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Music Note Learning Card Game Design

BY

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A thesis Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Fine Arts in Visual Communication Design

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Abstract

Within the past several decades, Chinese people's living conditions are getting better because of the quick development in Chinese economy. People are now paying more and more attention to children's artistic accomplishments in China. Therefore, more and more parents choose to let their children start learning musical instruments when they are young. However, the first step to learn an instrument is learning how to read and understand different note values and basic rhythm patterns. For example, in China, the traditional way of teaching basic rhythmic patterns is that the teacher demonstrates the basic rhythm pattern to a group of students through the blackboard or other media. Then the students follow the teacher and practice together. Because that is group class, it is difficult for the teacher to interact with each student. Therefore, the entire class is more like a music lecture. The students only have a few chances to practice and master the basic rhythmic pattern. In this way, learning basic music theory is undoubtedly dull and challenging for many children. As a result, some children with weak foundations or younger ages cannot understand the class's content. Basic music theory is the most important but also the most tedious part of music learning. So how to stimulate children's interest in learning basic music theory like notes and beats is a big question.

This thesis project aims to use interactive and visual design to enhance children's music learning experience. In this thesis, the author demonstrates the process of designing a music notes learning card game. The design combines physical and digital tools and use the combination of actual note cards and the mobile phone application to create this interactive learning experience for children.

**Keywords:** Interaction Design; Card Game Design; Education; UI/UX Design
Introduction

In today's Chinese society, because of the continuous improvement of science and technology, music education strategies have also undergone significant changes. Some new teaching methods like game-based teaching and mobile apps have appeared and worked well in helping students learning music. Especially in the basic music theory filed, there are many mobile phone applications designed for children to help them learn about basic music theory. However, the author interviewed a professional music theory teacher and knew about the Chinese music theory education's current status. Based on that interview, the author found that even though there are many new learning tools for students to learn music theory, most music theory teachers in China are still using the traditional way to teach music theory in the class, which is dull and inefficient. Therefore, it is the general trend to increase students learning experience by adding the concept of game-based teaching and new media technology to music theory teaching.

This paper explains how to design a card game that can be used in the classroom and everyday play by combining digital technology with traditional music note learning cards. In the learning cards design, by using different animals to represent different notes, children can better understand the relationship between them. What is more, the animal illustrations and the ability to scan cards to learn also make children's learning experiences more exciting. In addition, setting up different game levels for different children is also an excellent way to help students get the appropriate training based on their skill level. The children can learn music notes either through playing the card game or through scanning note cards. By increasing the fun and interactivity of the game, the author of this thesis project tries to increase children's motivation to learn music notes. To help viewers better understand the design concept, the author uses several animations to demonstrate how to play the card game using note cards and the App.

Context

Situation

With the improvement of Chinese people's living conditions, people attach more and more importance to the development of children's artistic literacy in China. Many people will encourage their children to learn musical instruments from an early age. Because of the increasing number of young students, music education, especially music education for young kids, has become a heated topic in China. In music education, music theory is a critical and fundamental piece. Learning music theory can help children master the intonation, rhythm, and other aspects of music knowledge to better help children learn musical instruments.

What is more, music theory is the foundation. With the solid knowledge of music theory, students can quickly learn beats and rhythm and help them play the instruments better. However, compared to playing musical instruments, learning the music theory, especially learning the basic rhythmic patterns, sometimes makes many children feel
bored. In many music theory classes, the teacher teaches basic rhythmic patterns through group lectures. In the class, the teacher demonstrates the rhythmic patterns, and then the students follow it and learn. The interaction between teachers and students is limited, and students find it is hard to understand the basic rhythmic patterns without enough practice. Besides, teachers have trouble taking care of every child in such a big class, and in this case, some children with weak foundations are challenging to keep up with the pace. They will lose their confidence and enthusiasm for learning music theory. So how to help children interestingly learn music theory and to enhance the motivation to learn music theory is critical. In recent years, lots of new learning methods appear to help children learn music theory, like mobile apps and animations. However, most of these tools help children learn music theory after class, but not to help teachers teach music theory in class. In this case, creating a new way to help enhance students' music theory learning experience and teachers' group-class teaching experience is essential.

**Target Audience Definition**

Through the above analysis, there are two target audience groups. One is for the beginners who try to learn music theory, mainly for children under ten years old. The other is for music teachers who want to conduct better group classes for children who have different skill levels.

**Proposed Solution**

In this thesis, the author used the concept of game-based teaching, combined with different media and tools, to design a music note learning card game. In recent years, game-based teaching has become a trend. Compared to traditional teaching methods, game-based teaching conveys knowledge to children through the game, allowing them to absorb and digest knowledge actively. This is in keeping with children's nature to play, while also achieving the goals of learning. Recently, more and more new media have been using in game-based teachings, like animation, mobile games, and apps. Attractive, meaningful visual design decisions play an integral part in these media. Therefore, creating an interactive game-based teaching experience with an excellent visual design is the author's design goal.

**Inquiries**

Based on the proposed solution, five inquiries need to be explained in the design outcome.

*Inquiry 01:* What are the rules of this game?

*Inquiry 02:* How does this game offer different experiences for children at different knowledge levels.

*Inquiry 03:* What is the proper way to combine learning cards and digital tools in the design?

*Inquiry 04:* What is the best overall visual approach for this game design?

*Inquiry 05:* What are the characteristics of different notes, and what are the best visual strategies to show their relationships?
Methods

Designing - Game Rules

Before starting the card game rule design, the author researched music notes and basic rhythmic patterns. Among all the music symbols, the essential part for beginners is basic notes and rests. This card game will also focus on the arrangement and the combination of basic notes and rest. There are three types of cards, time signature card, basic notes cards (whole note; half note; quarter note; eighth note; and sixteenth note) and rest cards (whole rest; half rest; quarter rest; eighth rest; and sixteenth rest).

In this case, how should these elements be used to design the rules of the card game? The author researched the principles of game design, and these are the six aspects that should be considering during game design. Objectives; Constraints; Success Criteria; Reward; Play; and Competition. Based on that, the author took inspiration from some of the existing card games such as "go fish" and "Uno," and developed the game's original rules. (Figure 1) However, the author's initial ideas, like "Music Uno," are more focused on creating a fun card game than creating a game that can help children learn. If this card game's educational function is not the priority, it will not be a significant solution for the existing problem.

To learn more about the current facts about music teaching and get some professional suggestions, the author has interviewed a piano teacher who also taught music theory (Figure 2.1& Figure 2.2, p7). From the interview, the author got some useful points of view. First, set the user scenario in a group music class. Most teachers today teach music theory in the group class, which will sometimes mix students of different ages. Second, lots of students have trouble with learning basic rhythmic patterns. Third, give students a sense of accomplishment is very important. Make sure the game difficulty could meet different students' skill levels.
Considering the above conclusions, the author improved the rules of the game and divided the card game into three levels to fit with different students’ needs (Figures 3.1 – 3.4 below). Besides, the author also added a mobile app to help conduct the card game. Using one set of cards to collaborate with the app could be played in different ways to fit different students’ skill levels.
In a discussion with the professor, the author found that the appropriate incentive mechanism was lacking in the existing game rule design. After the modification, the final rules of the game are as followed.

**Level 1** (Figure 4.1): This game could be played by 1-4 players. It is the easiest level. It is focused on practicing students’ ability to read and repeat the rhythm. The players should first use the mobile app to see the target rhythm. Then each player finds the appropriate notes cards to form the target rhythm. Then use the remaining cards to replace the notes in the target rhythm equally (e.g., a half note equals two quarter notes). The players should try to find as much pattern as possible, the first player to completely form all the possible rhythms presses the end button on the phone and win the game.

**Level 2** (Figure 4.2): This game could play by 1-4 players. It is for students who have certain foundations about music theory and focused on practicing student’s ability to listen and repeating the target rhythm. After hearing the target rhythm, each player uses their cards to form it. The first player who thinks he is complete will tap the phone. (each player will have a particular button to tap on the screen). Then check the answer and start another round of the game.

**Level 3** (Figure 4.3, p9): This game could play by 2-4 players. This level of the game is aiming to practice a student’s comprehensive abilities. Players need to listen, read, and recreate the rhythm. After hearing the target rhythm, first player combining cards to make the initial target rhythm, the second player claps the rhythm. If correct, the second player could replace one card with his cards and let the third player clap the new rhythm.

**Scan cards to check the answer** (Figure 4.4, p9): If any players clap the wrong rhythm, skip to the next player. However, if students have a conflict about whether the player claps right or wrong, they can scan cards to listen to the correct answer.

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*Figure 4.1 Updated game rule level 1*  
*Figure 4.2 Updated game rule level 2*
Card Design

After determining the game rules, the next step is to help students deepen their understanding of notes through the note cards' visual design. The author first came up with two design directions and did sketches about them. The first direction is the "music kingdom" (Figure 5.1). It uses different classes in the court to represent different notes. For example, use the king to represent the whole note, and queen to represent half note. The author tries to associate the relationships between these characters to music notes. The second design direction is "Animalized notes" (Figure 5.2, p10). The author uses different animals to represent different notes. Since these animals have different body sizes and speeds, the author tries to associate these animals' characteristics with the music notes' characteristics.

Figure 5.1 “Music kingdom” design sketches
After comparing these two design directions, the author found that animalized notes were a more appropriate design solution. By associating the characteristics of different animals with the characteristics of notes, students can understand the relationship between music notes in a more exciting way. For example, using a panda to represent a whole note, a penguin as a half note, a cat as a quarter note, a hamster as an eighth note, and a bee as a sixteenth note. It is easy for children to think about the sizes of these animals getting smaller, as their footsteps get faster. That is also the relationship between music notes. From the whole note to the sixteenth note, the note value is getting smaller, and their sounds go faster.

Before determining the final visual style, the author made some attempts. The author tried different ways to design the penguin’s character, for example, design a around penguin in different gestures or a penguin with a small head and big belly. Other than that, the author has tried vector design style and watercolor design style. In the end, the author chose the watercolor style (Figure 6, p11). It is because, among all these visual styles, the watercolor style is the most special one. Lots of children’s illustrations use colorful vector styles, but few use a realistic watercolor style. The author wants to make this card design different from the other learning card designs. Instead of making the animal illustrations cute and colorful, the author chose to use a more realistic and gentle way to depict the animals.
After a series of modifications and adjustments (Figure 7.1), the design was finalized. The author uses each side of the card for a different function. The front side of the cards which have animal illustrations on it used as learning cards. In order to help students remember different music notes, the learning cards have four components (Figure 7.2, p12): music notes, animal illustrations, names of the music notes, and the note value. To enrich the gameplay, besides designing single note cards for eighth notes and sixteenth notes, the author also designed note cards that could be combined (Figure 7.3, p12). Players could combine two eighth note cards or four sixteenth note cards to make a quarter note.
The backside of each card has only plain music notes with different colored bars (Figure 7.4), it can be used for playing the card game. In order to maintain visual consistency, the colors of the bars are extracted from the animal illustrations on the front side of each different card. The backsides of each card were simplified in order to avoid using too many illustrations that might disrupt students’ attention and focus when combing multiple cards together.

When playing this card game, it is better to let students focus on the rhythmic patterns rather than the animal illustrations. However, for learning individual music notes, the animal illustrations will help them understand and remember the music notes better.
App UI Design

The use of mobile apps in this card game is an integral part of the play. It mainly has two user flows. In one user flow, the users get the music notes’ information and introduction animation by using the single scan function to scan the front of the notecard (Figure 8.1). In the other user flow, the mobile app assists the note cards to conduct the card game. It provides the game’s target rhythm, audio, timing, and scores. (Figure 8.2). Simultaneously, if players are not confident with their answers during the game, they can check the correct rhythm by scanning all the backside of the note cards from left to right. The author drew some sketches to support the initial ideas (Figure 8.3, p14)

Figure 8.1 User flow 1

Figure 8.2 User flow 2
Moving forward to the steps of visual design, to make the whole design consistent, the author intends to continue the visual style of the notecard design. However, since the design for the screen needs more legibility than the design for physical cards, some brighter colors must be added in the UI design to help users operate the app. During the research process, the author found that the 1920's children illustration design style fits perfectly with the animal illustration styles on the note cards. In this case, the author refers to some 1920's children illustration style and extracts the color scheme from both these pictures and the note cards' illustrations (Figure 9.1). The final UI designs are as follows (Figure 9.2, p15). Each screen’s design style consists of each other and fits with the card illustration style.
Because the mobile app has only three main functions, on the home page (Figure 9.3, p16), the author made three icons in different colors to draw users’ attention and help them quickly find the function they want. To scan note cards to learn, users need to choose the “scan” function on the homepage and select “single scan” to scan the front of note cards (Figure 9.3, p16). Users can choose to watch introduction animations (Figure 9.4, p16) or learn more detailed knowledge about that music note (Figure 9.5, p17) on the note profile page. For playing card games, the user can select the proper game level from the game selection page (Figure 9.6, p17) and read the game rule by swiping up (Figure 9.7, p17). To help children better understand the game rule, the author uses illustrations to explain it. On the game start page (Figure 9.8, p18), the user can listen to the target rhythm and start the game. During the card game (Figure 9.8, p18), the app will keep record the time usage of this round of the game. If users are not sure about their answers, they can scan the backside of note cards to get the correct answer at any time (Figure 9.9, p18), which will help them get professional instructions when they feel confused.
Figure 9.3 Homepage and scan page

Figure 9.4 Note profile & introduction animation page
Figure 9.5 Note profile, detailed page

Figure 9.6 Game selection page

Figure 9.7 Game rule introduction
Figure 9.8 Game start & process page

Figure 9.9 Scan to check answer page
**Demonstration Animation Design**

To better illustrate the rules and patterns of the entire game, the author intends to show the final result through several demonstration animations. There are three demo animations: overall product introduction, game rule introduction, and single card scan, note learning module introduction. Before making the animation, the author also sketched the storyboard (Figure 10) to structure the animations.

![Figure 10 Animation storyboard](image)

**Results**

**Features**

The front and back sides of this set of cards have different functions and use methods as described below:

**Card Fronts**

On the one hand, the cards themselves' visual design plays a role in deepening the students' understanding of the characteristics of notes. Through a series of animal illustration design, in addition to achieving good visual results, the comparison of size and speed between animals also helps children understand the relationships between music notes.

What is more, the number on the cards represents the note value in the 4/4 time signature. For example, number two on the half note card, since it takes a quarter note as one beat in 4/4 time signature, a half note takes up two beats. The five lines on the cards that are different in width represent the staff. Moreover, the different color backgrounds between different cards are designing to help children distinguish between different music notes through color. On the other hand, the user can learn music notes by scanning the front side of cards through the mobile APP. Each note has its profile. After scanning the card, players can view the introduction animation on their phones. Use the animation to vividly and interestingly display the features of music notes to help children learn with ease and pleasure. Other than that, there are also some written introductions about music notes that aim to help students get a deeper understanding of that music note.
Card Backs
On the one hand, play a card game by arranging music note cards. In the backside design, the author removes most of the decorative elements and chooses to use simple music notes plus staff, which is to allow students to see the arrangement of notes during the game rather than being dazzled.

On the other hand, students need to use their mobile phones to get the target rhythm when playing the card game. Based on the difficulty, the game is subdivided into three levels to give students proper exercises depending on their abilities. After students get the target rhythm on their mobile phones, they can use the note cards to practice alone or play with their friends. While playing the card game, the students can deepen the understanding and mastery of basic rhythm patterns. What is more, to give students the correct instructions, students can scan the arranged cards through their mobile phones to get the correct rhythm, which could help students get enough professional help during the card game.

Project Related Links

**Overall Project Introduction:** [https://youtu.be/hfQnubTKUTI](https://youtu.be/hfQnubTKUTI)
**Game Rule Explanation:** [https://youtu.be/vZhmxPRngh4](https://youtu.be/vZhmxPRngh4)
**Single Card Scan Introduction:** [https://youtu.be/4_o50arH-8](https://youtu.be/4_o50arH-8)
**Thesis Website:** [https://designed.cad.rit.edu/vcdthesis/project/little-musician?preview_id=3706&preview=true](https://designed.cad.rit.edu/vcdthesis/project/little-musician?preview_id=3706&preview=true)

Evaluation & Feedback

Because of the impact of the Covid-19 pandemic, there were no viable ways to find music training institutions to let children test the author's design result. In this case, the author mainly tested the design by interviewing the music teacher who had been interviewed at the initial design stage again to get her feedback about the design result. The author got in touch with this teacher through an online meeting and introduced the design solution. For the final design, she gave the following feedback and suggestions.

*Feedback 1:* Use iPad instead of the mobile phone when it comes to the group class scenario. The use of the mobile phone is not appropriate in class (especially in China). On the one hand, many parents are reluctant to let young children use mobile phones, so it might be difficult for these children to start the game through mobile phones. On the other hand, the screen size of the mobile phone is too small for children to read and operate. In this case, use iPad to replace the mobile phone will be a better choice. Because the iPad has commonly been used in today's class teaching, it is easy for the teacher to bring the iPad to the classroom and conduct the card game.
Feedback 2: The music note card design is unique, and it is brilliant to use animals to represent the music notes. However, the overall tone of these cards may be too dark for children, and it might be better to use some brighter color in the card design.

Feedback 3: The overall design concept is good, but the rhythmic pattern's content design is too simple that it may only fit with the very beginners like children under grade two. If the author wants this design to be published, more in-depth knowledge of rhythmic patterns should be added. For example, the knowledge of triplet, syncopation and various combinations of sixteenth notes and eighth notes.

In conclusion, because of the extensive usage of digital media in the Chinese music education industry and the trend of game-based teaching, this design is feasible and acceptable for the user. However, if this design wants to be published and used in the real teaching environment, the iPad version should be added, and more in-depth rhythmic knowledge is needed.

Conclusion

This card game brings students brand new learning experience through the combination of new technology and traditional learning cards. The music note learning card is a commonly used music theory learning tool. However, the unique design that has resulted from this thesis study combines analog, hands-on cards with digital tools to give the traditional learning card a new life. The card's function is no longer limited to reading and remembering music notes. With a mobile phone, it can also become a toy and a card game that could be played with friends. This approach lets students learn through playing so that the music theory is no longer tedious and challenging to understand.

The music theory involved in this game combines basic music note recognition and basic rhythmic patterns, which are the most basic and most essential parts of music theory learning. In addition, the visual design of the cards is captivating. Using cute little animals on the cards to represent different notes also makes the music theory more interesting. It is also meaningful and appropriate to use the differences in body size and speed between animals to describe the connection between music notes.

Through the interview described on page six, the goals for improving students' music theory learning experiences and music teachers' teaching experiences were clarified. The design could be used not only for children practicing alone but also for helping teachers conduct a larger music theory class. The existing design fits with the two user scenarios mentioned above. Students can not only learn music notes privately by scanning cards or playing games on their own but could also play with a group of friends in class. Teachers can divide students into different groups to play the card game according to their different skill levels. In this case, all students can get the most appropriate
training. In addition, even parents could join this game with their children to promote affection between family members while learning.

In conclusion, in today's music education industry, using new technologies and new media to help teachers conduct game-based teaching is an inevitable trend in China. Moreover, students also need a better and more efficient learning experience than before. The ways in which this design combines traditional learning cards and mobile phones fit with the current trend of music education in China. The second interview with the music teacher reinforced that the design is a feasible solution for beginners to learn music theory. To make this design more in-depth, the author's next steps to enrich the game content will be to add more rhythmic patterns for students to learn and to incorporate the use of an iPad as a new tool for teachers to conduct the card game in group classes.

As a result of the entire design process, the final design plan and solutions were born after many revisions and discussions. Therefore, the author understands that a good design must be practical, not only a good idea but also a reliable solution. Only by absorbing the different opinions and continuously polishing the design can the final design be successful.
References


