ORANGE FANTASIA: A PROJECT-BASED STUDY ON HOW TO DESIGN AND PRODUCE A MUSIC EDUCATIONAL GAME

By

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A THESIS PRESENTED TO THE COLLEGE OF FINE ARTS
OF THE UNIVERSITY OF FLORIDA IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF ARTS IN DIGITAL ARTS AND SCIENCES

UNIVERSITY OF FLORIDA

2013

ACKNOWLEDGEMENT

I would like to thank both Prof.Barmpoutis and Prof.DeVane for their serious instruction and patience. The suggestion given by Prof.Barmpoutis helped me build a better visual Europe in the game. And Prof.DeVane instructed me to strengthen the structure of my thesis. Thanks for both of your mentorship.

I would like to thank my parents for supporting me all the time. Though we have been living so far away from each other in these two years, you are still my strongest power. I hope you will be proud of me.

I would like to thank Tim Difato for helping me generously. I really appreciate that I could meet a friend like you here in Gainesville. I would never forget the time we produced games together and the music album we created. You are a great musician. I dedicate this game to you for the great friendship.

I would like to thank Kun'er Zhao for your spiritual support and thoughtful companionship. I would like to thank Baobao Song for helping me adjust the text format so seriously. I would like to thank Mengjie Zhu for drawing super great loading pictures for the games. I would like to thank Johnny Jiang and Sheng Jiao for your concerning and caring. Without you I couldn't have finished the project.

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May, 2013

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Major: Master of Arts in Digital Arts and Sciences

By the development of internet and technology, people are able to interactive with each other more easily. As an important aspect of interactive behavior online, or social media, game has more significance to the society, seen a great tool of education and ideas implantations. And music, as an artistic form, enriches people's spiritual life. The way music influences the people changes greatly by the flourish of Internet. People want to know about music and learn to entertain their life by music. More and more parents send their children to tutors for learning music and instruments, which gradually becomes the mainstream trend in life. Under such context, this is a study regarding music educational game (digital-based). It intends to interpret how to integrate music education and games well, and how to design a game with the aim or purpose of providing better music-learning experience with a specific framework. As a project-based thesis, to better illustrate the ideas and whole procedures of building up such a game, it's mainly based on a game I created, called Orange Fantasia.

CHAPTER 1
INTRODUCTION

With the booming of the Internet and social media, more and more people are able to interact with each other on multiple platforms. The rapidly developing technology brings about the possibilities that people can play games more easily, anytime, anywhere. The video games are no longer limited on television screen, but exceeded to the computer monitors and cell phone screens. In modern society, the significance for games are more than just "for fun". Game serves as a platform to exchange messages, to exchange feelings, to implant ideas etc. It even becomes the platform of real-world trades, being one of the most competitive e-commercial platforms. Beside all these social functions, video games can be used for education.

But educators normally ignore this point. When they think about the video games, they might firstly regard them as something negative (Squire, 2003).Sometimes it can't accepted by parents. Though half of the parents would agree on games can have positive effects, like enhanced cognitive thinking skills, the other half would show their concerns about potential harmful effects from video games; meditation strategies; games contents; and the balance between video game and other activities. (Kutner et al., 2008) Being a great tool for learning, video games should be treated in a positive way. In a study there are data showing one-fourth kids (26%) acknowledges that video game playing sometimes interferes with homework and academic performance(Paul Lynch et al.,2001). On the contrary, it indicates that there are still 74% kids are able to handle the balance between video games. A well-designed game with purpose of education could potentially influence those 26% kids in an immature age. Children are spending increasing amounts of time playing video games, a research shows that "13

hours per week for boys, on average, and 5 hours per week for girls" (Gentile, Lynch, Linder, & Walsh, 2004). To change a view, it actually suggests that beside the time spent in classroom, children have extra time with games that could be educational and fun to learn something, other than bring about the negative influences.

Since a lot of parents are willing to send their kids to tutors to learn music and instruments, it's not difficult to imagine a music educational game has great opportunity to be accepted as an assistive technology by both tutors/teachers and parents. Music, especially classic music is not harmful to children for there is no violence involved in relevant activities. Some parents might worry about the video games like "Guitar Hero" would have negative impact influence on their children because of some features of "Rock' n' Roll" such as smoking, sex and drugs. In this study all the music learning will be around basic music theory, other than those sensitive music genres, which could arouse worry from parents.

To change negative attitudes on video games learning, it's important that how we use games most effectively as educational tools (Squire, 2005). Only those educational games produced well enough could bring positive impact to education, under the question and worries of teachers and parents. Game design is particularly important. For education purpose, when designing, we should avoid the potential harmful elements to create a better environment. For educational contents, how does a game designer arrange the knowledge points well and how to transform the course syllabus into a clear and progressive storytelling determines the effectiveness of an educational game. Game itself is a way of learning. Gee pointed out that "A good video game always incorporates learning principles that supported by the research in cognitive science."

(Gee, 2003, 2004). Therefore, we should manage to create simple and reliable mechanics for students to learn steps by steps efficiently, so as to turn the external knowledge into internal cognition. There are many ways to design a game, but for the specific music education field, a certain model/prototype worth exploring.

To summarize, by focusing on designing a music educational game, this paper intends to illustrate the whole Design Narrative of the "Orange Fantasia", which I produced as a music-theory based game, to directly give a grand view to game designers. Based on the existent game design methods and procedures, a certain framework specifically designed for music educational game is about to be specifically proposed.

CHAPTER 2
LITERATURE REVIEW

Music Education Development in U.S.

Music education has become one of the most important contents in today's school curriculum. There is no music education in the early development of US. Back to 18th century, the first American music school was founded in Boston in 1717. The only contents instructed were singing. That greatly improves the singing arts and music reading in churches. After that, the music education flourished by the establishing of Academy of Music in Boston. Boston Academy of music was formed in 1832 by Lowell Mason and George Webb to teach singing skills and music theory. The methods of how to teach music were developed during this period. (Michael Mark & Charles Gary, 2007)

Music was accepted as curriculum in 1838 in Boston Public School. It was the first time that public school system incorporated the music into the programs system. A document called "The Magna Carta of Music Education" explained why they included the music in the curriculum. It was written by Edward Bailey Birge, which is a respected historian of music education. In the United States, teaching colleges with four-year degree programs developed from the Normal Schools. The Oberlin Conservatory in Ohio was the first to offer a full Bachelor’s degree in Music Education (Birge, 1928 and Keene,1982). Nowadays, music education becomes really common and almost every college in US has its own music program, ranging from composition to instrument playing. Music education involves many aspects, regardless of instrument. The main aspects include practical knowledge and music theory. Music history, composition analysis, and study of different music genre are also included as additional units(Keene, 1982).

Music Education in Middle School

Music education could make students become more engaged with the school environment. Learning music in middle school can help students develop a sense of self-esteem, belong, and purpose (Montague, 2007). But some of the educational institutions can't see the importance of music education. Under the budgets limitations or some other reasons, music curriculums were cut in some schools; even the elective courses were cut as well. " Many schools in America have continued to reduce or eliminate music education programs, particularly in major urban school districts. And, with the current emphasis on ‘basics,’ too often challenged students do not have time in their schedules to take music classes, despite the data that shows the positive effect of music upon developing self-efficacy and dispositions toward learning. This most often occurs in schools where parents are less likely to be advocates for music instruction because of language difficulties or a social or emotional disconnect with schools in general" (Cavalier, 2006)."Much has been made in American education of the need for teachers to focus on the basics of reading, writing, and computing in the school curriculum. Where this narrow approach to education persists, society fails to contest those things that are amiss in culture."(Jorgensen, 2008, p.xii)

Educational Games

Educational games, or "Game-based learning", could be simply understood as games with educational purposes.To give a more comprehensive definition, given by Royle:"Educational gamesare games designed with specific curriculum objectives in mind" (Royle, 2008). Games had already started to serve the education when the computer showed up in a classroom. (Klopfer,E., Osterweil,S., Groff,J., & Haas,j., 2009). Since the game-based learning came into the classroom so early, why do we need to

learn things through playing video games? The most distinct feature of games is the motivation, which is regarded as a will to be continuously playing and not stop.(BECTA, 2001) The core reason of the motivation in game is fun. Learning can't be interesting, while playing games could bring more fun. People feel fun when they playing video games. The fun drives them addicted in the game. (Connie Veugen, 2004) The game scholar Gee pointed out that "while e-learning has a reputation for being dull and ineffective, games have developed a reputation for being fun, engaging, and immersive, requiring deep thinking and complex problem solving" (Gee, J.P. 2003). Having fun when learning, or, to learn with fun, is the main significance of educational game.

Representative existing educational music games

Most of the existent music educational games are online games. They are mainly designed for kids. The game structure is simple and the interaction is easy to understand. The music relevant games that are produced for fun with fancy interfaces and high prices, but with no obvious purpose for education, are normally regarded as "music games", such as Guitar Hero, DJ Max, etc.. They don't match the category:music educational games.

List of existent music educational games:

Music Teacher's Games:

http://musicteachersgames.com/

Educational music games:

http://www.musicgames.co/games-by-category/educational-music-games/

Learning games for kids:

http://www.learninggamesforkids.com/art_and_music_games.html

CHAPTER 3
METHODOLOGY

Before listing the main methodology used in this study, I'd like to discuss what game design is indeed. Some might see game design as just the arts design for the games, while others may regard game design as the way of executing game ideas. Actually, game design contains many basic elements in games, including all the content and rules-setting of a game in pre-production, as well as the world-building, character-setting, storytelling, etc..

Framework

There have been diverse opinions introducing the way game design does, varying from "MDA approach" to "Rules of play: Game Design Fundamentals". Researchers from different backgrounds proposed respective applicable theories. In "MDA approach", the scholars think of the players as consumers, and use a MDA framework to formalize the consumption of games by breaking them into their distinct components (Figure 3-1),and establish their design counterparts as (Figure 3-2).

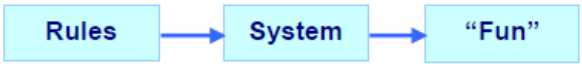


Figure 3-1

Figure 3-2

The fundamental to MDA framework is to see games as artifacts. It focuses on the behavior of a game, determining the behaviors as specific game contents.

The "Rules of play" proposed a framework thatconsists of three main factors: the rules (organization of the game), the play (gameplay experience), and the culture (game

contents). Game design is all about how to arrange these factors well in orders and work out a game step by step, as a framework. In this study, I choose to use the methods about framework and lenses from the book: "the Art of Game Design" for reference. (Schell, 2008) It has the similar framework as "MDA approach" but is more easily to understand in details.

In the book "the Art of Game Design", Jesse Schell sets up a series of systematic prototypes. To produce a mature game, a designer should follow several steps and incorporate all the elements about games. Some of these steps are really common and they are applicable to different game genres, such as action-game, first-shooting games, RPG games and so on. In this section they are all tightly relevant to the music education.

Elemental Tetrad

Schell proposed a useful method to define the four basic elements, which is called an "elemental tetrad". (Figure 3-3)

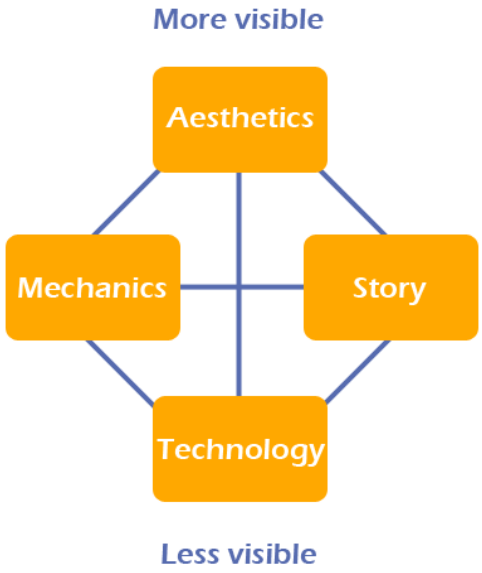


Figure 3-3

Mechanics

"Mechanics are the procedures and rules of the games. They describe the goal of the game and how players achieve it." (p.40) In a music educational game, the mechanics are about setting up a certain interaction system for players or students to interactive with the games smoothly. Thus, when you want to build a game mechanic for music education, you need to think about how you would like to impart the knowledge. This can be determined by the contents and game genre you choose. For example, if you want to give tutorials to players on "music history", you can probably choose to build mechanics as a RPG game prototype. A RPG game, which is a Role-playing game, is a game in which player change his identity to the main character of the game and start an adventure in the virtual world created by the game designer (Harrigan& Noah Wardrip-Fruin, 2007). You can list a set of mechanics regarding how players control the characters and how the rules of play function in the game. Besides, if you mainly want to teach "music theory" other than history, the mechanics could be changed to a prototype of an action game, like Super Mario, or a strategy game. The story of theory doesn't have to be linear like a history telling. So you may come up with an idea of setting several small games arranged in order of game difficulty. There is no limitation to the game genre you choose to produce a music educational game. If only you are able to stick knowledge points into players' minds accurately via reasonable mechanics setting.

Story

In game design, "story is the sequence of events that unfolds in your game"(p.41). As we mentioned in the "Mechanics", a story could be linear or branching according to the contents. In terms of music history teaching, a story could be series of

separate anecdotes of musicians arranged chronologically, or several documentaries introducing the development of instruments. If you want to tell the story via a RPG game, you will need a main character to line it up. For music theory teaching, storytelling might be branching. Therefore you should find the specific factor to string up this knowledge. Following the syllabus is a good way. If one doesn't learn tones firstly, he will not understand music scale. If one doesn't learn what rhythm is, he will probably not be able to understand the chord progression. The music theory course itself is a linear process because people learn knowledge scientifically from easy to difficult, step-by-step. Then, a story of how player beat levels one after another with the increasing difficulty could be applied to such a music theory game.

Aesthetics

"Aesthetics determine how your game looks, sounds and feels. They are so important that they have the most direct relationship to a player's experience."(p.42) For music education games, the aesthetic should be artistic and music-related. You can turn the notes and symbols of classic music into the basic graphic design elements. You may inspire from the notes arrangement in a music scale and turn those lines and spaces into a staircase of an action game. A unique theme in game design could better impress the players. The theme colors you apply and theme melody you use for the background music also provide players with better experience and make them become immersed in. You don't need to display the music elements anywhere in the game. But you should keep the consistency of aesthetics design. For example, If you want to demonstrate a game environment of Venice in 17th century, you need to verify the main architecture styles of that era; If your character and houses are all drawn with thick stroke, you should apply the same style to all the objects, like cars or trees in the game.

Technology

"Technology in video games refers to any materials and interactions that make your game possible."(p.42) That determines which platform you choose to apply all your mechanics, stories and aesthetics. You can equal it to the computers and electronics, but it's not limited to these digital technologies. "Technology means the very medium of our game -- the physical objects that make it possible"(Schell, 2008, p. 404). Because we are not going to talk about creating a music educational board game here, so the technology in music educational games mainly refers to the game environment, software platform, and interfaces we choose to interactive with the games. The preferences of using joystick or keyboard are determined by the game genres and ideas. It will be more efficient to control super Mario by joystick than keyboard. But if you play a RPG game based on a bunch of conversations, a keyboard would be a better choice. For some of the music-based games, such as Dance-Dance-Revolution, a floor pad with four arrows is undoubtedly the best interface. Its features make players dance with the arrows. Especially for DDR, it is the specific technology design.

"None of the elements is more important than the others. They are all essential" (p. 43). This tetrad fits any game genre and game theme. The four elements influence and interactive with each other. The technology chosen should support the mechanics; the aesthetics designed should emerge at the right position and create impact to players with the help of mechanics. A story won't be told fluently without the accurate aesthetics setting and reliable mechanics. The elemental tetrad system is a good approach to start a game design. Therefore, my methodology of building music educational game is based upon this tetrad.

Games Design of Music Educational Games (Framework)

Unify themes

Your first step is to unify a theme. "The theme is what your game is about." Jesse Schell lists two steps in the book to using a theme to strengthen the power of game experience.(p.49)(Schell, 2008)

- Step1: Figure out what your theme is.
- Step 2: Use every means possible to reinforce that theme.

In a music educational game, without the doubt, your themes will be highly related to two factors, music and education. In this case, themes should be around these two factor words to start a game. Normally, you can list the theme by a short phrase, like:

- A music-history-based game about historical adventure
- A music-history-based game about musicians' lifetime and anecdotes
- A music-skill-based game about how to play an instrument (piano, guitar, etc.)
- A music- theory-based game about introducing how chords work
- A music-theory-based game about learning music staff

Now it's time to reinforce the theme. Assuming we have chosen the theme: a music-history-based game about musicians' lifetime and anecdotes. What you need to do is to list all the possible means to reinforce this theme. The list could include all the objects or technologies that strongly-support "music history","musicians" and "anecdotes". Therefore, these means could but not limited to be:

- Historic music staff book (it brings the historical feeling)
- The relationship between two musicians (interesting anecdotes)
- The architecture styles of different eras (Unique aesthetics setting)
- One representative master piece for each musician (using signature music to illustrate the music features of each musician)

You may notice that all the things come into your mind all belong to the elemental tetrad we mentioned. Don't worry about that, you don't need to classify these means at this step. If only they serve the theme you select, they all have inner impact on each other. Schell states "the primary benefit of basing the design around a single theme is that all of the elements of your game will reinforce one another, since they will all working toward a common goal."(p.51)

Think of an idea

For music education, an idea often comes from the daily life. I think all the people that love music must love life. Because music is just like a window for people to imagine a world in a different way. When listening to the music, the view in front of you could be more colorful or turning grey at all. The music changes the way you review the world. So my suggestion is to get inspiration from music. In another way, you can think directly about how your music teacher taught music in class before, and try your best recording some ideas in your mind. That's a good way of getting inspiration too. Actually you can inspire yourself in many ways, the importance is to have awareness of writing down the inspiration in time.

Schell states in the book, "the way you turn the inspiration into a great game design is to admit you have a problem"(p.60). He emphasizes, "the purpose of design is to solve problems". Under such context, don't hesitate to state your problems on a paper or share them on your social media. To find someone and brainstorm together could be a nice method. The problems are normally within the range of the elemental tetrad. You could have had problems like:

- How can I play virtual instruments by keyboard and mouse?
- How can I make a video game that could be played on cell phone?
- How can I display a science-fiction world environment for my theme?

- How can I write a story about escaping from a maze?

State these problems, and match them to the right categories. Next step is to solve them by building up a prototype. You would have had many ideas turning into problems, narrow down some of them to keep you focus.

Demographics

Demographics here means people from different ages and backgrounds. It's common that a game could be designed for people from all ages and backgrounds, such as "Pac-man" or "Plants vs. Zombies". The rules and controls of these games are easy to learn. Due to the outstanding mechanics, people learn to play really quick. But for music educational purpose, you need to decide on what group of people the game will be designed for. The music education could be aimed at those kids who know nothing about music. It could be designed specifically for the people of all ages who want to know about a certain genre of music, like pop-music, classic music, etc.. It could be designed for those who are professional music students from music academy as an assistive application to test what they learnt from class. There is one thing you need to know, at least the game should be attractive to kids. Jesse Schell indicates that "Childhood is centered around play, to truly communicate with someone, you must speak the language of their childhood."

Plan and arrange the music contents.(History or Theory? Syllabus List)

Before heading to the prototype section, you need to have a list of music contents that you would like to teach and arrange them clearly enough. For instance, if you mainly want to teach western music history, make a list of how music develops by year or era. If you just want teach the music from renaissance era to romantic era, you need to shorten the list the focus more on this certain periods. Furthermore, if you

mainly want to teach students the multifarious music instruments, you need to match the instruments to certain category firstly and discuss about each instrument separately. Your teaching content determines the length of the list and how you arrange it. It's important to write a list of teaching plan before you set about your design. Being a strong support for your prototype setting, it provides a clear view of how you want to put each knowledge point in the right position.

Risk Assessment

Risk here means things that might go wrong in your game. A glitch or an overestimated timetable could ruin your game. Since you have already had your teaching plan, list every risk right after each problem you state, to remind yourself from time to time that each step you take should avoid the risks.

Conceptional Design

An Example of Schell's Framework in Conceptional Design

Because all the games are composed of the four fundamental elements, you can create a comceptional design by setting up rules and orders from one to another. Since we have discussed about what mechanics, story, aesthetics and technology mean in a music educational game, we are here displaying an example, which is to directly text your thoughts.

In the example, we still use the idea of "producing a music-history-based game about musicians' lifetime and anecdotes".

Mechanics (for Basic rules and controls)

I want to set up a RPG game. There is only one main character in my game. I want my character to walk to the musicians and talk with them, and then there will be conversations telling the main line of stories. I want to set up an inventory system as a

platform of exchanging objects. I want None-Player Character in the game to serve as sellers and the guide. I want to set up a trading system so as to sell objects as rewards for gold. I want to set intriguing rewards in each level as a triumph to stimulate players' motivation. The player will finally learn the history and anecdotes of greatest musicians.

Story

This is a story about the violin. The main character is a youth and male. He is a fantastic violin player and travels around the world. He visits many violin musicians to improve his violin skills. During his journey he knows many anecdotes of different musicians. Finally he learns the final skill from greatest violinist Paganini. He puts all the anecdotes and skills into a book and goes back to his motherland. He becomes a world-class musician in the end.

Aesthetics

The whole game will be built in a 3D environment. I will refer to the modeling styles of SimCity and Second Life (an online 3D social game). The main character is wearing a suit and holding a violin case with him all the time. The story happens in Europe during Romantic Era. The city is elegant and historical. The buildings are all under three layers. There are classic patterns on the surfaces of building. There are many churches in the city. Most of the musicians work for courts and churches so normally they wear suits and fineries. The best violin should be drawn a logo of Stradivari, for he is the most famous violin producer in the world.

Technology

I'd like to produce this game on a PC. In terms of software, I want to use Unity as a game engine to execute the mechanics. I want to model all the characters and buildings in Maya. The player will move in the virtual world through computer keyboard.

The mouse will be set as main inventory controller. The game will be released to PC and OS system. If there is existent compiling plug-ins, I'd like to release game to smart phone platform as well, such as IOS and Android.

Rapid Prototyping

Now you must have had a completely clear view of what a conceptional design looks like. A music-history-based RPG game frame is right there, with all elements clearly illustrated. You can transfer these texts into a table or figure, for a more intuitive appreciation. Thereafter, it's the step to make a rapid prototyping.

Prototyping simply means an early version model or sample. In computer science, it's set to test or build an iteration of a model. In terms of game design, it's understood as a "draft structure mode" of a game. Since you have had everything ready, having ideas about what to design, teaching plan and certain demographic groups, it's time to set about practicing the plan in your mind.

It's really crucial to make sure the prototype work smoothly, for all the later executing parts are based upon this prototype. You can start to make a draft work and test it. You can simply include all the elements we discussed in the conceptional design. By creating a rapid productive prototype, you will have a more subjective feeling about what you are about to produce. You can play on your draft game and feel if it's fun enough. How your character moving in the game could be tested through this draft work. After that, there is a procedure called looping. You need to loop this prototype as an iteration with risks assessed. Looping means to upgrade the statements after consecutive checking and discussion.

During the looping there must be plenty of problems showing up. Make sure all the problems in prototyping are solved. With the final prototype in hands, you could declare being ready to execute the statements to a real game.

Build the rules and execute the mechanics (Coding)

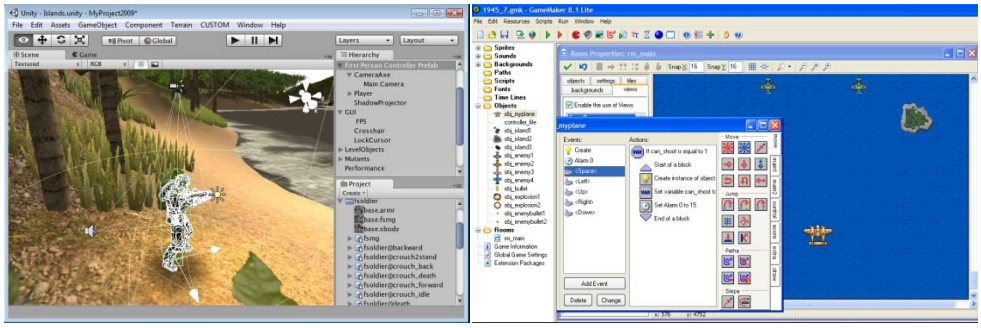
The technology and mechanics are set in this step. The final prototyping will be the reference you used to choose the right technology and appropriate mechanics.

For technology, it should be a comprehensive solution to practice all the settings in mechanics. Normally a designer will start from the game engine. There are many mature game engines we can use for designing a game. Some of them are very specific for only one game genre. For example, the famous "Source" is a game engine developed by Valve Corporation and designed specifically for the games like counter-strike and Team Fortress. (Figure 3-4)

Figure 3-4

It's a 3D first-person shooting game engine. You might as well not use it for a 2D action game or sports games. For music education games, there are no specific game engine temporarily, but there are still many powerful engines that fit many game genres. I recommend Unity and Game Maker (Figure 3-5) for game technology. They are both

open-source engine and they can handle most of the game genres, including the music game of course. The difference is Unity is for 3D and Game maker is for 2D.



Unity3D Game Maker

Figure 3-5

For mechanic, Jesse Schell defines mechanics as the core of what a game truly is. He claims that there are no certain standards for game mechanics because of the big complexity. Different game genre would have different mechanics. For music educational games, I specifically list a short procedure of building game mechanics here, based upon Jesse's common solution to any kind of game.

Creating a space of the "notes".

Music notes need a music staff to be represented. In terms of games, it means you need to create a consistent 2D or 3D space for the whole game. You need to have a view of how big the space is, and estimate how long a player would take to spend on this space. If the space is too broad and the character is two small, the player will waste most of time in travelling, which could possibly bring the boredom. If there are conversations and inventories, you need to reserve a certain room or space for this kind of functions. A conversation chat box should not exceed too much of the screen. You don't occupy the whole screen while doing the conversation or visiting the inventory store, unless you design a specific room for the function.

Creating the notes and lines.

Notes and lines here mean the objects and attributes. You could make a list of objects existing in the game. And you need to set up specific categories for each object to match. The objects may have different attributes that have impact on one and another. You can make a note harmful bullet to the character or else set it as the triumph and gold. It's all determined by the designer. In game maker engine, the attributes of objects includes but not limited to the depth, visible, solid, persistent and so on. Some objects are laid over others with a higher depth; Some objects are solid while others could cross the character. It's not difficult to understand the attributes, the importance is how you define the function of each object to make the game fun enough to play. Of course, the attribute of an object that exists in real life may change in a game. The games always bring the fantasy and imagination. A piano in the game could sound like electronic machine if the attribute of it was changed by another mysterious object, such as an UFO laser. Building attributes is commonly determined by your imaginations. No one sets a barrier that a music educational game must be realistic and serious.

In terms of a special object category, the characters in the games should be particularly designed. Characters have functions, which count the attributes to the characters. Each single character could do something causing positive or negative influence to the games. A hero will save the world while a Lucifer could ruin the world; The NPC guides you to the next destination while the Boss prevents you from going further. With specific identity, each character in the game will be functional in his own way. Jesse Schell defines that "the character mechanics are about how you match the characters to the functions." From the movie "Spiderman", we can get that though the hero could save the world, but when he's got infected, the hero could turn himself into a

Lucifer. When applying the functions to the characters in the game, you should not set barriers to your imaginations. Why the heroes have to be good? What if the heroes do something bad to the world? Will this bring the story to the climax in the game and drives the players crazy and addicted to the game?

For music educational games, it's not difficult to set the musicians as the tutors or NPC to create the interactions. But if you think it more, you can set up a musician as a hostage that you are fighting against. Only if you beat him you could pass this level or complete mission. Characters' functions are crucial to the storytelling. There are two ways of displaying the necessary information of the game. One is a letter or sentences on the wall to guide you what to do next. Another one is the tutorials or the guiding information you get from the NPC.

Creating the moving melody

There are objects in the games moving randomly or following the path line. There are objects in the games with the movement controlled by the player. For music education, it makes sense that a note moves following the keyboard pressing. In the Korean-produced music game "DJ Max" or "Guitar Hero" (Figure 3-6), the object movement rule is: when the notes fall to the baseline by the rhythm, press the corresponding buttons to hit them. The more accurately you press on rhythm, the higher score you gain. In this case, a player can't control the notes, but control the precise moment when the notes hit the baseline. There are variety of movement settings, which are determined by your final prototype.

DJ Max Guitar Hero

Figure 3-6

Setting the "Keys and Tempos"

Keys and tempos constrain the notes rules in music. They determine the tone of each note and how fast the notes should be played. The rules for music educational game could integrate the rules of basic music theory. Turning the music rules into game rules is the core thought of building a music educational game. The highness and lowness of the tone could be displayed by the heights of the staircase; the speed of how a music is played could be correspondent to the speed of the game. The quicker the game goes, the quicker the melody is played; You can even define a color to a specific tone, thus the color has its own musical attribute. For all the game genres, the core of the rule is to set a goal to achieve. The game should have a final goal, which greatly stimulates player's motivation. It keeps the player in the game and creates fun for the player. When you have the final goal, you can take step to setting the rest. In terms of the rules, we cite a diagram of David Parlett, (Figure 3-7) to display the different rules categories.

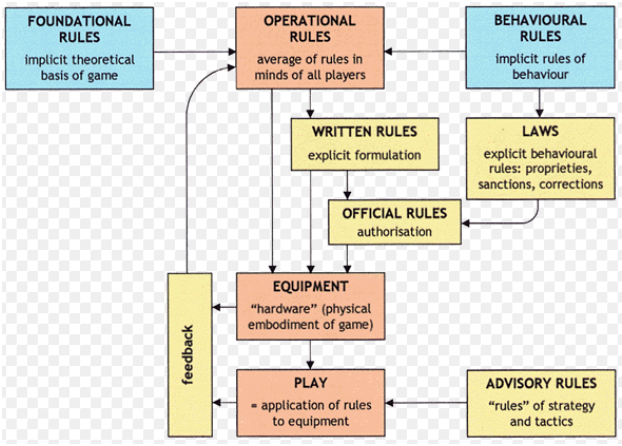


Figure 3-7

Parlett created the diagram to analyze different kinds of rules involved with games. From the picture, you can easily find the relationship among different kinds of rules. Operation rules are the rules set for your interactive control; Foundation rules are the most basic rules you set for your game. Everything in the game should obey the foundation rules. Behavior rules determine what you could do and what you couldn't do in the games. All the rules have inner relationship and they serve as the core thoughts of building a game.

Creating the skills

There are skills in every game. A specific skill could bring more sense of challenge and success to the player. Schell pointed out, "if the player's skill level is a good match to the game's difficulty, the player will feel challenged and stay in the flow channel." (p.152)(Figure 3-8)

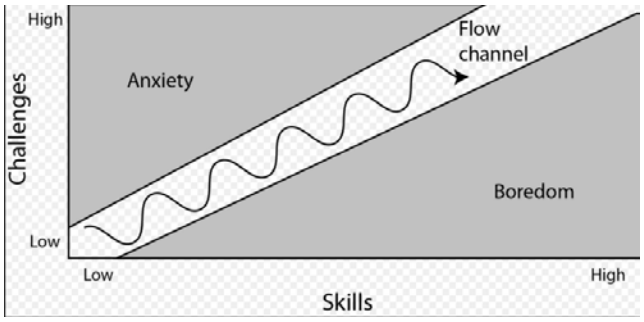


Figure 3-8

You can see from the picture that, the more skills in the games will bring more challenges. And challenge is an important factor to keep the player in the flow so that the play will be more focused in the games. Both growing challenges and skills improve the game experience. For music educational games, the game skills could be easily established via listing the music skills. Music skills are shown on many aspects such as the skill of playing an instrument or the skill of hearing a specific tone. With these music skills, all the designer need to do is set up a certain skill list and put the music skill in it. Then expand your imagination to turn the music skills into the game ones. Jesse classified the skills in the games into three classes:

- Physical Skill
- Mental Skill
- Social Skill

To give an easy description here, think about the theme we used before: a music-history-based game about musicians' lifetime and anecdotes.

With this theme, the physical skill would be the violin skill he owns himself; And the mental skills would be the selection he chooses, such as an easy "going left" or "going right"; The social skills would be an instrumental ensemble. At the moment the player is not only playing instruments with others, but communicating through the sound of harmony. Furthermore, because the game itself creates fantasy, you could add a skill

that doesn't exist in real life to the player. How about a violinist-playing violin under water?

Creating Chances

In this step, you could add some uncertainty the game, to make the games more mysterious and challenging. It's always fun when one cooks a hot potato. If you could design a gamble system in the game, you will find it surprisingly increases the motivation of the players, though you don't have to set up such a system in an educational game. The uncertain direction is usually the reason for a adventure, which drives the players to have a look at it. This is the one last step to reinforce your game play. You can easily equal this to create the surprises in music educational games. For instance, if you own a violin played by Paganini before and later you find it produced by Stradivari, would you feel double happiness about this extra trophy? The surprises are the rewards. A reward brings about the balance of the game. When you consume something in the game with gold, you could earn it back by a reward. It keeps a balance and inserts the chance, bringing more fun to the games.

Character and Worlds design (Graphics)

Scale

Since you have designed the movements of all the characters and objects, in this step you need to make them fit in the world you create. You may draw the sketches of characters and the worlds, including the maps, on a paper firstly. The first thing you have to notice is the size. If you set your game is a third-person distortion, you need to make sure the scale works well for the players. The main character couldn't be too big in comparison to a building. If the character is as tall as a 6-layer building, the player will get confused and regard the game as a giant game. Secondly, if the space of the room

is big enough but you put all the objects and players in a corner, occupying only one-fourth of the room, it will be weird for the players. You can easily adjust the scales of character and objects by put the character right next to the object and think of the accurate scales in real life. In a short, the size and the scale could be imaginable unless you mean to do that. Otherwise, the confusion of players would lead to the boredom and worse game experience.

Graphic Design

Then, you need to consider the aesthetics setting for the whole game. Like we discussed above, if the theme has been decided, there must be a corresponding style fitting the theme. If you create a world in the future, you could add the science and future elements to your game. The architectures could be constructed in multiple shapes. When it comes to a music educational game, the music elements should cover the whole game to make player realize he or she is playing a game based on music. And think of the story regarding the musicians in Renaissance Era, you shouldn't put the paintings of Da Vinci anywhere in the games, or the player will misunderstand the game for a fine arts educational game.

Now that you have a still character dressing fancy or historical, it's time to make it move. When you animate the characters in the games, you should make sure it works smoothly and not got stuck. Normally you should create a series of still pictures to each movement, such as jumping, walking, crouching, running, etc. That will be substantial work, which means you need to seriously consider the timetable you made to finish the game. You could also add animations to the buildings or the clouds in the sky. They will surely bring a better experience for the players. Schell points out :"an aesthetic considerations are part of making any experience more enjoyable." (p.43)

Besides, how your characters dress and behave in the games could provide an opportunity for the players to go into the virtual world. In the fantasy of the game settings, the players might actively fit himself to a figure of superhero or a character with super power and skills. That's a kind of identity transition. Being another role motivates the player to accomplish the goal he couldn't achieve in real life. Prof.DeVane states in his dissertation that:" Many good video games present players with value-laden roles that they can inhabit. These roles in turn do not exist in a vacuum; they are tied to practices, dispositions and problem-solving strategies. " (p.15) The aesthetic of the main character is the particularly influential. It impressed the players most directly and it could increasingly drive the motivation of the players. So make sure your characters look really cool ,sound adorable, or behave really bad to fit the roles.

Audio Design

Beside the graphic design for characters and architectures, audio design is especially crucial to a music educational game. Sound is one of the most important factors that may influent the whole aesthetics. Because sound is normal the bigger format for a game, some designers may choose to use less sound and more loops to make the game small enough in case of overusing memories. But for the music educational games, it could be different. The lowest sound quality standard for a CD is 44,100 Hz, 128bits, WAV files. In the game design, we could use the compressed Mp3 file to replace the WAV files. To remain the stereo output in a music game, we should at least maintain the sampling of 44,100 and 128bits. That's the lowest audio format requirements I set for a music relevant game.

There are mainly two kinds of sound in a game. The first one is the background music. It's player in each level or room of the game. You don't need to make it too loud

in the game because it serves as a background that seldom attracts the attention of players. The main function of it is to offer a better emotional experience. When you hear music really tense in the game, you could figure maybe the boss is coming, or you have reached the final level. Background music has function but it's not apparently shown.

The second one is called the function sound. It's played when a function or a skill is executed, like a collision in-between two objects or a trophy awarded to the player. It creates the potential impression into player's mind. With the function sound in mind, the player could have a clear view of what to do. What if the character touches a sharp rock and an annoying sound is played? The player will possibly avoid touching the rocks again.

In the music educational game, music has its unique significance more than just giving a signal. The music clips played in the game could be tutorial of how music theory works. By comparison between two samples could the player distinguish the subtle changes of music. To give the tutorials by playing sound is the most direct way to teach music theory. Under such circumstance, as a game designer of music education, you need to edit the entire sound well before using them as the images in game engines. Meanwhile, the quality of sound is highly required.

Technology for Aesthetics

Sometimes the designer needs to balance the arts and technology. In terms of the animation, the basic rule is, the more layers of a animation, the more precisely the character moves. In this case you should consider if a common player could handle your game with his laptop. The more complicated the animation is, the more ROM (memories) a digital equipment requires. You can move your steps forward if the technology permits.

When it comes to the technology, you could model the movement of the characters via 3D software like MAYA or Blender if it's in a 3D environment. Or you can easily create simple animation for the characters by Photoshop or Illustrator if it's in a 2D environment. You can edit sounds with sound editing software like Cubase or Protools. On Mac system, you may use GarageBand or Logic to edit sounds.

To combine and produce the game (Demo)

Finally, the most exciting moments are coming. Like cooking a meal, you have had all the food materials ready, the final step is to put them all in the wok and start to fry. The frying is commonly regarded as "coding". In most of the game engine, you need to code the mechanics. The aesthetics will also be presented by coding. Step by step, how long it takes is determined by the complexity of the game you design.After several days industrious working, you have your first game demo.

Game test

Every game test is an iteration. When you have your first game demo, you can't say it perfect. You need to beat the whole level yourself for several times to make sure there are no glitches. Even if you have done everything following the prototype you updated many times, there could still be risks and bugs in the games. And you may possibly miss something important when you were coding.

Play-testing

Now you have your own final version. But it's still not the end. It's a game designed for music learners, you need to test if they could actually learn music via your games. Furthermore, the purpose of your game is not only to make people learn music, but to enjoy the game when playing. Play testing is the best way for you to solve these

problems. Schell has regardedplay-testing as a must-do procedure in game design. "Play-testing is necessary to serve as a wakeup call and force you to solve the ugly problems you've been putting off."(p.390) The quickest and simplest way to do the play testing is to gather you friends and other game developers together, and make them play the game. The first you need to make sure is there are no glitches showing up when they playing. Then you could design a short survey to measure their subjective feelings about your game and collect their advices. After all, you go back and summarize all the data and improve your game on more time. Do the play testing again and again until you have your own game that most people like.

The final framework for creating a music educational game could be seen as the procedure of Figure 3-9:

Figure 3-9

CHAPTER 4
RESULTS

Based on the method I proposed, here I present the Design Narrative of the game I created. I followed every step of the music educational game framework written above, and finally I finished the game: The Orange Fantasia.

Design Narrative of Orange Fantasia

Theme

I want to produce a game about offering tutorials of basic music theory. Some of the music history knowledge will be integrated in the game as well.

Ideas

I got my inspiration from a movie called Midnight in Paris, which was written and directed by Woody Allen. It is a romantic comedy movie that tells about a story of Gil Pender, a screenwriter, having a fantastic experience in the midnight of Paris. When the night fell and neon was on, Gil went alone in the street. Then he encountered several geniuses from diverse arts fields, such as Ernest Hemingway, Pablo Picasso, Salvador Dalí, etc. He crossed the time and space, talking with them and experienced the fantastic moments, which was so impressive to me.

My idea is: To make a RPG game with the background of classic music history. The players will control my character and have an adventure of music. During the adventure the players will learn the music theory from easy to difficult, step by step. They could also learn some of the music history, including to know about the greatest musicians in the world as well as their signature works.

With the basic idea, I stated my problems:

- How can I create a similar scene as Midnight in Paris?
- How can I give tutorials to the players?

- How can I integrate music theory and the story?
- How can I choose a certain period of music history to make my game happen?
- How can I drive the motivation of a music learner?

Demographics

I mainly designed the Orange Fantasia for the middle school students. It serves as an assistive tool for students to learn music theory with the help of digital techniques. It also serves as an adventure RPG game for those whoever are male or female, young or old, being interested in classic music to enjoy fun when listening the masterpieces.

Music contents

My music education plan is split to two parts: the music history and music theory.

For the music history, the players would know about 18 greatest musicians in the world, from Baroque Era to the end of Romantic Era. In the meanwhile, they could listen to the signature masterpieces composed by these musicians in the game.

For the music theory, the players would know about the basic theories, starting from the pitch and tones of the note to the melody and chords theories. They could learn these theories through the educational music clips presented in the games.

Therefore, I wrote a plan like a teaching syllabus of what I want to teach in order.

All the musicians and music theories are integrated in a list: (Figure 4-1)

ID	Era	Musicians	Functions/ Theories	Signature Works
1	Baroque 1600-1750	Monteverdi	"Stranger"	L' Orfeo, (Opera)
2		Pachelbel	N/A	Canon in D
3		Vivaldi	Pitch	Four Seasons
4				Concerto in D Major for Flute and Strings
5		Handel	Pitch Values	The Messiah, Part 2_Hallelujah!
6				Water Music Suite No_3 in G Major
7		Bach	Clef/Quiz1	Fantasia and Fugue in G Minor
8				Orchestral Suite No_3 Air in D Major
9				Minuet in G major
10	Classic 1750-1820	Mozart	Intervals	Serenade No_13 in G Major, Eine Kleine Nachtmusik
11				Sonata No_11 in A Major for Piano, Rondo alla Turca
12				12 Variations on Twinkle, twinkle in C Major
13		Haydn	Music Scales	Concerto No_11 In D Major For Fortepiano And Orchestra
14				Symphony No_94 In G Major, "The Surprice"_III
15				Symphony No_100 In G Major, "Military"_IV
16				Symphony No_45 In F-Sharp Minor, "Farewell"_I
17		Beethoven	Keys/Quiz2	Sonata No_8 in C Minor for Piano, Pathétique_III
18				Sonata No_14 in C-Sharp Minor for Piano, Moonlight_I
19				Symphony No_5 in C Minor, Fate_I
20				Symphony No_9 in D Minor, Choral_IV_Ode to Joy
21				Symphony No_9 in D Minor, Choral_II_Molto vivace
22	Romantic 1820-1900	Schubert	Key Changing	Marche Militaire No_1
23				Moments musicaux, Air Russe in F Minor
24				Schwanengesang, Ständchen (Serenade)
25				Wiegenlied (Lullaby) No_1
26		Mendelssohn	Note Values	Concerto In E Minor For Violin And Orchestra (Attacca)
27				Songs Without Words, Spring Song In A Major
28				A Midsummer Night's Dream, Wedding March
29		Schumann	Time Signatures	Kinderszenen, Träumerei
30				Kreisleriana, Schnell Und Spielend
31		Brahms		Waltzes, Op39_No_15 in A-Flat Major
32				Hungarian Dances, No_5 in G Minor
33		Wagner	Tempos/Quiz3	Lohengrin_Bridal March
34				Die Walkure_Ride of the Valkyries
35		Chopin	Melody	Nocturnes,No_2 in E-Flat Major
36				Fantaisie Impromptu in C-Sharp Major, Op_66
37				Waltzes, No_1 in D-Flat Major, Minute Waltz
38				Waltzes, No_2 in C-Sharp Minor
39		Berlioz		Symphonie Fantastique, (March To The Scaffold)
40		Liszt		No_3 in G sharp minor (La Campanella)
41				Mephisto Waltz No_1
42		Tchaikovsky	Chords/Final Quiz	Concerto No_1 in B-Flat Minor for Piano and Orchestra
43				The Seasons, June_Barcarolle
44				The Nutcracker, Waltz of the Flowers
45				Swan Lake, Ballet Suite, Dance of the Swans
46		Dvorak		Symphony No_9 in E Minor, From the New World_II
47				Symphony No_9 in E Minor, From the New World_IV
48				8 Humoresques, No_7 in G-Flat Major
49	After 1900	Debussy	"the Wizard"	Deux arabesques (Two Arabesques), L 66_No_1
50				Suite bergamasque, L 75_III_Clair de lune

Figure 4-1

Risk assessments

In the early design of Orange Fantasia, I had risks in:

- The whole game setting might not be as fun as I think because I want to implement quizzes in the game.
- The game engine might be out of memory if I want to set a big stage and put too many objects in the game.
- My main character is a boy. I'm not sure if the girls would like him.
- Those are substantial works to do. I'm not sure if I could finish it before the deadline.
- My game would be long. I doubt if I should shorten the game length.

Conceptional Design (Based on Schell's Framework)

Mechanics

I want to build a RPG game. My main character is a boy called Claude. I want him to move in the rooms and cities. I want to use WASD to control him. I want to set the E button as an executing button. I need my character to move from city to city by Carriage and Boat. I want to set the musicians as NPC in the games. Each of them will give tutorials of music theories to my character. Conversations would happen all the time when Claude walks to the musicians. I want the signature master piece to be played for each musician. The final goal of the game is to get the "Orange Fantasia", which is a magic book to let Claude cross the time and space. There is a functional NPC called Tim Difato in the game. He is the wizard and he tells the rules and stories of "Orange Fantasia" to Claude.

Storytelling

My main character is a boy called Claude. He is 14 years old and he likes classic music very much. On his way to school, he was listening to the violin music on the

school bus. He'd like to know how those master music were composed. When he woke up in the morning for the second day, he found he was in Venice. He asked the wizard in a house with red roof what happened. Finally he knew he had crossed the time and space. The only way to go back to his age is to get the music notebook called Orange Fantasia. For the sake of it, he started to learn music from master musicians in Europe of different eras. He really wanted to find the clue of "Orange Fantasia" to send him back. In the end he found everything was a dream but the book was already there on his floor. The whole game was a fantasy.

Aesthetics

I want my main character wear like an American boy from Gainesville. I want him to wear cap and hoodie. I want to make cartoon figures for all the musicians. I want the graphic style of my game to be colorful and with thick black stroke. I need to make the city the virtual world look like the real one. I want to see gondolas and buildings with at least four storages in Venice. I want to set Arc de Triumph in Paris to make players realize where he is. I want to make Vienna and Paris graceful and elegant. I want to build the cities from a fake 3D view. I want the players to view the world from a 3rd-person distortion. I want to scale the characters right. I don't want to make complicated animations. I want the music and sound to be played stereo. I need the music to fit the environment the storytelling.

Technology

I want to produce a fake 3D RPG game with Game Maker 8.1. Game Maker is a strong engine to run the games. It has perfect pre-settings and high level coding system. I can use the script in game maker to play the music so as to narrow the volume of my

game. The players will use the keyboard and mouse as interfaces to interact with the characters in the game.

Rapid Productive Prototyping

With the elements determined in Conceptional Design, now it's time to make a rapid prototype and loop it. Firstly I reviewed all the aesthetics statements I planned in the game, and I created some simple objects via Adobe Illustrator. Then I set several simple mechanics to my character and objects. I decided to create the space from the bedroom of my character, so finally I had a room with both character and objects.(Figure 4-2)

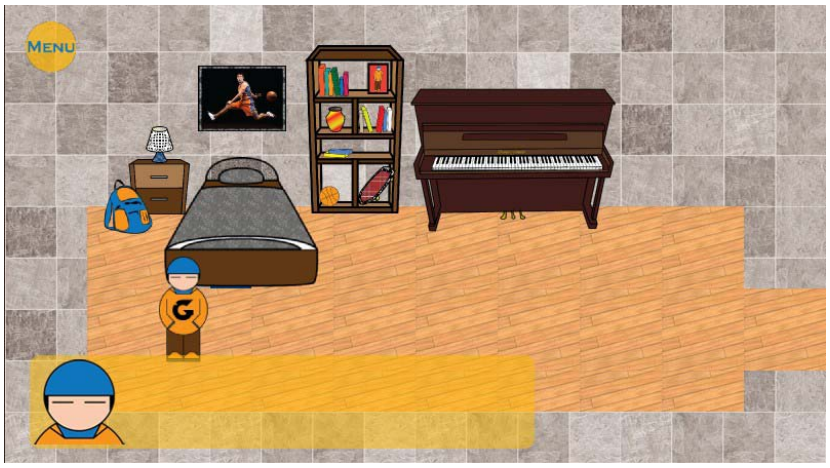


Figure 4-2

In this draft game I had my character, piano, bed, stand, shelf and bag in my room. Also, I set up a menu on the corner of the game view. The chat box was created with the figure of my character and a half transparent orange background. I made sure my character could walk freely in the bedroom by looping and adjusting it again and agin.

Producing the game

Choosing Technology

As I decided in the rapid prototype, at last I chose to do all the things in the Game Maker 8.1 game engine. (Figure 4-3)

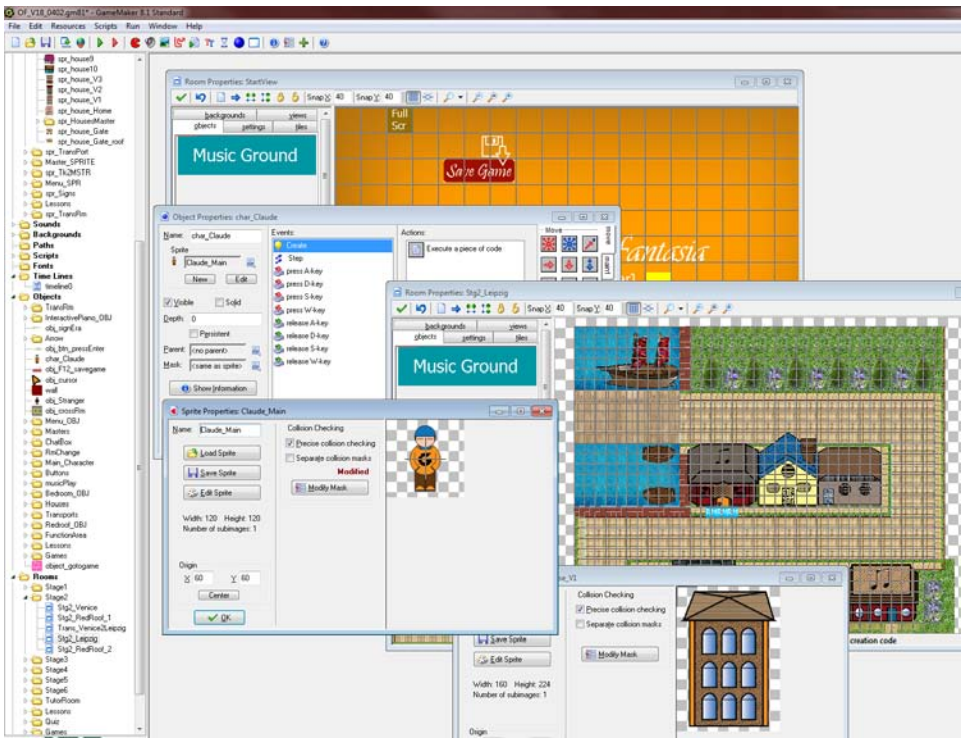


Figure 4-3

Creating Mechanics

Space: In game maker, space means room. I set up several rooms as the spaces which contain all the characters and objects. The cities of different eras are made in different rooms. There are rooms designed specifically for the quizzes and music games. Main character could move through these rooms by the transportations, carriage and boat. (Figure 4-4)

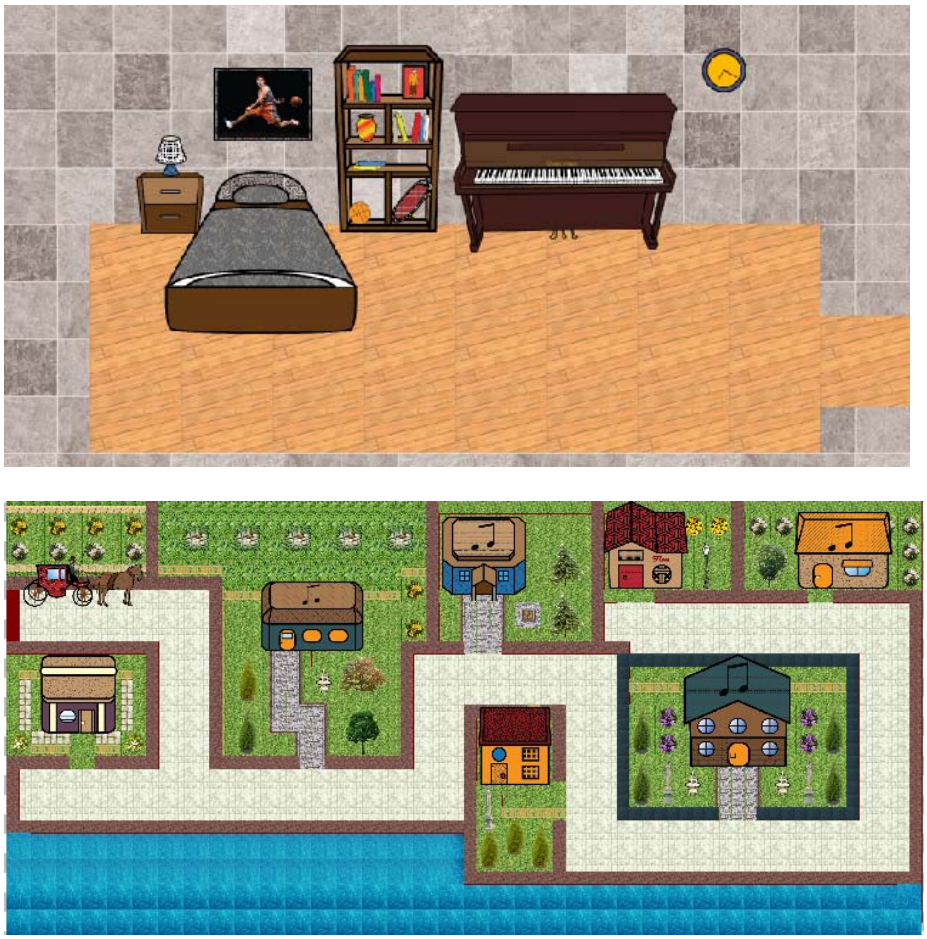


Figure 4-4

Objects and Attributes: The main objects of my game are characters, buildings, transportations, architectures and buttons.

Characters include the musicians and main characters, they all have the conversation functions and they are all solid. That means you cannot walk across them. (Figure 4-5)

Figure 4-5

For the buildings, all the houses are solid and there are invisible entrance setting at the door. If you walk to the door and collide with the invisible objects, you would be sent to the inner side of the room. (Figure 4-6)

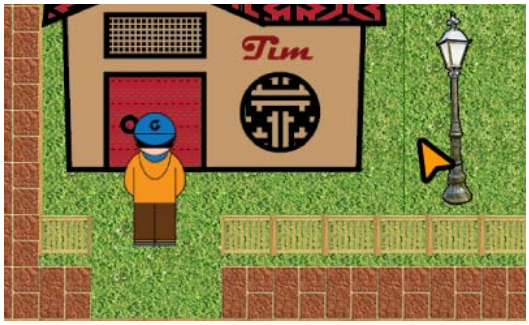


Figure 4-6

When you are approaching to the transportations, a star would be activated, then you could press the E button to go to another city. (Figure 4-7)

Figure 4-7

There are menu buttons on the right corner up of the screen, which could be regarded as a UI (Users Interfaces) design. If you need help or you want restart the game, you could press the corresponding buttons to activate the function. (Figure 4-8)

Figure 4-8

In the quizzes section, the play button is easy to function. You just click it and the music clip would be played. (Figure 4-9)

Figure 4-9

Moving: In Orange Fantasia, only the main character could move. You move the character with "WASD" buttons and execute the function of collided objects by button "E". Due to the attributes setting, when you collide with some certain objects, the object would destroy itself. In Orange Fantasia, when you collide with the backpack, or you could say, picking up the backpack, it will disappear at once, and then the backpack button would be activated. (Figure 4-10)

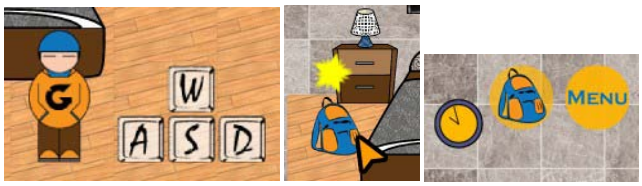


Figure 4-10

Rules setting:

- Operational Rules: control the main character to go to the tutors and learn music theory.
- Foundational Rules:The player should go to tutors and finish the tutorials. The tutors might have the clues about where "Orange Fantasia" is. After completing each class, the player could win a notebook of Tutors. After collecting 16 notebooks, he could go to the final stage. There are 4 quizzes in the games, only if the player passes all the quizzes, could he or she go to the final stage.

As a linear storytelling setting, only by finishing one event could the player trigger the next event. The player could possibly be trapped in the bedroom if he doesn't play the piano. That creates the "uniqueness" of the game play.

Skills: All the "skills" of music should be gained via learning music from the tutors. The tutors have different skills emphasis in music theory.

The basic skills of character in the game are playing the music, clicking the right answers and beginning a conversation. This is a linear game, no exceptional narrative of the game.

Chance/Rewards: After every meeting with the tutors, you could collect the notebooks of him. Also, his portrait would be shown on the musician library page. When you collect 18 musicians' portraits, you will finish the whole. That's one motivated setting. (See Figure 4-11)

Figure 4-11

The final goal is to get the magic music book "Orange Fantasia". It has the power of bringing the main character back to his age. And the player could listen to the "Deux arabesques, L 66_No_1" by Claude Debussy by beating the whole stages. That song is set as a final trophy, with the feeling of Orange. It gives you the feeling of peace and fantasy, so the player could recall the time he spent with "Orange Fantasia" and review the music theory knowledge he had learnt in the accompaniment of this Arabesques. (Figure 4-12)

Figure 4-12

Creating Aesthetics

Characters: The first thing came into my mind is the color. With the name of "Orange Fantasia", I certainly choose "orange" as the theme color for my game. Being a gator for two years in University of Florida, I made the main character wear the cap and hoody, orange and blue. So if a gator boy plays Orange Fantasia for learning music, this figure could motivate the identity transition to make him drown in the role really quick. (Figure 4-13)

Figure 4-13

I didn't spend too much time in drawing the animation of the character. But I did for the musicians figures. For letting the player be more attracted by artistic design, I made the musicians look just like their portraits. (Figure 4-14)

Ludwig van Beethoven

J.S Bach

Figure 4-14

The wizard is a mysterious character in the game. He knows everything and foresees the future. So I set maroon as his color, making him float in the air, with maroon robe and authoritative wand. (Figure 4-15)

Figure 4-15

Cities: The cities in my games are all real cities, so what I need to do is make the cities look just like what are. Every city has its own features. For example, Venice is a city with canal and bridges. The gondolas are the symbols of Venice. And the buildings in Venice are normally with more than 3 floors. You can easily recognize Paris when you see the" Arc de Triomphe", which is the triumph arch. There, I seriously considered about these features and put them in the cities. (Figure 4-16)


Venice


Paris

Figure 4-16

Houses:I put the two connected eighth-note on the roof of each musician's house, as a sign to let players easily distinguish the house with functions from other normal houses. (Figure 4-17)

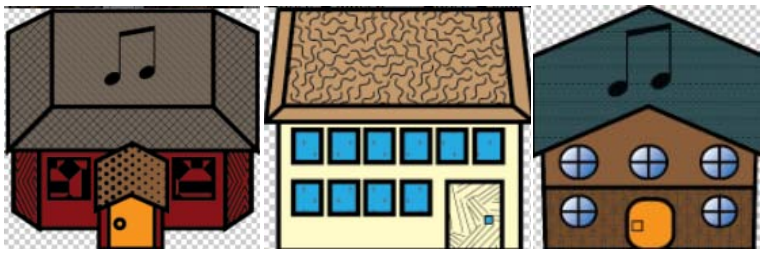


Figure 4-17

Other Objects: There are some other functional objects in the games. They kept the same style as characters and houses, with thick black stroke and thick color. The most important thing in aesthetics setting is consistency. In Orange Fantasia, I maintain this style to all the objects. (Figure 4-18)

Figure 4-18

Audio Design: The Figure 4-1 shows that each musician would have his own signature works. In the Orange Fantasia, all the music has been adjusted on an average sound level. Some of the function sounds are mono, but all the music is stereo. In a music educational game, the designer should guarantee the sound quality to let player enjoy music when playing the games.

Final Quiz: The Final Quiz is a small game. I got the inspiration from a music game called "The Simon". In "the Simon", there are four buttons with different colors. The music machine plays the buttons with corresponding sound. The players have to

remember both the color and sound, and then repeat the order of the button being played. In my final quiz, I assigned 10 tones to 10 colors. When the player clicks the play button to listen to the music clip, he needs to walk directly to the button that reflects the specific sound. It's designed for testing the sensibility of melody. (Figure 4-19)

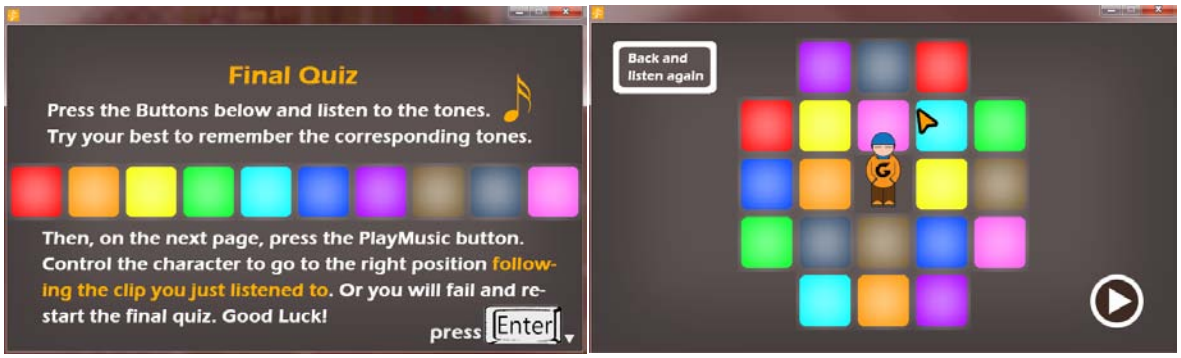


Figure 4-19

Interactive Piano: This virtual piano can let player play the piano with keyboard. It's an interactive design in the games. Each key has its certain pitch and tone. (Figure 4-20)

Figure 4-20

Combination /Executing

In game maker, you only need to press the button "Execute as a standalone executable file" to do the final combination or executing. An .exe game file will be exported.

Game Test:

After I exporting the games, I ran it for several times beating from the first stage to the last stage. Once there were problems existing, I kept fixing glitches one after another. Final I got the demo, and I showed how it worked to both of my committees members. During the displaying there were still problems. Now it's the final version.

Play testing:

I designed a short survey and invited 3 of my friends to play it. The survey and results are shown on the Appendix page.

CHAPTER 5
CONCLUSION

The whole practical process of producing a game is innovative and elaborate. Every step should be serious taken. After producing a complete game, we can learn that designing a game always starts from a certain framework. In this study, the framework I proposed, which was used to creating Orange Fantasia, was mainly based upon Jesse Schell's framework. It could be applicable to most games emphasized in the fields of music education. By following the design narrative of "Orange Fantasia", a game designer could have a grand view of what's the first step to take to building a game. With the better quality music educational games being produced, students would like to learn more from the "games". In this case, music education in middle school will be promoted via the digital sciences. And the music class will never be cut. That's the main significance.

The biggest game marketing of youths is dominantly occupied by the entertainment games. Though most of the games are so enjoyable and they entertain the after-school time, inevitably, some of them that include the violence and sexual elements would be harmful to the immature students. Parents and teachers' being worried about the negative elements leads to the ignorance of the positive influence of games. In fact, not all the games are harmful and wasting time. The educational game could be a good counter-example.

Game-based learning has been gradually applied to many elementary and middle schools in the world. But most of the educational games are designed for kids under 12, due to the short designing cycles and easy mechanics. Forming a team to work specifically on educational games need reliable economic supports. Normally it

takes long to develop and research an outstanding game. It's not hard to imagine the educational games won't make profits as much as those video games in the markets. Therefore, the development of educational games needs the supports of government and relevant education foundations.

Seeing the trend of being more and more educational games on websites, I believe the future of educational games is coming, especially for the arts education, such as music and fine arts. We need to listen to the music to feel it. Without the help of music playing, people could hardly understand what it says via merely reading books. Learning music staff with five lines and four spaces makes no sense without the help of piano. Nowadays most universities have the online digital libraries. If we could have game designers involved in the establishing of digital libraries, could we have more average visitors coming to the digital libraries per day? In terms of digital entertainment, if the learning process is entertained and enjoyable, would people spend more time in playing the knowledge other than escaping from the rigid classes and books?

At last, Internet-based interaction and coding change the way people communicate and the way of thinking. Digitalization and gamification bring the convenience and efficiency to people. They bring fun to us as well. On this hand, actually, to createamusic educational game equals exactly to digitalizing the common music class with the purpose of learning through interaction. That could be a good attempt, for more and more knowledge are turning into data and connected by people all around the world. Living in such an information and technology era, it's worthy of more study and research on the digital worlds to improve the experience of our lives.

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