Interactive Interpretive Ballet

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Interactive Interpretive Ballet

Thesis for Master of Fine Arts Degree
Rochester Institute of Technology
College of Imagine Arts and Sciences
School of Design
Visual Communication Design

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2. Introduction
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1. Abstract

My thesis exposes users to interpretive ballet, using many aspects of computer graphics design, including 3D animation, interaction and graphical user interface design. The interactive work consists of dragging and dropping pre-rendered animated ballet moves to create a sequenced dance performance. The target audience is young girls, ages 7-13, who are interested in interpretive dance and/or ballet. As ballet consists of precise movement, my animation focuses more on interpretive dance movements that imply ballet, rather than mimic the actual precision of ballet moves. The model used for this project was constructed on a grant from the National Center for Women in Technology. The design portion was changed to make the project more believable. The model’s casual outfit was changed to ballet tutu. The tennis shoes were changed into ballet slippers. The hair was changed into ballet bun. The pink tutu and leotard were given to the model because most young girl-ballerinas wear pink. The new transformation made her more believable as a ballet dancer. This Interactive Interpretative Ballet project successfully combines and uses many aspects of computer graphics design, including 3D animation, interaction and graphical user interface design. The objective is to publish Interactive Interpretative Ballet on an interactive website, allowing users to view Interactive works.

2. Introduction

Ballet is a beautiful form of art. The dancer can express it gracefully as a human form of art. Many young girls love dance because it gives them the feeling of royalty as a princess, and offers ways to escape into the imaginary world. Sometimes, young girls want to see the beautiful dance
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on computer. They love Ballet Interactive because the dancer represents them. A young girl would look at the dancer as if she were the one doing the dancing. The interactive interface gives the feeling like the young girls are part of the dance. Different dance buttons can be arranged to show a step-by-step sequence. The young girls can also choose different backgrounds to make them feel a part of another world.

This Thesis is on developing an Interactive and Interpretive Ballet application that will be used as a fun way to explore interpretive dance within a digital environment, as well as demonstrate basic ballet moves. It features 3D animated ballerina. The user will be able to create a variety of custom interpretive dances to a set piece of music. The interactive work will consist of dragging and dropping pre-rendered animated ballet moves to create a sequenced dance performance.

The target audience will be young girls, ages 7-13, who are interested in interpretive dance and/or ballet. As ballet consists of precise movement, my animation will focus more on interpretive dance movements that imply ballet, rather than mimic the actual precision of ballet moves. This project will be good for the target audience because it is very visual. The Interactive tool will allow users to have even more fun in their experience of ballet. The model that was created to shows interpretative ballet animations of five different dance positions. The positions are Balance en avant, Arabesque, Fouetté, Fehr and Chainés.
3. Project Description

3.1 Functional Specification

3.1.1 Opening

As the users enter the website of the Interpretive Interactive Ballet, they will see the ballerina on the front-page leap in a Grand Jete dance jump (Figure 1). The user will click the play button to enter the main page (Figure 2).

3.1.2 The Main Page

The main page shows an auditorium with royal red drapes, gold ropes and gold tassels (Figure 2). When users roll over the background, music, and dance buttons, the yellow glow light will show. Instruction on the top says "Click, drag and move to open slot," to guide the user to drag and drop to the open frames above.
4. Review of Literature

There were several books and materials that helped me to finish my Thesis problems. I used American Ballet Theatre Online Dictionary to gather the ballet terminology and the dance movements. I used a book entitled “How to Create in Maya 2012” to help design and rig my character for the animation. I used the “Flash + After Effects” book to help me with the Interactive works. I used “The Modeling and Animation Handbook” book to help me with the interactive design components of my thesis. As for the design, I researched various theater styles and designed the model based on what young girls think of ballet.

5. Process

5.1 Model Redesigned

Professor Marla Schweppe gave the model to me. The model was constructed on a grant from the National Center for Women in Technology (Figure 3). After receiving the model and understanding its development, I chose only to change the design portion necessary for my project to be believable. It was wearing blue short, white t-shirt and tennis shoes. And the hair was down. The model’s casual outfit was changed to ballet tutu. The tennis shoes were changed into ballet slippers. The hair was changed into ballet bun. The pink tutu and leotard were given to her because most young girl-ballerinas wear pink. The new transformation made her more believable as a ballet dancer.
5.2 Technical

5.2.1 Rigging

I added legs, spine, arms, hands and head skeleton to the model. Then I put IK handle to allow the animation to bend their elbow and knee joint properly. Lastly, I put paint skin weight to keep from skin becoming distorted in the wrong place when animating.

Figure 4. I added legs, spine, arms, hands, heads skeleton to the model

Skeleton

1. First, I added lower body (legs and feet) skeleton to the model (Figure 4). Then I added the spine skeleton, arms, hands and head.

Inverse Kinematics

1. I added IK handle from hip joints to ankle joints to ball joints. Next, I put IK handles from shoulder joints to wrist joints. IK handles would help the knees and elbows to bend properly. Also, it would make it easier to animate.
Controls

1. Controls allow me to manipulate the rigging easily (Figure 5). I have placed Feet, Hips, Knees, Spine, Shoulder, Elbows, Wrists and Master Controls.

![Figure 5. Spine, Shoulder, Elbows, Wrists and Master Controls](image)

### 3.2.4 Combining

Smooth Bind

1. In Maya menu, I go to Skin, Bind skin, and smooth bind. This allows the skin to bounds to the skeleton.
Painting Skin Weight

1. Skin becomes distorted in the wrong place when animating. Painting skin weight prevents this problem (Figure 6).

Figure 6. Skin becomes distorted

5.2.2 Animating

1. Reference
   a. Before animating, I created a visual reference as a guide to help the animations (Figure 7). The reference was not meant to be an exact copy, but an interpretative dance of the reference.
2. Animating.
   a. The model that was created shows interpretative ballet animations of five different dance positions. The positions are Balance en avant, Arabesque, Fouetté, Chapeau, and Chaines.

3. Positioning
   a. In each dance position, the model must begin and end in the same pose, in order to make a smooth transition from one dance to the next dance (Figure 8).

Figure 7. Visual Reference

Figure 8. Begins and End in the same pose
5.3 Design

5.3.1 Five Dances Animation

I chose Échappé because it allows both feet to come off the floor at some point in the dance routines. I chose Balance Renverse because it is a slow graceful movement; and that is what ballet is all about. I chose Chaînés because it allowed the ballerina model to use the entire room rather than just staying in one spot. Arabesque is a beautiful and simple ballet position, and the animation needed something calming. It gives the eyes the opportunity to rest. Fouetté is one of the most favorite dance moves enjoyed by ballet enthusiasts. It is one of the most fun moves to watch, because of its whipping turns. I felt it would be the most fascinating to incorporate.

I chose these 5 movements because I wanted to make sure the start and end frames lined up with each other (Figure 9). By making them both start and end with the same ballet positions, I was able to transition from one dance move to the next with ease, by connecting the supporting end-positions. This allowed me to make each dance to have as much variety as possible.

Five seemed to be a good number of moves to create a variety of different dances without over extending myself in the animation process.

![Figure 9. Five Dances Animation](image-url)
5.3.1 Backdrop Winter Wonderland

Children, generally, enjoy snow. Some of the happiest moments, whether in movies, or in paintings, or on Hallmark cards, are of children playing in the snow. They are always wide-eyed with excitement, having fun making snow ball, snow men, sleighing, ice skating and even snow angel. Since, my target audience is girls ages 7-13, I felt a Winter Wonderland snow scene would be one that the girls would enjoy as backdrop (Figure 10). I also included a frozen lake that includes ice skating.

![Figure 10 Winter Wonderland Backdrop](image)

5.3.2 Backdrop Castle with River

Everywhere I turned in the children department stores, whether in toys section, clothing, or room décor, the common theme for girls is princesses and their castles. So it stands to reason that my target audience is a castle scene (Figure 11).

![Figure 11 Castle with River](image)
5.3.3 Red Curtains

I chose to create a border of rich red curtain with gold fringes for the stages to simulate a real theater stage environment (Figure 12).

5.3.4 Font

I chose the font, Monotype Corsiva, for the word "ballet" because it is easy to read and its connecting strokes and curves make the word ballet look like it could be dancing. The font I chose for the word "Interactive" is Garamond because it is one of the most legible, timeless, beautiful and functional letterforms, and ballet is both timeless and beautiful.

And the remaining font is in Arial Black. It was chosen because of its crisp, clean details and typographic texture that make it aesthetically pleasing and easy to read.
5.3.5 Dance Buttons

The dance buttons are on the left and are arranged orderly in two lines and each button have different dance symbols that indicate different dance moves (Figure 13).

Figure 13 Dance Buttons

5.3.6 Backdrop Buttons:

Buttons on right are background buttons that indicate different backdrops (Figure 14). I minimize the size of the backdrops into the buttons. This will give a clear visual guide of what the background would look like.

Figure 14 Backdrops Buttons
5.3.7 Music Buttons.

The music buttons have different music symbols on the top to show the difference among each brand of music (Figure 15).

![Figure 15. Music Buttons](image)

5.4 Troubleshooting

The Animation was a challenge because many times the body would rotate in wrong ways. I learned that the problems are called Gimbal Locks. I was able to fix these problems. I also fixed the feet; because, initially, the feet were sliding all over on the ground. When I was animating, the skin would pull off when I moved the arm, I worked diligently to keep the skin to stay intact with the face. I fixed this challenge by using paint skin weight. There were few challenges with ActionScript, because the model would show up on front at first, then I changed the code to set child 3 to see the animation. The new code was needed to set child 3 in a position that allows the dancer to stay on front of background.
6. Usability

6.1 Buttons

Here are some of the initial challenges faced in this project:

The dance button did not have a logo and it was confusing for the user to know which buttons to click to initiate dance. The buttons were not neatly organized and they were not arranged orderly. I made the buttons to line up in two rows to make it easier for the user to see the buttons.

6.2 Usability Testing

On usability testing I did a survey of 20 girls, ages 7-13 years. It was both a quantitative and qualitative survey because all the girls were invited to a testing location in Hoover, Alabama. All the girls came with their parents and some of the parents helped the girls. The girls in my sample were randomly selected among a pool of neighbors and members of my church. Also, there were several boys and adults who came along and showed a lot of interest in the project but I only surveyed and tested 20 girls. Here is a summary of the results:

6.2.1 Home Page

90% of the girls were able to find the play button at first attempt.

10% of the girls didn’t click the play button right at first attempt but succeeded on second attempt.

6.2.2 Main Page

45% of the girls clicked the background button first

40% of the girls clicked the dance button first

15% of the girls clicked the music button first.
All the girls (100%) were able to successfully find their way to the Main Page interface design. Six girls (30%) who clicked the “dance buttons drag” tried to put it in the last slot, but the container would not hold it. On second attempt, they able to put the dance button into the first slot in order. They were able to figure out how to find the dance (play) button. Fourteen girls (70%) were successful at the first attempt.

All the girls (100%) recognized the buttons that show the different dance moves and they were all engaged with playing with the model until it was time to go. On the last question on how useful was this tool, all the girls said that they loved it. On a focus group session with the parents, there was a unanimous opinion that the model was very useful and that they believed their girls would enjoy the model as learning and recreational experience.

7. Conclusion

Interactive Interpretative Ballet is the practice of combining and using many aspects of computer graphics design, including 3D animation, Interaction and graphical user interface design. There are not many tools that combine all these aspects. A survey of literature and existing options do not show similar interactive designs that focus on ballet. Therefore my aim is to publish Interactive Interpretative Ballet on an interactive website, allowing users to view Interactive works.

The target audience is young girls, ages 7-13 years, due to the cute ballet model. The young girls will look at the model with interest and delight due to the colorful background. They can easily imagine themselves in the role of the model.
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The rigging of the model was challenging to me, because if one was not careful, one could easily skip the details and, thus, could ruin the animation. I spent a lot of time doing the animation, trying to achieve smooth motion.

I am glad that I was able to create a work that incorporates many aspects of Computer Graphics Design. The experience has been wonderful. It will, definitely, help me in my future professional works.

I am deeply thankful for all the assistance I received from the members of my thesis committee. The great support and guidance were tremendous and have resulted to a successful completion of my thesis project.

8. Appendix

8.1 Thesis Proposal

8.1.1 Thesis Title
Interactive Interpretive Ballet

8.1.2 Project Description

The proposed Thesis is on developing an Interactive and Interpretive Ballet application that will be used as a fun way to explore interpretive dance within a digital environment, as well as demonstrate basic ballet moves. By using a 3D animated ballerina, the user will be able to create a variety of custom interpretive dances to a set piece of music. Interactivity will consist of dragging and dropping pre-rendered animated ballet moves to create a sequenced dance performance. The goal is to expose the user to interpretive ballet, using many aspects of
computer graphics design, including 3D animation, interaction and graphical user interface design.

The target audience will be young girls, ages 7-13 who are interested in interpretive dance and/or ballet. As ballet consists of precise movement, my animation will focus more on interpretive dance movements that imply ballet, rather than mimic the actual precision of ballet moves.

8.1.3 Thesis Problem

Computer graphics design provides a method to create unique user experiences. Interpretive ballet provides an audience with more of an emotional response than a participatory experience. My thesis will explore using computer graphics as a way to capture users’ emotional reaction to watching interpretive ballet plus engage them in creating their own dance within a digital environment.

8.1.4 Proposed Solution

I will design an interactive application that can be used on the Web to explore interaction design and interpretive ballet. The users will experiment with different ballet moves to create their own interpretive dance to a set piece of music.

8.1.5 Why I think this project will be a good tool for the target audience.

This project will be good for the target audience, young girls from age 7-14, because it is very visual. The Interactive tool will allow users to have even more fun in their experience of ballet. This project takes a unique approach to interpretive dance by using interactivity. A survey of literature and existing options does not show similar interactive designs that focus on ballet.
Another contribution to the field of Computer Graphic Design is the universal access to the website developed for this project.

8.1.6 Methodological Design

The tools that will be used in this project are Flash, Maya, and After Effects.

- Animated video of different dance steps.
- User participation (Drag and Drop)
- The ballet vocabulary is in glossary form and does not provide demonstration or user participation. This is to provide a background for the different ballet positions but it is not meant to be instructional.
- Some videos provided for both viewer enjoyment and learning illustration, but many of them have just the description.

8.1.7 Implementation Strategies

Animated Dancer

I will be using the model that was given to me by Professor Marla Schweppe. The model was constructed on a grant from the National Center for Women in Technology. Rigging will be done on the model in order to animate the model for dancing. I will batch render the movements of the dancer and then import them into Flash. The animation will be a frame-by-frame animation.

Interactive Ballerina Dancer

The interaction is a drag and drop interaction. A collection of different dance moves is stored. The user will choose from this collection and play the selected dance moves in a chosen sequence.
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Drag and Drop

1. Balance en avant
2. Arabesque
3. Fouette Rond De Jambe En Tournant
4. Chaînés
5. Échappé sauté

Music Selection

1. MC Debussy Petite Suite Fourth Movement Composed by Leonard Handler
2. Allegro Tendu- Hungarian Dance #5 for Ballet LE’cole.
3. Tendu- Minuet for Ballet Composed by Ballet LE’cole.

Background Selection

1. Curtain Drape Performance Stage
2. Winter Wonderland
3. Castle with river

9. Bibliography

9.1 Survey of Literature

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