NARRATIVE CASUAL LEARNING:
EXPLORE A NEW WAY OF LEARNING A LANGUAGE THROUGH
A GAME "MANDARIN MYSTERY"

A Thesis Presented
by

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ABSTRACT

Educational games have become a mainstream trend in the education industry. This research represents a narrative language learning game "Mandarin Mystery," which uses a narrative structure in place of simple word repetition to teach Mandarin Chinese. This game combines stories, real conversation audios, and vocabulary exercises to help players learn Mandarin. In order to know if the game’s method has an advantage compared to old-style learning - word repetition, this paper conducted a survey that compares Mandarin Mystery with a popular language learning application "Duolingo." Players are asked to play both of the applications and complete a survey about their opinions of each of them. The result shows players' preferences to both applications are almost the same, while Mandarin Mystery seems more attractive but Duolingo keeps its supporters through word repetition method and clean design interface.
ACKNOWLEDGEMENTS

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I am particularly grateful for the assistance given by all play testers who were willing to take part in my survey and share their opinions. I am also grateful to all my friends who always stand by me. This research could not have been possible without their assistance.

My sincere thanks are also extended to my parents, Jie Yao and JinFang Lu for their continuous support and unconditional love. Their warm encouragement and faith on me keep giving me research motivation. I dedicate my thesis to my family.
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1. INTRODUCTION

1.1 Overview of Language learning

It takes a lot of time and effort to learn a new language. Baer (2014) talks about how it is difficult and perplexing for an adult to learn a new language. Therefore, it is no wonder that the language learning industry is worth $82.6 billion (Baer, 2014). Because of market demand, there are a lot of learning applications. To stimulate users’ interest, developers of language-learning software are now trying to create applications that are more interesting to users. For example, besides fill-in-the-blank exercises, mini-games are widely used among those kinds of software. Muntean (2011) claimed that by using gamification in e-learning, they wish to trigger a more efficient and engaging learning behavior.

1.2 The purpose and necessity of this study

This research examines a narrative Chinese learning game - Mandarin Mystery, which merges learning process into an interesting narrative environment to stimulate interest in learning and improve results. Instead of just offering simple fill-in-the-blank exercises, this game combines stories, real conversation audios, and vocabulary exercises to help create an immersive environment for learning a new language. In order to give players a real-life situation and an immersive feeling, the game uses realistic art to simulate a real-life setting. Moreover, the game story has fictional ingredients, which
makes the game experiences more fun and attractive.

Since the learning methods in the game are different from other language learning software such as Duolingo (Culbertson, Andersen, White, Zhang, & Jung, 2016) to some extent, it is meaningful to test the users' preferences and experience of the game.

In order to test of users prefered the narrative method of Mandarin Mystery, this paper conducted a comparative survey of Mandarin Mystery and Duolingo - which is representative of repetitive learning methods. Playtesters are asked to play both of the applications and fill out a survey afterward. The data shows their opinions about each application and their learning method preferences.

1.3 This paper’s main study content, purpose and expectation

To sum up, this paper’s purpose can be described as below:

(1) Playtest of the new language learning game - Mandarin Mystery.

(2) Compare user experiences between Mandarin Mystery and Duolingo.

(3) Get user preferences between the two applications.

(4) Get user opinions about each app.

(5) Improve Mandarin Mystery in the future based on users' feedback.
2. Background

2.1 Introduction to Language Learning Applications

Due to the rapid growth of language learning needs, there are many language learning apps, software, and games in the market. Serious games can engage a wide range of people wishing to learn a foreign language, including those who are not motivated enough to learn the subject matter (Johnson, Vilhjalmsson, and Marsella, 2005). Duolingo, the most popular free online language learning application, has more than 200 million users. It provides written lessons and dictation for users. In the learning process, users can earn points through lessons, and are deducted points when they make mistakes. Users will learn more than 2000 words through lessons and exercises. But Duolingo does not include real-life conversations, and the sentence making practice does not generate useful sentences but only focus on selecting the right word. The translation exercises and lessons are not entirely relevant. Some users consider the exercises boring as well (Jašková, 2014). This paper mainly compares Mandarin Mystery with Duolingo to test the advantage of storytelling in a language learning game.

Hallinen, Walker, Wylie, Ogan, and Jones (2009) created a narrative game to help students learn the distinctions between different past tense forms in French. Thirty-eight undergraduate students were invited to take part in this experiment and learn French both through the narrative game and nongame-learning environment. According to the survey,
researchers found that students were more engaged with the narrative game system, and it was more challenging and rewarding to learn through the narrative game.

Moreover, Lombardi (2012) expressed the necessity of adding humor and enjoyment to serious language learning games. Mandarin Mystery has funny characters and humorous dialogues to create a more enjoyable experience for the learning process. Compared with Duolingo, it should theoretically decrease the boredom associated with language learning.

2.2 Duolingo learning method

Duolingo is a free language learning platform that has both website and app products. Duolingo reached 200M users and became one of the most widely used free language-learning applications. The primary method used by Duolingo is word repetition. Duolingo uses different ways to repeat a word, such as picking the right pronunciation (Pinyin in Mandarin), character, or paring up Pinyin and character (Hanzi). Duolingo is heavy on practicing words, which aims to help users remember the new words.

Duolingo also has a precise level up system. The user cannot jump chapters but can only finish levels step by step. The topic of each chapter is clear. For example, users will learn numerical words in a "number" chapter and learn clothing related words in a "dressing" chapter. Users can create an account to record their learning progress. Duolingo is free to use, but players can choose to upgrade, which means they can pay to...
eliminate advertisements in the application.

*Methods for Reading.

*Methods for Listening
Methods for Speaking. The hint will show up when the mouse cursor is over the word.

**Figure 2.2 Duolingo learning methods.**

Figure 2.2 shows the methods Duolingo uses to focus on word learning. Users will practice a word from listening, reading, and speaking. This method remains the same, and they repeat themselves in every single chapter.

### 2.3 Mandarin Mystery learning method

Mandarin Mystery is a 2D narrative game designed to allow players to learn a new language through stories and real-life conversations. Mandarin Mystery can be played on a web browser for free. It has different chapters, but the stories in each chapter are connected. In other words, Mandarin Mystery has a whole story but is divided into small chapters so that players can play based on their own pace and not feel overwhelmed. The detailed learning methods are in Chapter 3.3.
Figure 2.3 Mandarin Mystery Website Interface.
3. The Design and Development

3.1 Overview

3.1.1 Background and Theoretical Framework

It is reasonable to believe that learning a new language requires a person to invest a lot of time and mental energy. A major obstacle to learning a new language is that it can be a tedious and boring process. Because of the abstract nature of language and the vast amount of memorizing and practicing necessary, people may be inclined to give up before they have mastered the new language. The time investment for learning a new language is also considerable. Learning a new language requires consistent practice, once a person stops using a language for a while, they begin to forget it. When attempting to master a new language, a lack of persistence and practice within a social setting are the most prominent issues.

When people decide to learn a new language, they usually find out the following issues:

• Passive reading and passive listening to explanations and lectures are considered as the least effective teaching methods (Middendorf & Kalish, 1996), so reading a book might not effective for a beginner learner.

• Professional learning software, such as Rosetta Stone, is expensive and also has the disadvantage of not being entertaining enough to hold the language learner’s attention.
The simple repetition used by the most popular language learning apps can become boring very quickly (Shirodkar, 2015);

- Tutors are very expensive. According to payscale.com, the average tutor payment is $17.28/hour. The Freeman Spogli Institute (FSI) at Stanford University (Steve, 2015) indicates that it takes 720 hours to reach basic fluency in Chinese. Based on this data, a person would need to spend at least $12441 on a tutor.

After summing up all of the issues from all comparable language learning products, I found that the main issue with those products is that they all lack interesting narrative content! All of those products offer language-learning functions, but they mainly focus on learning words without gameplay. The interactions in those products are simple, such as organizing words or choosing the right meaning. The main problem with those products is that they lack emotional support. Without an emotionally engaging story, the learning process can become boring, causing the learner to disengage and forget the progress they have already made. A narrative structure provides a correlation between the different levels of the game, and stages of their learning. Moreover, a lack of visual elements in those products is another serious problem. Michalowicz (2013) pointed out that people naturally remember visual cues better than words, and one trick to remember anything is to convert words to pictures. So Pictures and visualizations should massively help improve memory. My hypothesis is that by integrating a narrative story and visual
imagery into language learning games and apps, the ability to memorize and retain a new language can be greatly improved.

3.1.2 Goal

Listed are the goals the game should achieve:

1. Learn through play.

   It is a game and it is fun! Even without the language learning part, it is still a game worth playing. As a narrative story, it has interesting content, funny characters, and beautiful artwork. The player's choice and performance in the game can lead to different branches of the story and multiple endings. The learning part is well integrated in the game story and the player even won't feel he/she is learning something. But rather that, "I am just playing the game."

2. Sensory stimulation.

   Mandarin Mystery offers pictures, movements, and sounds while learning the new language. This sensory stimulation can help players memorize the new words better. A lot of time has been invested in designing the game's characters. They are beautiful and make players feel comfortable when seeing them. The characters and background pictures are in a realistic style in order to give players a real-life game experience.

3. Logical and Emotional stimulation.

   Since the game has a lot of characters and rich stories, players will get emotional
stimulation all the time. Also, players will need to think and memorize words to solve puzzles and continue the game, which gives players logical challenges. Sylwester (1994) pointed out that emotion plays an important role in learning so emotional supportive activities such as games could enhance student learning. As a result, it will be much easier to remember the abstract words and sentences under emotionally involved scenarios.

4. Explicit grammar explanations and followed practices.

Grammatical elements that players need to remember will be included in the game and be explained in an organized and simple way. Necessary practices will be included in the story telling. Understanding grammar is the foundation on mastering a new language.

5. Interesting stories help players memorize words without boredom.

Another essential part of learning a new language is practicing and repetition. Grounding the words in a narrative story, they become less abstract, so the repetition becomes a game mechanic, rather than a boring task to be repeated. What's even better is players can always replay the game anytime or check new chapter updates. Never get bored remembering words again! More interesting characters will show up along the game process.

6. Tons of sentence practices.

Helping finish the sentences in the game and gradually master all vocabularies and sentences gives players an interactive learning experience. Players can replay the
sentence sound by pressing the sound button.

7. Make language learning become a byproduct of gameplay

Mandarin Mystery is a narrative game that players can play on different platforms. Even if learning a new language is not the first goal, this game is still a game that worth playing. Learning a new language is a byproduct of fun, so why not?

3.2 Design Material

The game is designed through Unity Game Engine. It is a 2D narrative based game. The character artwork is created by Wen Yao. The background images are copyright free and polished or changed as necessary. The background music comes from a YouTube Channel called Free-Copyright music. The character voice is generated by “Baidu Yuyin,” which is an online Mandarin speech synthesis service or recorded from real speakers.

3.3 Language Learning Methods

3.3.1 Word cards collection and review

In the beginning of each chapter, Mandarin Mystery uses word cards to help players learn the new words first. Players can listen the pronunciation by clicking the card, and then they need to drag the card to the green box to collect it. The purpose for dragging the word card is to give players a sense of interaction with the game. Each word card has a related picture to help players understand the meaning of the word as well as to prompt
their memory through visual stimulation. After collecting the card, the player can review the cards by clicking the green box. Players can review the word cards as needed throughout the game to help them with conversations later in the game. Also, players can listen to the pronunciation by clicking the card in the review window. The illustration of the word card method is shown in Figure 3.1.

*Players need to drag the card to collect it.

*By clicking the green box, players can review the word. They can click the word card to listen to the pronunciation.

**Figure 3.1 Mandarin Mystery Word Card Method**
3.3.2 Answer the question or fill in the blank

After collecting the word cards, the story will begin. A character will show up and have a conversation with the player. However, some sentences might have a blank space where players need to fill in the missing word.

*Question

*Choose the right word to answer the question

Figure 3.2. Answer a question
3.3.3 Story

Players need to choose the right word to fill the sentences in order to continue the story. Both word cards and subtitles have audio. The story helps players to repeat the words, and also allows players to know how the words are used differently in real conversational contexts. Players will feel that they are playing a narrative game rather than actually leaning a new language. The purpose of the game is to give players a real conversational environment in the beginning even when players do not know the words. Players will only learn two words each chapter but they have access to real life conversations throughout the chapter so that they can get familiar with the language unconsciously.

*Indicate players to choose the word for "Goodbye".

*Choose the right word in Mandarin for "Goodbye".

Figure 3.3. Fill-in the blank
*The game has a continuous story.

*Players can make choices in the story that would lead them to different situations.

**Figure 3.4. In-game choices that can lead to different stories.**

In short, Mandarin Mystery is not the slow step-by-step learning method that is made up by words repetition, but offers a real language environment in the beginning and allows players to learn words gradually.
4. Playtest

4.1 Goals and Methods

The research uses a survey to collect user experiences and players' opinions about the two applications. The survey is created in Northeastern Qualtrics and can be finished online. The survey asks players the number of chapters they played each session, and gives them the opportunity to share their opinions about each application and which one they preferred.

4.1.1 Participants

According to Viriya and Sapsirin (2014), there is no difference in learning strategies for language learning between males and females. Therefore, the study did not intentionally choose even numbers of male and female participants. Since the game is for adult English speakers to learn Chinese (Mandarin), adult participants who can speak and understand English well and are also interested in learning Mandarin were recruited. The game survey link was sent through email to participants, and was posted on social media and forums to recruit interested participants.

4.1.2 Materials

A survey with a Likert scale and open-ended questions was used and is described in detail in Appendix A. The survey questions are designed based on the main purpose - to
measure user preference between Mandarin Mystery and Duolingo. Quantitative questions such as the number of chapters a player played in each application are asked. Players also provided qualitative feedback through open-ended questions about their preference and the effectiveness of each application.

4.1.3 Procedure

A website was created to conduct the survey. The site contained links to both Duolingo application and Mandarin Mystery game, as well as a link to the survey. Simple instructions are listed to help players. The link to the website was sent to potential play testers, and also posted on social media to gain participants.

4.2 Result Analysis

4.2.1 Quantitative questions

The result of all quantitate questions are listed in Charts below.

![Chart](chart.png)

**Figure 4.1. Quantitative feedback - How many chapters did you play?**
The figure shows more people tend to play more chapters in Mandarin Mystery than Duolingo.

![Graph showing player feedback on quitting in the middle of chapters.]

**Figure 4.2. Quantitative feedback - Did you quit in the middle?**

This figure shows one player quit in the middle while playing Duolingo. The reason the player gave for quitting was "wanted to". There are two players that left in the middle of a chapter from Mandarin Mystery. One reason reflected by the player is "work related emergency came up", which has nothing to do with the application. The other reason is the "bug". The game has a bug that cannot let the game continue.
These two figures show only one player replayed a Duolingo chapter, but there were three players replayed a Mandarin Mystery chapter. Also, there was one player replayed two chapters, and one player replayed four chapters in Mandarin Mystery. Most players did not re-play any chapters in both applications. When asked how many chapters players want to replay if they have to, most players think they would only replay once of a chapter in both applications. But Mandarin Mystery slightly gains more players who are
willing to replay more.

![Figure 4.4. Quantitative feedback - app rate](image)

This figure shows how would players rate the application if they played it in an app store. Most players rate Mandarin Mystery four stars. Duolingo has more rating on three stars and five stars compare to Mandarin Mystery.

4.2.2 Qualitative questions

The open answers are coded. And then the codes are calculated and categorized based on the numbers they showed up and the attitude position. Another researcher was asked to do the code separately. And then the code concordance between the two researchers was calculated. Inter-rater reliability: k= 0.9
Table 4.1. Players' opinions on Duolingo

<table>
<thead>
<tr>
<th>Positive Code +</th>
<th>Show up times</th>
<th>Negative Code -</th>
<th>Show up times</th>
</tr>
</thead>
<tbody>
<tr>
<td>sentence builder</td>
<td>1</td>
<td>repeat</td>
<td>1</td>
</tr>
<tr>
<td>guess game</td>
<td>1</td>
<td>boring</td>
<td>4</td>
</tr>
<tr>
<td>repeat</td>
<td>2</td>
<td>less attention grabbing</td>
<td>1</td>
</tr>
<tr>
<td>repeat in different ways</td>
<td>3</td>
<td>plain design</td>
<td>1</td>
</tr>
<tr>
<td>break down words</td>
<td>1</td>
<td>give up</td>
<td>1</td>
</tr>
<tr>
<td>heavy on learning the word</td>
<td>1</td>
<td>lack internal push</td>
<td>1</td>
</tr>
<tr>
<td>neat design, polished</td>
<td>2</td>
<td>undesirable design</td>
<td>3</td>
</tr>
<tr>
<td>difficulty scale</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>clean progress feeling</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>separate words</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>punishment for failure</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>extensive</td>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This shows that the most positive aspects of Duolingo are that it repeats words in different ways and gives players a sense of progress. The most negative feedback from players is that Duolingo is boring, and there are some annoying features such as clicking twice to continue. In sum, the word repetition and clear word learning is highly appreciated in Duolingo.
### Table 4.2. Players' opinions on Mandarin Mystery

**Mandarin Mystery**

<table>
<thead>
<tr>
<th>Positive Code</th>
<th>Show up times</th>
<th>Negative Code</th>
<th>Show up times</th>
</tr>
</thead>
<tbody>
<tr>
<td>cards</td>
<td>2</td>
<td>fast level upgrade</td>
<td>2</td>
</tr>
<tr>
<td>conversation</td>
<td>3</td>
<td>easy answer</td>
<td>1</td>
</tr>
<tr>
<td>character art</td>
<td>2</td>
<td>little word repetition</td>
<td>2</td>
</tr>
<tr>
<td>background setting</td>
<td>1</td>
<td>unclear dialogue design</td>
<td>1</td>
</tr>
<tr>
<td>drawing on the card</td>
<td>2</td>
<td>unrelated card drawing</td>
<td>1</td>
</tr>
<tr>
<td>new approach</td>
<td>1</td>
<td>plain audio</td>
<td>1</td>
</tr>
<tr>
<td>realistic sentences</td>
<td>1</td>
<td>background music</td>
<td>1</td>
</tr>
<tr>
<td>intrinsic motivation</td>
<td>1</td>
<td>unclear difficulty progress</td>
<td>2</td>
</tr>
<tr>
<td>story</td>
<td>1</td>
<td>bug</td>
<td>2</td>
</tr>
<tr>
<td>It's actually a game</td>
<td>1</td>
<td>short story</td>
<td>1</td>
</tr>
<tr>
<td>realistic accent</td>
<td>1</td>
<td>art</td>
<td>1</td>
</tr>
<tr>
<td>brevity</td>
<td>1</td>
<td>no incentive to improve</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>broken English</td>
<td>1</td>
</tr>
</tbody>
</table>

On the other hand, players like the conversations in Mandarin Mystery and they think the word cards are helpful on learning. Most players maintained interest while using it. Negative feedback for Mandarin Mystery focused primarily on the design of the interface and word learning procedure. Players feel the application is not fully developed due to some obvious mistakes, such as a bug and broken English. Also, players reported that the difficulty level is not properly increased in Mandarin Mystery. They feel it suddenly becomes very difficult after chapter four. Interestingly, different players hold opposite opinions to the same game feature. For example, two players like the character art but one player showed indifferent to the game art in general.
Suggestions for both applications from the "additional comments" section are listed below:

The learning process should be simple and not repetitive. The difficulty level should level up gradually. There should be some speaking interactions to encourage players speak out. The stories should be longer, and more practice on words is appreciated.
5. Discussion and potential further studies

Based on the research result, there are five aspects of Mandarin Mystery that can be improved in future development.

1. Increase chapter length and add more word practice.

In sum, players play more chapters in Mandarin Mystery on average. This does not necessary show that players might prefer Mandarin Mystery to Duolingo, rather, the reason might be the playtime in Mandarin Mystery is less than Duolingo. Because Duolingo uses repetition, its chapters are longer than chapters in Mandarin Mystery. Players favored the repetitive aspect of Duolingo, which indicates that Mandarin Mystery should perhaps incorporate repetition into its gameplay.

2. Fix bugs and improve user interface.

There is currently a bug in Mandarin Mystery that can interfere with game play, and some users have indicated that they believe Duolingo has a better, more polished user interface. The usability and aesthetic design of Mandarin Mystery's interface should be improved to match the clean and clear style of Duolingo. Mandarin Mystery should create an art style that can represent itself and make the user interface easy to use. There should be a section on Mandarin Mystery's website for users to report game bugs so that they can be corrected immediately once reported.

3. Create a clear learning goal in each chapter by adding more feedback.
Many players complained that they feel the difficulty level increases sharply in Mandarin Mystery. After four easy chapters, the difficulty level suddenly increased. This swift increase was intentional so that both difficult and easy chapters could be tested. However, players were unaware of this, and the survey suggests that players prefer a more gradual increase in difficulty. Also, most players gave feedback that they feel a little bit lost because the game did not give them a clear goal. Even though they know they need to learn the new words in each chapter, they feel it is not enough to test their result based on only one or two questions for each new word. There should be more questions to test the learning result to give players feedback on what they have learnt throughout the game. Moreover, some players prefer some punishment for the mistakes they have made in the game so that they can be stimulated to do better. In short, players need more feedback on their learning results.

4. Create a clear level up system. Record user progress.

Players appreciate the level up system in Duolingo, but some players do not like the fact that they cannot jump to later chapters. Mandarin Mystery should also create a clean level up system and let players know where they are. But it should not be necessary to unlock later chapters and force players to play in order. Since Mandarin Mystery is story based, the story in each chapter is interconnected. If players jumped to later chapters, it will not affect their learning because they can always go back play previous chapters. Some players do not like be forced to play chapters in order, so Mandarin Mystery can
give them this freedom. But the level of each chapter should be clear to the player so that they know which part they are learning.

5. Improve game art.

Some players complained the background music is too loud and it affects them listening the actual speech. Some player said it is unclear that which character is talking on the screen. Because many players suggested the background music is too loud, the game could benefit from a button that allows players to mute the background music. In other words, Mandarin Mystery should adjust the details of the game interface to make it more user-friendly.
6. Conclusion

In conclusion, Mandarin Mystery, as a testing game for narrative casual learning method, achieved good feedback. Players like the conversations in the game and the realistic speech. The most negative feedback is on the design of the game, such as the aforementioned bug and bad user interface. The narrative learning method is appreciated by the players. However, some players like Duolingo's repetition method because they feel repetition helps with memorizing words. Mandarin Mystery should combine the methods in Duolingo and build them in a realistic conversation environment. Through combing repetition and narrative story, Mandarin Mystery might achieve better learning result and be the new leading language learning game. In future development, Mandarin Mystery might incorporate famous works of literature to create a solid foundation for the accuracy and beauty of language. Working with experienced language teachers could also help to add well-validated learning methods to Mandarin Mystery.
REFERENCES


APPENDIX A.

Game and Survey Link:
https://yaowen16.wixsite.com/mysite

Survey Questions:
1. Please put a nickname for yourself.
"Mandarin Mystery" Questionnaire Section
2. How many chapters did you play in “Mandarin Mystery”? 
3. Did you quit in the middle in any of the chapters in "Mandarin Mystery"?
4. If you quit in the middle of the chapter, why?
5. Did you replay any chapters in "Mandarin Mystery"? How many chapters did you replay?
6. If you replay any chapters in "Mandarin Mystery", What is the average number that you replay a chapter?
7. What is your opinion about Mandarin Mystery? What is the part you like about it and what is the part you don't like?

"Duolingo" Questionnaire Section
8. How many chapters did you play in “Duolingo”?
9. Did you quit in the middle in any of the chapters in "Duolingo"?
10. If you quit in the middle of the chapter, why?
11. Did you replay any chapters in "Duolingo"? How many chapters did you replay?
12. If you replay any chapters in "Duolingo", What is the average number that you replay a chapter?
13. What is your opinion about Duolingo? What is the part you like about it and what is the part you don't like?

Other questions:
14. If you played "Mandarin Mystery" in an app store, how would you rate it?
15. If you played "Duolingo" in an app store, how would you rate it?
16. Which application do you prefer to use?
17. Additional Comments:

END. Thank you so much for taking the survey.