Rochester Institute of Technology

A Thesis submitted to the Faculty of the
College of Imaging Arts and Sciences
in candidacy for the degree of
Master of Fine Arts

GardenScapes: A Harmonious Approach to 3D Art
Charmie Tate

September 4, 2007

Thesis Committee Approval

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Alex Bitterman, Assistant Professor, Graphic Design

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Acknowledgements

I take this opportunity to extend a heartfelt thanks to everyone who played an instrumental part in my success. I give thanks to my parents who were supportive of my endeavor, to my sister and brother-in-law for their encouraging words, and to my professors who gave me guidance and assistant, to all I thank you.

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Appendix B: Pictorial Documentation

GardenScapes 3D Imagery DVD's 1 2 3 (please visit the Wallace Library)

Introduction

For my thesis immediately I knew I wanted to design an installation piece involving 3D work. I wanted to develop a concept that was unexpected, unique, and exceeded the boundaries of design. The concept and design layout resulted in a challenging project, which presented unfamiliar design issues. In turn, these concerns after troubleshooting and research have proven to be invaluable knowledge that I have gained. This project was overwhelming and an enormous undertaking at times, but one in which I truly appreciate the process and the final result.

After a couple of brainstorming sessions I decided to design a 3D environment and physical viewing space geared towards reducing stress by offering the viewer a calming outlet. My purpose was to design a space in which viewers could experience a positive soothing environment and escape from their daily stressors. I designed the virtual and the physical space in a manner that fostered relaxation, by creating a 3D virtual environment and physical space I was able to design a peaceful and tranquil place where one could go to de-stress.

Design Process

Physical Construction

The physical space was designed for viewing 3D garden imagery while experiencing a feng shui inspired environment. I designed the layout and constructed the structure of the physical viewing installation. The dimensions of the physical space were 10' long by 10' wide by 8' high. Materials needed to

create the structure were PVC piping, rear projection screens, heavy-duty construction tape, fabric, and fabric fastenings.

Prototype of the physical environment structure

I was fortunate to have essential key materials at my disposal. The PVC piping that was used to create the foundation of my environment and the material for the rear projection screens were loaned to me from my department. This resulted in a tremendous reduction in the overall budget.

After those materials were gathered the next task at hand was to find a location in which I could construct a test structure. Ideally I wanted to be able to utilize a space where I could leave the partially constructed structure intact, so that I would not have to keep breaking down and reconstructing the form over again. Adversely, I was unable to reserve a studio space large enough to store the structure; therefore, testing opportunities were limited. I had to resort to using the

presentation site, which was a smart classroom, for testing the construction of the environment and the projection screens. This scenario in the end turned out to be quite sufficient. I was able to construct several test structures and test the 3D images on the screens before the thesis show.

 Prototype of the physical environment

Constructing the structure of my installation was a challenge. After numerous attempts to construct a stable structure, I finally designed a layout that was structurally sound and was durable enough to withstand several yards of fabric. In addition, the joints of the PVC piping where reinforced with heavy duty tape for extra security. Once the piping was erected, the projection screens where fastened into place with Velcro. Then fabric was draped across a 10' by 10' top creating a fabric ceiling canopy. Inside the environment three pod ottomans where position in front of each screen.

Tranquil and nurturing colors were chosen for the color palette. The physical space was designed in a manner that fosters relaxation and created a place where one may go to de-stress.

Appendix: Prototype of the physical environment structure

Virtual

I wanted to design 3D scenes that were perceived as relaxing soothing images. The imagery needed to engulf the viewers and take them away from their current mind set to one of tranquility. I researched several photographs, paintings, and drawings and found that garden images were a recurring theme in reference to images that were suggestive of being calming.

Appendix: Individual GardenScapes scene.

I designed five 3D garden scenes to project onto three rear projection screens in the environment. The 3D modeling, texturing, lighting, rendering, and animation were developed using Autodesk Maya. The textures where created primarily by using procedural 3D textures within Maya. In addition, as desired Adobe

Photoshop was utilized to generate customize textures. For some of the scenes I had to use reference layers because the complexity of the scenes increased the file size to where it caused the program to lock up. Furthermore, different render passes and layers were created.

A series of different render passes were developed in order to improve the realism of the scenes. Examples of some render passes that were used are shadow, effects, and depth passes. Objects in separate layers were also rendered, which allowed the elements to be tweaked independently of each other and provided more efficient render times. The layer passes included a background, shadow, and effects pass. I used Adobe After Effects to composite the different passes and layers together to create the final desired output. Both Photoshop and After Effects were used to enhance the colors and textures of the scenes as desired.

Appendix: Individual GardenScapes scene.

Appendix: Individual GardenScapes scene.

Each 3D garden scene was designed while keeping in mind the five essential elements of feng shui in experiencing a place. Scenes were designed with a focus of perspective, alignment, balance, placement, and hierarchy of height. The 3D scenes gave forth a sense of calmness because the following criteria was met and incorporated in the design: a contrast between large and small open spaces and large covered spaces, a hierarchy of levels between the ground and the base of buildings, bridges, etc., a sense of rhythm in the design of spaces, perspectives and a line of focus by connecting narrow walkways and exposed paths, and a sense of balance and harmony by enhancing the spatial organization. These key elements of feng shui were inspirational factors in both the physical and virtual creation.

The scenes where accompanied by soothing ambient conditions: dim lighting, quiet surroundings, and sounds of nature. I composited and edited the nature sounds by using Soundtrack Pro.

Appendix: GardenScapes: A Harmonious Approach to 3D Art presented at the thesis show.

Reaction

The goal of this thesis was to design 3D garden scenes and space that exuded feelings of peace and tranquility. By designing 3D virtual environments and a physical viewing space the objective was to reduce stress by offering the viewer a calming outlet from their daily stressors. The tranquil imagery was projected onto large screens and accompanied by soothing ambient sounds of nature. The virtual and physical space was designed in a manner that fostered relaxation.

According to the viewers my purpose was accomplished. The 3D virtual images along with the physical environment provided a relaxing atmosphere for the viewers. The layout of the design and the nurturing color palette of the décor were received positively by the spectators. Rave reviews were given about how the environment, both virtual and physical, offered a soothing and calming state of mind.

Conclusion

Overall the thesis concept and execution was a success. There were a couple of issues that I encountered along the way, for instance an increase of file size, render time, and budget, redesigning the virtual display, and modifying the screening scenario. The increase of file size and render time were resolved by researching and troubleshooting, resulting in creating reference layers and render and layer passes.

After I calculated the dimensions of the environment structure, I knew that I had under budgeted. In order to accommodate the size of the structure more fabric was needed, along with a heavy duty fastening material to secure the structure's

joints. The initial amount was exceeded by approximately fifty percent. In the end it was worth the extra cost because it resulted in the desired design.

The virtual display changed during the course of designing the physical structure. Each PVC piping section held a 10' long screen. The rear projection screens where not conducive to displaying one large panoramic scene. The PVC piping held three screens in place, which broke the flow of the scene into three sections. Therefore, instead of one panoramic scene I decided to create three different viewing sections which each displayed 3D garden imagery.

The initial screening scenario had to be modified since the testing structure was constructed in a smart classroom on the weekends after hours. The location was not optimal for the screening to take place. Instead an alternative testing scenario was devised. After all the garden scenes where completed I circulated the printed images around and surveyed the campus by asking: what does this image convey to you? The majority stated that the images suggested a relaxing and peaceful environment.

Resources

Birn, Jeremy. (2006). *Digital Lighting and Rendering*. Berkley, California: New Riders.

Birren, Faber. (1992). *Color Psychology and Color Therapy*. New York, New York: Carol Publishing Group.

Chuen, Lam Kam. (1991). *The Feng Shui Handbook : How to Create a Healthier Living and Working Environment*. New York, New York: Henry Holt and Company, LLC.

Eiseman, Leatrice. (1998). *Colors for your Every Mood: Discover your True Decorating Colors*. Sterling, Virgina: Capital Books.

Geesaman, Lynn. (2003). Gardenscapes. New York: Aperture.

Hale, Gill. *The Practical Encyclopedia of Feng Shui*. (1999). London, New York: Lorenz.

Hancock, Peter A. (2001). *Stress, Workload, and Fatigue*. Mahwah, New Jersey: Lawrence Erlbaum Associates, Inc.

Heriteau, Jacqueline. (1996). *Glorious Gardens: Designing, Creating, Nurturing*. New York: Stewart Tabori and Chang.

Kahn, Ada P., Ph.D. (1998). *Stress A-Z.* New York, New York: Facts on File, Inc.

Ladau, Robert F. (1989). *Color in Interior Design and Architecture*. New York: Van Nostrand Reinhold.

Mahnke, Frank H. (1987). *Color and Light in Man-made Environments*. New York: Van Nostrand Reinhold.

McCoy, Janetta Mitchell and Evans, Gary W. (2005). *Handbook of Work Stress*. Thousand Oaks, California: SAGE Publications.

Nierenberg, Ted. (1993). *The Beckoning Path: Lessons of a Lifelong Garden*. New York, New York: Aperture Foundation.

Ohashi, Haruz. (1988). *Japanese Courtyard Gardens*. Tokyo: Graphic-sha Publishing Co.

Rossbach, Sarah and Yun, Master Lin. (1998). *Feng shui design The art of creating harmony for interiors, landscape and architecture*. New York, New York: Penguin Putnam Inc.

Sharpe, Deborah T. (1981). *The Psychology of Color and Design*. Totowa, New Jersey: Littlefield, Adams.

Too, Lillian. (1999). *The Complete Illustrated Guide to Feng Shui for Gardens*. New York, New York: National Book Network.

Too, Lillian. (2000). *The Illustrated Encyclopedia of Feng Shui: the Complete Guide to the Art and Practice of Feng Shui*. New York: Barnes and Noble Books.

Quick, James C. (1984). *Organizational Stress and Preventive Management*. New York: McCraw-Hill.
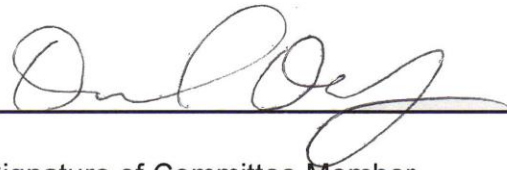
Appendix A

Thesis Proposal Committee Approval

Marla Schweppe, Professor, Computer Graphics Design

Signature   10/17/06

Signature of Committee Chair   Date

Dan Deluna, Assistant Professor, Computer Graphics Design

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Signature of Committee Member   Date

Alex Bitterman, Assistant Professor, Graphic Design

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Signature of Committee Member   Date

Thesis Proposal

Abstract

The physical environment is constant and universal. The properties and attributes of the physical environment, whether of work or school cause stress. Everyone experiences stress in one form or another. Stress has an affect on one's psychological and physiological state. The philosophy of feng shui is that balanced surroundings positively affect health and improves lives of inhabitants. Designing a 3D garden based on the art form of feng shui will reduce one's stress in life. In feng shui design perspective, alignment, and balance are crucial elements in the experience of a place. This thesis is designed to alleviate the stress, tension, and anxiety from an individual and their environment by introducing an area that allows one to de-stress. This thesis will focus on key elements of feng shui in the 3D design as well as in the structure and layout of the space. The principles and practices of feng shui will assist with the creation of a therapeutic 3D garden scene and aid in the transformation of the surrounding space into a positive harmonious experience. Through the use of color, texture, pattern, spatial organization, and controllable ambient conditions the tranquil virtual garden and physical viewing environment will be defined.

This thesis will be available for viewing at www.rit.edu/~cat4644/thesis.

Problem Statement

Stress is universal and affects one's psychological and physiological state. The most common indexes of psychological stress in the work and school environment include evaluations of stress, fatigue, tension, workload pressure,

various forms of anxiety and task performance. Many individuals will overcome the negative impact of stressors from a task performance as long as the event is not severe, the performance does not require an extreme amount of cognitive capacity, or the duration of the task is not prolonged. Physiological markers of stress may occur without the individual being aware of the effects. They include heightened physiological arousal (e.g. skin conductance), elevated cardiovascular activity (e.g. blood pressure), and shifts in the sympathetic adrenal medullary system (SAM) (e.g. epinephrine, a hormone secreted by SAM in response to stress, which increases heart rate, blood pressure, cardiac output, and carbohydrate metabolism) and the hypothalamic-pituitary adrenocortical axis (HPA), (e.g. a steroid hormone known as cortisol). The physiological indexes of stress may all result in disease (McCoy&Evans).

By creating a 3D environment that focuses on the geographic and geomantic (divination and ritual) art form of feng shui the stress in one's life may be lessened. Feng shui is an ancient Chinese' discipline used to design and decorate architecture. It is the art of placement so that harmony and balance are achieved through symmetry, orientation, and hierarchy of height. Feng shui ranges from aesthetic appreciation to a complete metaphysical design system. The aesthetic aspect of feng shui is the sense of balance that one experiences when witnessing a harmonious environment. The metaphysical aspect is that it links humans with their environment (Rossbach). This thesis will take the concepts of feng shui and incorporate the elements and techniques into a 3D garden design and space. This thesis is designed to alleviate stress in one's working environment by creating a 3D therapeutic garden scene and a physical environment with a focus towards releasing stress, relaxing, and rejuvenating the mind and body.

Background Information

Eighty percent of visits to the physicians' offices result from some form of stress in patients' lives (Kahn). Art has been therapeutic since the nineteenth century. What had been known as folk practice or anecdotal reporting became systematically part of therapy. Stress has been reduced by using biofeedback methods, progressive relaxation techniques, and visual art (drawing, painting, and clay) procedures. There are several videotapes and DVDs on the market, with calming images and sounds, promising positive results of reducing stress. Unlike the previous methods, this thesis is designed for an open space where the garden scene will be projected onto a large screen, which will fill the physical space with soothing imagery, and this design will allow groups of people suffering from stress to benefit from the therapeutic space at once.

Methodology

The goal of this thesis is to design a 3D garden and space that exudes feelings of peace and tranquility. The following criteria must be met in order for this to be accomplished: creating a contrast between large and small open spaces and small covered spaces, creating a hierarchy of levels between the ground and the base of buildings, bridges, etc., creating a sense of rhythm in the design of spaces, creating perspectives and a line of focus by connecting narrow walkways and exposed paths, and creating a sense of balance and harmony by enhancing the spatial organization.

My objective is to design a 3D environmental garden scene and physical viewing space that reduces stress by offering the viewer a calming outlet from their daily stressors. The scene will also be accompanied by soothing ambient sounds of

nature. The virtual and physical space will be designed in a manner that fosters relaxation and aids in the therapeutic process.

The 3D modeling, texturing, and lighting will be developed using Autodesk Maya. The patterns of color and textures will be created primarily by using procedural 3D textures within Maya. Adobe Photoshop and/or Adobe After Effects will be used to enhance color and textures where needed. Rendering will be done using Maya and compositing scenes will take place in After Effects. The nature sounds will be recorded in North Carolina and edited using Soundtrack Pro.

The presentation for this thesis will take place in a separate room. The 3D tranquil scene will be projected onto a large screen. The physical space will include comfortable floor pillows and inviting chairs. The ambient conditions will be dim lighting, quiet surroundings, and soft nature sounds accompaniment. The implementation of the design will take approximately six months. At this time there are no limitations in developing this project.

Target Audience

The target audiences are college students and white and blue-collar workers. This thesis is geared to reduce stress in full and part time students and workers. A screening will take place to evaluate the effectiveness of the virtual environment. Before the screening viewers will fill out a brief questionnaire, the questions will be as follows: are you a part-time/full-time student, are you a part-time/full-time worker, do you feel a) relaxed b) stressed c) content d) overwhelmed. After the screening the viewers will fill out another questionnaire as follows: are you a) content b) overwhelmed c) relaxed d) stressed. The questionnaire will be placed on the chairs, colored coded to specify before and after viewpoints, and numbers on the back to indicate which before and after survey are a pair.

Marketing

This thesis will be submitted to SIGGRAPH and entered into competitions with *3D World*, *Computer Arts,* and *Computer Arts Project* magazines. The concept will be presented to HR departments of businesses and Health and Wellness departments of schools to promote the idea of establishing an in-house 3D harmonious room that will give an individual the opportunity to relieve tension during their breaks.

Budgeting

The budget for this project will be two hundred dollars, including promotional advertisements, print work, the purchasing of pillows, fabric, and appropriate seating for the physical space. Forty hours a week will be allotted for working on this thesis. An estimated monetary budget is below.

Item	Estimated Cost
Print Work: posters, business cards, large high-resolution prints	60-80
Furniture: pillows, fabric, appropriate seating	80-100
Miscellaneous Items	20
	Max. Total 200

Literature Review

Barling, Julian, Kelloway, Kevin E., Frone, Michael R. (2005).
Handbook of work stress. London, United Kingdom: Sage Publications, Inc.

This book gives in-depth explanation sources of work stress and consequences of work stress. It highlights the physiological and psychological effects of stress on the body in a physical work environment and its potential health risk factors. It also discusses the negative performance issues the stress may cause.

Birren, Faber. (1992). *Color psychology and color therapy*. New York, New York: Carol Publishing Group.

This book discusses the psychological aspects of color and the emotional response to different colors. This book gives a description of a color's general appearance, its mental and direct associations, and its objective and subjective impressions.

Bridgman, Melinda. (1986). Artistic creation and the power to heal. *Metalsmith*, 6, 22-23.

This periodical gives a personal account of how art has had a positive effect on healing individuals. Bridgman feels that the artistic creation and healing are interconnected and that one's body, mind, emotions, and spirit are nourished from art.

Butterfield, Suzanne. (1998). *Color Palettes*. New York, New York: Clarkson N. Potter, Inc.

This source gives examples of a wide range of palettes of diverse colors. This book will assist with choosing a color palette for the virtual space as well as for the physical environment. There is also a helpful palette guide for reference.

Carolan, Robert. (1997). Back 2 nature. *CGI – Computer Generated Imaging*, 2, 29-30.

This article discusses how particle systems simulate a realistic effect in the virtual world and gives tips on how to give the effects a less manufactured 3D look. This article also gave examples of related sources.

Curtis, Hillman. (2004). Hillmancurtis, Inc. Retrieved October 6, 2006, Website: http://www.hillmancurtis.com

This website features video and web motion work. This site was viewed to become more aware of art pieces being created with video and motion.

Eiseman, Leatrice. (1998). *Colors for your every mood*. Sterling, Virgina: Capital Books Inc.

This book gives examples of color palettes related to certain moods. It describes how each color selection conveys a different emotion and it gives suggestions on

how to substitute color selections that one may dislike with another suitable choice. It also gives a helpful list of versatile colors that will work well in every palette.

Fieshman, Bob and Fryrear, Jerry L. (1981). *The arts in therapy*. Chicago, Illinois: Nelson-Hall Inc.

This book is a comprehensive reference of the principal art therapies. This book was written for students, art therapists, and health personnel. It explains how art is an effective form of therapy and how people with health issues respond positively to visual and mixed media art.

Gerecht, Karen Hope. (1999). *Healing design practical feng shui for healthy and gracious living.* Boston, Massachusetts*:* Journey Editions.

This book highlights feng shui principles and the essence of feng shui. This book provides ideas on dramatic ways to enhance the working environment. There are eight sites visited throughout this book that illustrate the proper feng shui layout for each space. This book explains how feng shui is a practice that is healthy and uplifting for one's life.

Hale, Gill. (1999). *Practical encyclopedia of feng shui*. New York, New York: Anness Publishing Inc.

This source gives in depth description and illustrations of feng shui principles and

features that are essential in a garden. An example of a principle that will aid in the design of the virtual space is the shape of the garden. Features that are discussed are the appropriate placement of paths, boundaries, water, and lighting. This book also provides case studies on garden layouts.

Huff, Kenneth. (2006). Retrieved October 4, 2006, Website: http://www.kennethahuff.com

This site illustrates 3D works, prints, sculptures, and time-based projects. The site gives information on effective rendering resolution and print size. A contact is also listed for further printing techniques.

Kahn, Ada P., Ph.D. (1998). *Stress A-Z.* New York, New York: Facts on File, Inc.

This resource is a sourcebook for facing everyday challenges. This book defines stress and gives examples of how to relieve and manage stress. It also gives a list of additional helpful sources to review and keywords to research.

Leeson, Lynn Hershman. (1999). B.C. and A.D.: before computers and after digital virtual space, expanded interaction, and infinite reality. *Domus*, 816,112-118.

This article discusses Hershman's work and illustrates her installation pieces. This periodical also discusses how computers are increasing the possibilities of virtual spaces.

Lip, Evelyn Dr. (1997). *What is feng shui?* Great Britain: Academy Editions.

This book gives an in depth explanation of the meaning and history of feng shui. This book will also assist with how to access feng shui in gardens and landscapes. In addition it addresses feng shui colors in interior design and how there should be a balance of yin and yang in the design of an interior.

Nukie, Knight. (2004). Tutorials: 3ds max: Running water and waterfall effect using particle systems. Retrieved October 8, 2006, from 3dKingdom.org Website: http://www.3dkingdom.org/index.php?name=News&file=article&sid=521

This site gives a water tutorial that will assist with creating the ponds and waterfalls in the scene. This site also has textures and materials that may be useful.

Rossbach, Sarah and Yun, Master Lin. (1998). *Feng shui design The art of creating harmony for interiors, landscape and architecture*. New York, New York: Penguin Putnam Inc.

This source gives a brief history on feng shui and how it relates to society today.

The philosophy, divination, and tools to understanding feng shui components are discussed. This book also gives examples of garden features and ways of proper positioning.

Selye, Hans. (1980). *Selye's guide to stress research.* New York, New York: Van Nostrand Reinhold Company.

This book discusses the classifications of stress and organizes sources of human stress into categories. It also discusses how stress illnesses is an increasing issue and gives examples of how progressive relaxation techniques, along with other procedures have been successful with reducing stress.

Steidl. (2003). *Pulse: art, healing, and transformation.* Boston*:* The Institute of Contemporary Art.

This source demonstrates the power of art and the creative process as a transformative agent for change. This book features series of essays on the therapeutic relationships between art and ones health.

Trucco,Terry. (1998). *Color details and design.* New York, New York: PBC International, Inc.

This source is an encyclopedia of color. It illustrates a wide range of examples of color used as accent, architecture, serenity, and sanctuary. This source also gives a prime example of the landscape design and color choice of a place designed for meditation and relaxation.

Walker, James Faure. (1998). Visions of the future. *CGI – Computer Generated Imaging,* 4, 15.
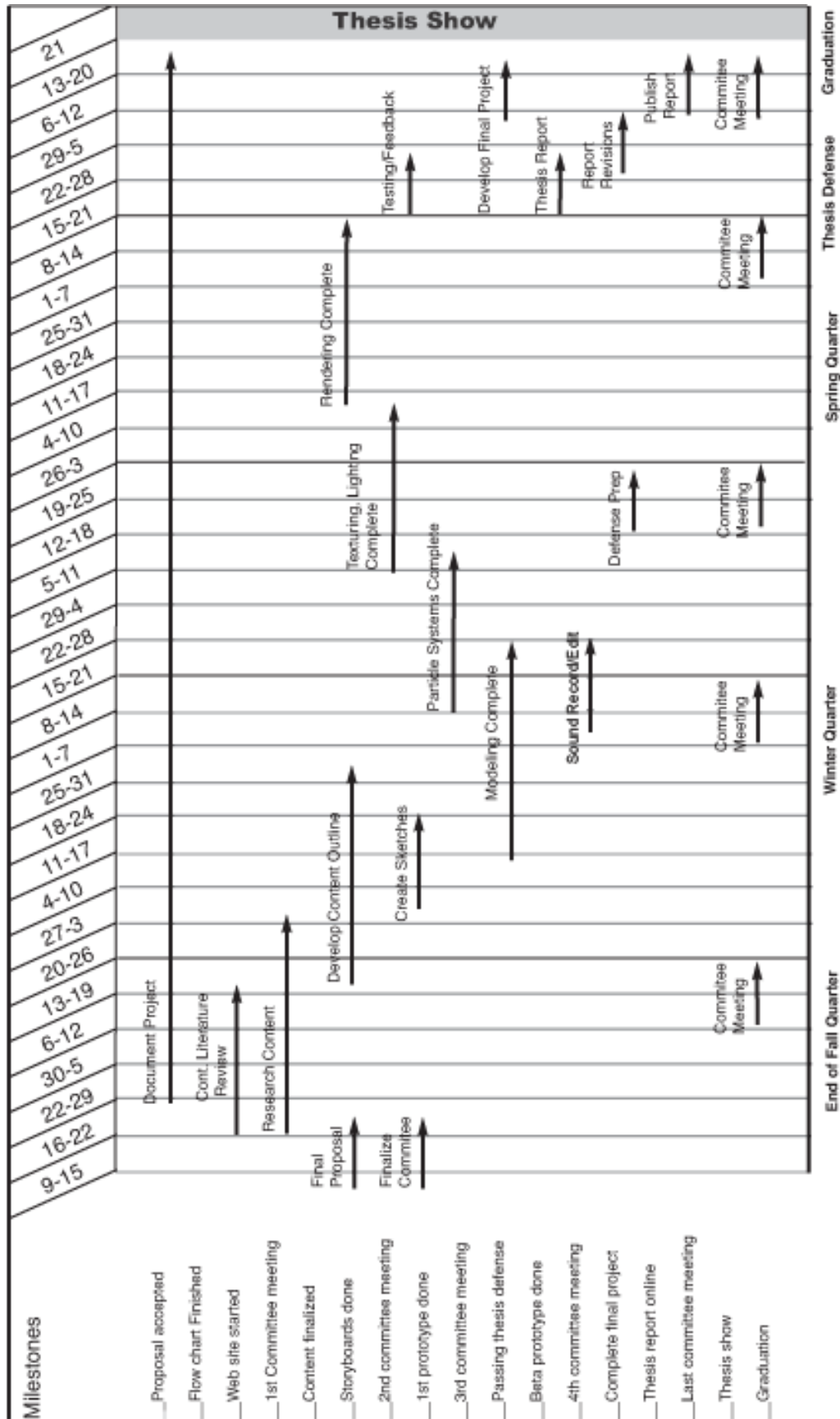
This periodical discusses Spalter's book 'The Computer in the Visual Arts', which demonstrates how computers and arts have merged. It also gives helpful techniques about printing high-resolution images.

Thesis Timeline   Therapeutic 3D: A Harmonious Approach to 3D Art

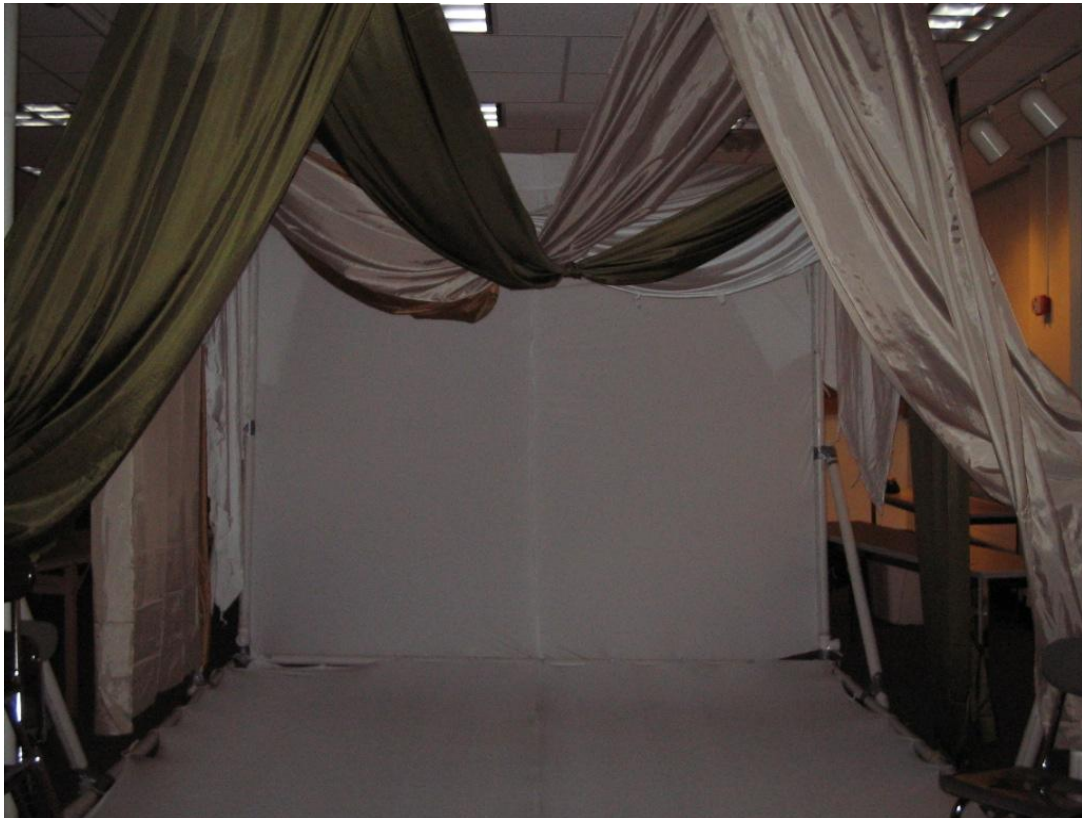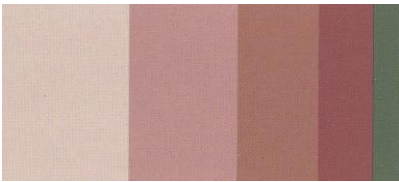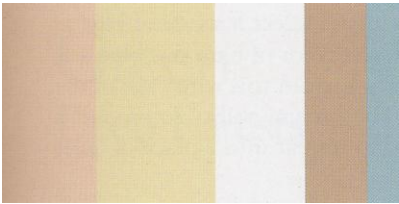**Months:** October | November | December | January | February | March | April | May

DATES: 9-15, 16-22, 22-29, 30-5, 6-12, 13-19, 20-26, 27-3, 4-10, 11-17, 18-24, 25-31, 1-7, 8-14, 15-21, 22-28, 29-4, 5-11, 12-18, 19-25, 26-3, 4-10, 11-17, 18-24, 25-31, 1-7, 8-14, 15-21, 22-28, 29-5, 6-12, 13-20, 21

Thesis Show

Timeline entries:
- Document Project
- Cont. Literature Review
- Research Content
- Final Proposal
- Finalize Committee
- Develop Content Outline
- Create Sketches
- Modeling Complete
- Particle Systems Complete
- Sound Record/Edit
- Texturing, Lighting Complete
- Rendering Complete
- Testing/Feedback
- Develop Final Project
- Thesis Report
- Report Revisions
- Publish Report
- Defense Prep
- Committee Meeting (multiple)

Quarter markers: End of Fall Quarter, Winter Quarter, Spring Quarter, Thesis Defense, Graduation

Milestones:
- Proposal accepted
- Flow chart Finished
- Web site started
- 1st Committee meeting
- Content finalized
- Storyboards done
- 2nd committee meeting
- 1st prototype done
- 3rd committee meeting
- Passing thesis defense
- Beta prototype done
- 4th committee meeting
- Complete final project
- Thesis report online
- Last committee meeting
- Thesis show
- Graduation

Appendix B

Following are pictorial documentation of my thesis process.

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Inspired color palette

Following are pictorial documentation of the thesis show presentation.

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Below are individual 3D GardenScapes scenes.