | 4 | 5 |
| Disagree | Slightly Disagree | No Opinion | Slightly Agree | Agree |

13. The description of the 'ChanceStar' is clear.

| | | | | |
|-------|-------------------|------------|----------------------|----------|
| 5 | 4 | 3 | 2 | 1 |
| Agree | Slightly Agree | No Opinion | Slightly Disagree | Disagree |

14.The description of 'Playing the Game' is confusing.

| | | | | |
|----------|----------------------|------------|-------------------|-------|
| 1 | 2 | 3 | 4 | 5 |
| Disagree | Slightly Disagree | No Opinion | Slightly Agree | Agree |

15.The description of 'Getting Around 'ArtLife' is clear.

| | | | | |
|-------|-------------------|------------|----------------------|----------|
| 5 | 4 | 3 | 2 | 1 |
| Agree | Slightly Agree | No Opinion | Slightly Disagree | Disagree |

General Instructions: In order to properly identify the screens listed throughout the questionnaire, please refer to the attached 'Reference Sheet'. Once you have located the proper screen on the 'Reference Sheet' you may view that specific screen of the s/g on the computer. If you should have any questions please ask for assistance.

D. Visual Aspects of the Prototype

Instructions: For Section D and E, you may go through the prototype as you answer the questions. Please circle one of the numbers below that best describes your opinion.

16 . The graphics/icons of the 'Game Menu' screen are clear.

| | | | | |
|----------|----------------------|------------|-------------------|-------|
| 1 | 2 | 3 | 4 | 5 |
| Disagree | Slightly Disagree | No Opinion | Slightly Agree | Agree |

17. The text sizes of the 'Game Menu' screen are difficult to read.

| | | | | |
|-------|-------------------|------------|----------------------|----------|
| 5 | 4 | 3 | 2 | 1 |
| Agree | Slightly Agree | No Opinion | Slightly Disagree | Disagree |

18. I think that the colour of the 'Game Menu' screen is attractive.

| | | | | |
|----------|----------------------|------------|-------------------|-------|
| 1 | 2 | 3 | 4 | 5 |
| Disagree | Slightly Disagree | No Opinion | Slightly Agree | Agree |

19. The 'Exterior Warehouse Gallery' screen is cluttered with too many details.

| | | | | |
|-------|-------------------|------------|----------------------|----------|
| 5 | 4 | 3 | 2 | 1 |
| Agree | Slightly Agree | No Opinion | Slightly Disagree | Disagree |

20. The graphics of the 'Exterior Warehouse Gallery' screen are realistic.

| | | | | |
|----------|----------------------|------------|-------------------|-------|
| 1 | 2 | 3 | 4 | 5 |
| Disagree | Slightly Disagree | No Opinion | Slightly Agree | Agree |

21. The 'Interior Warehouse Gallery' screen doesn't show enough artwork.

| | | | | |
|-------|-------------------|------------|----------------------|----------|
| 5 | 4 | 3 | 2 | 1 |
| Agree | Slightly Agree | No Opinion | Slightly Disagree | Disagree |

22. The graphics of the 'Interior Warehouse Gallery' screen are attractive.

| | | | | |
|----------|----------------------|------------|-------------------|-------|
| 1 | 2 | 3 | 4 | 5 |
| Disagree | Slightly Disagree | No Opinion | Slightly Agree | Agree |

23. The 'Studio Environment' is difficult to comprehend as it is cluttered with too many details.

| | | | | |
|-------|-------------------|------------|----------------------|----------|
| 5 | 4 | 3 | 2 | 1 |
| Agree | Slightly Agree | No Opinion | Slightly Disagree | Disagree |

24. The graphics/icons of the 'Studio Environment' screen are clear.

| | | | | |
|----------|----------------------|------------|-------------------|-------|
| 1 | 2 | 3 | 4 | 5 |
| Disagree | Slightly Disagree | No Opinion | Slightly Agree | Agree |

25. The colours of the 'Studio Environment' screen are attractive.

| | | | | |
|-------|-------------------|------------|----------------------|----------|
| 5 | 4 | 3 | 2 | 1 |
| Agree | Slightly Agree | No Opinion | Slightly Disagree | Disagree |

26. The graphics/icons of the 'Simulation' screen are clear.

| | | | | |
|----------|----------------------|------------|-------------------|-------|
| 1 | 2 | 3 | 4 | 5 |
| Disagree | Slightly Disagree | No Opinion | Slightly Agree | Agree |

27. The cartoon characters of the 'Simulation' screens are attractive.

| | | | | |
|-------|-------------------|------------|----------------------|----------|
| 5 | 4 | 3 | 2 | 1 |
| Agree | Slightly Agree | No Opinion | Slightly Disagree | Disagree |

28. The sounds of the 'Simulation' screens are interesting.

| | | | | |
|----------|----------------------|------------|-------------------|-------|
| 1 | 2 | 3 | 4 | 5 |
| Disagree | Slightly Disagree | No Opinion | Slightly Agree | Agree |

29. The text sizes of the 'Simulation' screen are appropriate.

| | | | | |
|-------|-------------------|------------|----------------------|----------|
| 5 | 4 | 3 | 2 | 1 |
| Agree | Slightly Agree | No Opinion | Slightly Disagree | Disagree |

30. The pace of the 'Simulation' is comfortable.

| | | | | |
|-------|-------------------|------------|----------------------|----------|
| 5 | 4 | 3 | 2 | 1 |
| Agree | Slightly Agree | No Opinion | Slightly Disagree | Disagree |

31. The text sizes used for the 'Colour Exercise' screens are not appropriate.

| | | | | |
|----------|----------------------|------------|-------------------|-------|
| 1 | 2 | 3 | 4 | 5 |
| Disagree | Slightly Disagree | No Opinion | Slightly Agree | Agree |

32. The 'Colour Exercise' screens are cluttered with too many details.

| | | | | |
|-------|-------------------|------------|----------------------|----------|
| 5 | 4 | 3 | 2 | 1 |
| Agree | Slightly Agree | No Opinion | Slightly Disagree | Disagree |

33. The graphics (images) of the 'Portfolio Selection' screens are attractive.

| | | | | |
|-------|-------------------|------------|----------------------|----------|
| 5 | 4 | 3 | 2 | 1 |
| Agree | Slightly Agree | No Opinion | Slightly Disagree | Disagree |

34. The graphics of the 'ChanceStar' screen are interesting.

| | | | | |
|----------|----------------------|------------|-------------------|-------|
| 1 | 2 | 3 | 4 | 5 |
| Disagree | Slightly Disagree | No Opinion | Slightly Agree | Agree |

35. The graphics of the 'Title screen' screen are attractive.

| | | | | |
|-------|-------------------|------------|----------------------|----------|
| 5 | 4 | 3 | 2 | 1 |
| Agree | Slightly Agree | No Opinion | Slightly Disagree | Disagree |

E. Navigational/General Concerns

36. The buttons/menus of the 'Game Menu' screen allowed me to select items and to explore the game.

| | | | | |
|----------|----------------------|------------|-------------------|-------|
| 1 | 2 | 3 | 4 | 5 |
| Disagree | Slightly Disagree | No Opinion | Slightly Agree | Agree |

37. Overall, the transitions between screens throughout the game were comfortable.

| | | | | |
|-------|-------------------|------------|----------------------|----------|
| 5 | 4 | 3 | 2 | 1 |
| Agree | Slightly Agree | No Opinion | Slightly Disagree | Disagree |

38. The buttons/menus of the 'Studio Environment' screen allowed me to select items and to play the game.

| | | | | |
|----------|----------------------|------------|-------------------|-------|
| 1 | 2 | 3 | 4 | 5 |
| Disagree | Slightly Disagree | No Opinion | Slightly Agree | Agree |

39. Overall, the mouse is easy to use.

| | | | | |
|-------|-------------------|------------|----------------------|----------|
| 5 | 4 | 3 | 2 | 1 |
| Agree | Slightly Agree | No Opinion | Slightly Disagree | Disagree |

40. The buttons/menus of the 'Portfolio Selection' screen allowed me to select items and to play the game.

| | | | | |
|----------|----------------------|------------|-------------------|-------|
| 1 | 2 | 3 | 4 | 5 |
| Disagree | Slightly Disagree | No Opinion | Slightly Agree | Agree |

41. The buttons/menus of the 'Colour Exercise' screen allowed me to select items and to play the game.

| | | | | |
|-------|----------------|------------|-------------------|----------|
| 5 | 4 | 3 | 2 | 1 |
| Agree | Slightly Agree | No Opinion | Slightly Disagree | Disagree |

42. The 'Help Menu' didn't help me to play the game.

| | | | | |
|-------|----------------|------------|-------------------|----------|
| 5 | 4 | 3 | 2 | 1 |
| Agree | Slightly Agree | No Opinion | Slightly Disagree | Disagree |

43. I enjoyed playing this game.

| | | | | |
|----------|-------------------|------------|----------------|-------|
| 1 | 2 | 3 | 4 | 5 |
| Disagree | Slightly Disagree | No Opinion | Slightly Agree | Agree |

44. I didn't learn anything about making 'paintings'.

| | | | | |
|-------|----------------|------------|-------------------|----------|
| 5 | 4 | 3 | 2 | 1 |
| Agree | Slightly Agree | No Opinion | Slightly Disagree | Disagree |

45. This game will be helpful in teaching the general public (14 yrs-21 yrs) about the process of art production.

| | | | | |
|----------|-------------------|------------|----------------|-------|
| 1 | 2 | 3 | 4 | 5 |
| Disagree | Slightly Disagree | No Opinion | Slightly Agree | Agree |

46. This game will not be helpful in teaching the general public (14 yrs-21 yrs) about the process of documenting artwork.

| | | | | |
|-------|----------------|------------|-------------------|----------|
| 5 | 4 | 3 | 2 | 1 |
| Agree | Slightly Agree | No Opinion | Slightly Disagree | Disagree |

47. This game will be helpful in teaching the general public (14 yrs-21 yrs) about the process of exhibiting artwork.

1
Disagree

2
Slightly
Disagree

3
No Opinion

4
Slightly
Agree

5
Agree

Appendix L: Post Test - Focus Group 2 Evaluation

Questionnaire 4

This questionnaire is to be completed by users of the target population (the general public between 14 yrs-21yrs).

Instructions: Thank you for participating in this evaluation. To answer the questions in sections A and B, please place a tick in the appropriate space below.

A. Demographics

1. Age: 14yrs_ 15yrs_ 16yrs_ 17yrs_ 18yrs _ 19yrs _ 20yrs _ 21yrs _
2. Sex: M____ F____
3. Maximum level of art education: Grade 6 ____ Grade 7____ Grade 8 ____
Grade 9 ____ Grade 10 ____ Grade 11 ____
Please specify other: _____

B. Previous Experience/Attitudes

4. How often do you play educational computer games?
Very often __ Sometimes __ Seldom __ Never __
5. If you do play educational computer games, what kind of computer platform do you use?
PC/clone ____ Mac ____ Amiga ____
Please specify other: _____
6. How interested are you in educational computer games?
Not at all ____ A little ____ Average ____ Very much ____
7. If yes, where do you play educational computer games?
Home ____ School ____ Community Centre ____ Family or Friends ____
Please specify if other: _____
8. To what extent do you think educational computer games are useful, in terms of learning about a subject?
Not at all ____ A little ____ Average ____ Very much ____

C. TRUE or FALSE

Instructions: This section refers to the Simulation/Gaming Features of 'ArtLife'. For the following questions, please circle the correct answer.

9. Alternative Galleries usually exhibit artwork of Contemporary artists.

- a. True
- b. False

10. A colour scheme is a very specific type of colour palette.

- a. True
- b. False

11. The art studio is a place typically used for viewing artwork.

- a. True
- b. False

12. Figuring out the colours and their categories will allow you to select a portfolio to send to the 'ChanceStar'.

- a. True
- b. False

13. Before you make a stretcher, you must first stretch the canvas.

- a. True
- b. False

14. The art critic will always give positive reviews of the artist's work.

- a. True
- b. False

15. A cross bar is needed when the stretcher exceeds 1.5 feet.

- a. True
- b. False

16. A vernissage is a retreat in the country for artists.

- a. True
- b. False

17. Gesso is a primer used for grounding the canvas.

- a. True
- b. False

18. A portfolio of a studio artist consists of a collection of slides that represent the artist's work.

- a. True
- b. False

19. When the canvas is being stapled, it is important to stretch the opposite end so that the surface is basically tight and smooth.

- a. True
- b. False

20. The ChanceStar that is featured in the s/g can give you opportunities to exhibit your artwork.

- a. True
- b. False

21. When preparing the stretcher and canvas for painting, you will first have to place a primer onto the canvas.

- a. True
- b. False

22. The second step when preparing the stretcher and canvas for painting is to stretch/staple the canvas onto the back of the stretcher.

- a. True
- b. False

23. Mixing colours for the colour palette is done once the surface to be used for painting is ready.

- a. True
- b. False

D. Multiple Choice

Instructions: This section refers to the specific knowledge of mixing colours for creating the painting titled 'Organic Scapes'. Please circle the correct answer for the following questions (either a, b, c, or d).

24. Which colour is considered a primary colour?

- a. Green
- b. Orange
- c. Red
- d. I don't know

25. When an artist uses different degrees of dark or light of one colour, he/she is using a:

- a. Grey scale colour scheme
- b. Monochromatic colour scheme
- c. Complementary colour scheme
- d. I don't know

26. What combination of colour categories produce an intermediate colour?

- a. Primary and Secondary
- b. Tertiary and Primary
- c. Primary
- d. I don't know

27. In order to make a colour 'tint', what needs to be added to the colour?

- a. Black
- b. White
- c. Blue
- e. I don't know

28. Which colour is considered a secondary colour?

- a. Grey
- b. Blue
- c. Orange
- d. I don't know

E. Opinions

Instructions: Please circle one of the numbers below that best describes your opinion.

29. I enjoyed playing this game.

- | | | | | |
|----------|----------------------|------------|-------------------|-------|
| 1 | 2 | 3 | 4 | 5 |
| Disagree | Slightly Disagree | No Opinion | Slightly Agree | Agree |

30. I didn't learn anything about making 'paintings'.

| | | | | |
|-------|-------------------|------------|----------------------|----------|
| 5 | 4 | 3 | 2 | 1 |
| Agree | Slightly Agree | No Opinion | Slightly Disagree | Disagree |

31. This game will be helpful in teaching the general public (14yrs-21yrs) about the process of art production.

| | | | | |
|----------|----------------------|------------|-------------------|-------|
| 1 | 2 | 3 | 4 | 5 |
| Disagree | Slightly Disagree | No Opinion | Slightly Agree | Agree |

32. This game will not be helpful in teaching the general public (14yrs-21yrs) about the process of documenting artwork.

| | | | | |
|-------|-------------------|------------|----------------------|----------|
| 5 | 4 | 3 | 2 | 1 |
| Agree | Slightly Agree | No Opinion | Slightly Disagree | Disagree |

33. This game will be helpful in teaching the general public (14yrs-21yrs) about the process of exhibiting artwork.

| | | | | |
|----------|----------------------|------------|-------------------|-------|
| 1 | 2 | 3 | 4 | 5 |
| Disagree | Slightly Disagree | No Opinion | Slightly Agree | Agree |

34. I think that I learned plenty about the process of art production, documenting artwork, and exhibiting artwork.

| | | | | |
|-------|-------------------|------------|----------------------|----------|
| 5 | 4 | 3 | 2 | 1 |
| Agree | Slightly Agree | No Opinion | Slightly Disagree | Disagree |