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Board Games:

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A Perfect Match for Reading Comprehension

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Master of Fine Arts Thesis
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Final Signatures

Board Games: A Perfect Match for Reading Comprehension is a Masters of Fine Arts thesis prepared by Christopher Frazier for Liberty University's Department of Studio and Digital Arts.

Abstract

Analog board games greatly benefit students' development and over-all well-being. Board games offer opportunities for early learning, help boost language skills, sharpen students' ability to focus, teach the value of teamwork, and soothe anxiety. Integrating board games with literacy skills allows students to assimilate information and develop into lifelong learners. Without solid literacy skills, the future is bleak for most students. To compound the problem, a trend today is to replace traditional board games as educational tool with digital alternatives. This trend has seen a downward correlation with students having significant reading deficiencies in their reading comprehension in grades three through five.

This thesis will examine how utilizing analog board games in elementary classrooms can improve reading comprehension skills in students. To better understand how analog board games an effective as an instructional tool in the classroom, research will be conducted through a series of research questions:

> 1. How has the increased use of technology in the classroom affected students' learning outcomes?
> 2. What is the difference between an analogy and a digital board game?
> 3. What are the environmental aspects that aid employing analog board games in learning process of the classroom?
> 4. What effects do board games have on the learning process in the classroom?
> 5. What are the opposing concerns about using analog board games in the classroom?

After completing this research, a literate review was conducted in addition to visual and content analyses. A visual solution will be created as an analog board game to aid in developing reading comprehension skills in elementary school students, grades three through five. The creation of the deliverable will provide the stakeholders at all levels, individual, institutional, and societal, with a concrete example of a reading comprehension game that can aid in developing literacy skills in students.

Contents

Chapter 1:
The Problem

Introduction

Research Statement

This thesis aims to demonstrate how analog board games can help develop reading comprehension skills in grades three through five when used as educational tools. Therefore, this research demonstrates how the combination of lesson content with gamification and design enables the development of a board game that engages the students. An engaged student is a student that is ready to learn. Additionally, this thesis seeks to empower educators, game developers, and educational entities to utilize analog board games in the educational process.

Objectives

Imagine living in a place where one could not read anything. Not even the text on the menu, street signs, or a label on a can at the grocery store. How would one survive from day to day not knowing how to read the simplest text? If you are reading this, you are one of the two-thirds in America, which is just a thinking activity. However, for one-third of the population of America, this is a reality. One-third of Americans cannot read, and their daily lives are a struggle (Adult, 20219). They live in a constant state of survival, depending on friends, neighbors, and the kind cashier at the grocery market to help them. Their quality of life is so far less than the literate population of America. They live with anger and resentment for not being able to read. Unfortunately, there is little hope for this one-third of Americans ever to be able to read. However, the likelihood of more Americans falling into the trap of illiteracy can be diminished and, hopefully, one day, eliminated by using board games in the educational process.

This thesis will explore the use of analog board games to increase the reading comprehension skills of students in grades three through five, ages eight to eleven. This stage of development is the characteristic age when comprehension deficiencies emerge. Furthermore, the research will examine how the educational benefits of board games can carry over to

students' social and emotional development that increases their quality of life. The study will investigate the science and methods of developing analog board games that engage students and create a desire to read.

The study will confirm its findings' credibility by analyzing industry-proven board games employed as educational tools in the classroom. Furthermore, the study will demonstrate how vital a tool board games are in students' educational and emotional development.

In order to visually demonstrate the findings brought forth in this thesis, an analog board game will be developed employing the fundamental theories and concepts brought to light by the research. The board game will contain the game board, question cards, pawns, dice, and package design. Each of these critical deliverables is an integral part of the functionality of the board game that can meet students' social, emotional, and educational needs.

Research Questions

1. Why does humankind have an internal desire to play games?
2. How does the development of literacy skills increase the quality of life in an individual?
3. How are board games being utilized in the classroom today?
4. What is the importance of reading comprehension skills?
5. What is the impact of board games on the development of reading comprehension skills?
6. What visual and functional aspects of the board game design directly affect the development of reading comprehension skills?

Observed Problem

From the beginning of time, people have played board games. It is an activity that transcends time from generation to generation. Board games have been an integral part of society; they bond people together and make life-long memories. Researchers have uncovered board games dating back to over three thousand years ago. However, since the onset of video games in the seventies and eighties, mainstream society has moved away from traditional board games. This event has caused a crippling ripple effect on the youth. Today's children harbor severe emotional and

social problems that negatively affect their educational development from overusing technology. Today's society has become increasingly obsessed with technology. Whether it is a video game, app, or surfing the net, society is completely obsessed with technology and has become blinded from the past. Society today no longer looks to the value of the analog society of the past. This frame of mind has penetrated every aspect of human life, every race, age, or gender. However, the analog society of the past has excellent value. If today's society would embrace the values of analog society and incorporate them into the digital age, the bounds would be limitless. .

A key area this can be seen in education. Primary and secondary schools today use technology extensively. One of the critical foundational analog tools is the board game. The analog board game is one of the essential tools that must be brought back into the classroom. Board games in education can impact children's emotional, social, and educational development in monumental forms. Board games are highly beneficial to children's proper development and overall well-being. They offer opportunities for early learning, help boost language skills, sharpen children's focus, teach the value of teamwork, and soothe anxiety. Furthermore, integrating board games with reading allows a child to boost comprehension and reading skills.

Knowledge Gap

Extensive research has demonstrated the usefulness of board games in improving students' social and emotional development along with helping improve their literacy skills. This factor has shown a linkage between the benefits of board games in educating students. However, the knowledge gap lies in studying specific commercial board games on the market that target reading comprehension skills for students three through five. The knowledge gap the thesis desires to address is the deficiencies in the design of educational board games that specifically address the target audience.

Chapter 2:

Research

Research

Rationale

The primary rationale for researching the benefits of board games to aid in the development of reading comprehension skills is that board games are highly beneficial to children's proper development and overall well-being. Board games offer opportunities for early learning, help boost language skills, sharpen children's focus, teach the value of teamwork, and soothe anxiety. Integrating board games with reading allows a child to learn more and become lifelong learners. However, gaps in the research show a disconnect between specific educational board games that are highly effective in developing literacy skills (Wong, 2021). Therefore, the premise of the research is to look at how specific analog board games can aid in the development of significant reading deficiencies in their reading comprehension. Analog board games greatly benefit students' development and overall well-being. Board games offer opportunities for early learning, help boost language skills, sharpen students' ability to focus, teach the value of teamwork, and soothe anxiety. (Avdiu, 2019). Integrating board games with literacy skills allows students to assimilate information and develop into lifelong learners.

Moreover, the future is bleak for most students without solid literacy skills. Likewise, there is a trend today to replace traditional board games as educational instruments with digital alternatives (Gee, 2022). This trend has caused a downward correlation with students having significant reading deficiencies in their reading comprehension in grades three through five.
This thesis will examine how utilizing analog board games in elementary classrooms can improve reading comprehension skills in students.

To better understand how analog board games are effective as an instructional tool in the classroom, research is to be conducted through a series of research questions:

1. How has the increased use of technology in the classroom affected students' learning outcomes?
2. What is the difference between an analogy and a digital board game?
3. What are the environmental aspects that aid in employing analog board games in the learning process of the classroom?
4. What effects do board games have on the learning process in the classroom?
5. What are the opposing concerns about using analog board games in the classroom?

The research aims to exemplify how analog board games can aid in developing reading comprehension skills. Furthermore, the research aims to investigate how board games physiologically affect the ability for comprehension to occur and increase. Finally, the research examines how specific design solutions increase children's comprehension and retention rates.

Stakeholders

Individual:

The primary stakeholder in the research is the students in grade three through fifth. This population will be directly affected by the study's findings because they will use the board game to help improve their reading comprehension skills. Secondly, the educators are reciprocal primary stakeholders because they will assess and analyze the content of board games to determine their use in instruction. They will then, in turn, implement board games in the lessons.

Institutional:

Organizations and corporations are vital stakeholders in this research. State and local school systems and the Department of Education, both at the state and federal levels, are critical institutional stakeholders. Furthermore, educational publishers and product developers such as Lakeshore Learning and Pearson Publishing are also key stakeholders in the finding of this study because they will use the data to develop and create instructional board games. These stakeholders can use the evidence of how and why board games are immensely valuable as a teaching tool to create games that can target specific subjects and students in the classroom.

Societal:

Large parties and international bodies such as the International Literacy Association, International Reading Association, and the World Reading Association, which are global initiatives to improve educational development by recommending and providing guidance in materials, is a stakeholder in this research. The problem with reading comprehension skills is not local. Evidence of this fact is apparent in the literature review. Reading comprehension is a developmental deficiency affecting children worldwide in every classroom. The utilization of the data collected in this study can help improve reading comprehension skills globally.

Research Methods

Visual Analysis

Visual analysis is a method of understanding art by looking at the visual elements, such as color, line, texture, and scale, to gain a sense of its form and function. It is a description and explanation of the visual structure of a piece of art. The visual analysis will benefit the creation of the board game because it will allow for pinpointing a focused approach to its development. The visual analysis will aid in directing the visual solution's aesthetic appeal to target the elementary school audience. A visual analysis will be conducted on each of the three case studies in the prior section employing the following approach:

1. Define the overall visual theme of the design of the board game?
2. Reveal the connection between the design and the intended audience for the board game?
3. Envision the student's perceived response to the board game's visual solution?
4. Determine the effectiveness of the image, color, and typogra phy employed in the game's board design, package design, and ac companying components?
5. Examine the aesthetic judgments made in the design of the board game design.
6. Pinpoint and connect relevant aesthetic choices to the identi fied purpose.

Case Study

Case study is an approach to research that employs a meticulous design examination. Furthermore, a case study is an account of research in which a thorough review is conducted during the initial phases of the design process. A case study will be essential to the project because it employs a framework to assimilate the information learned. This data will, in turn, provide essential insight into the development of the design. Three case studies will be conducted on three different board games by three different educational material development companies employing the following approach:

1. Define the originating source of the board game.
2. Determine the motivation of the board game.
3. Does the board game cover cross curricular subject areas?
4. What specific skills do the board game target?
5. Summarize the game flow of the board game.
6. Identify concerns in the game flow of the board game.
7. Specify the overall view of the concept of the board game.
8. Pinpoint and connect relevant elements to identified purpose.

Image Board

Image board is a visual presentation encompassing a design's possible use of images, textures, typography, and color themes. An image board conveys a general idea or feeling about a particular design. Hence, the image board will be employed to provide a visual connection to the findi brought to light by the literature review, visual analysis, and case studies.

Summary of the Literature Review
The Analog Board Game Today:

In addition to looking at humanity's desire for games, one must also look at humanity's desire for competition. In essence, games are competition; one cannot play a game without competition being present. Competition is the primary component of games. It is what drives the game. Therefore, discussing this topic is essential because it is woven throughout board games. An article by Alex Chediak titled *"Christians and Competition"* addresses this topic of discussion by stating that competition encourages excellence by creating a desire to do better. That competition also directs us into certain areas of work or passion. People who thrive in a sport or business devote more time to becoming more successful. When using board games to teach, it is vital to manage competition positively. The competition used in this manner can motivate, teach and strengthen all involved in the lesson, whether they win the game. One must not look negatively at this, for it has a positive purpose. Competition is often considered inappropriate because it creates jealousy and pride. However, in the context in which it is, competition is good.
A board game is the training ground for the real world. Monopoly is a fine example. In this game, one must navigate the board; while doing so, the player must make financial decisions on every move. This task carries over into actual real life, making an authentic connection. This vision dovetails into the other benefit of competition. It enhances the performance of others by helping develop a particular skill or talent. We ought to admire, respect, and imitate those who are more skilled, experienced, or accomplished. By humbly acknowledging their abilities and accomplishments, we can learn from them and, by following their example, become better stewards of our talents (Chediak).

Understanding the inner desire for games and competition highlights the effectiveness of analog board games in teaching children. Andreas Hellerstedt and Peter Mozelius outlined this in their paper they coauthored called "Game-based learning - a long history" in 2019 at the Irish Conference on Game-based Learning. They sate the use of play and

"We can approach games in a teachable spirit and ask God to show us something about himself in the gaming experience".

games in educational contexts goes way back in history, with mathematics, combinatory skills, and logic taught and trained with board games such as Chess and Mancala. Chess has Asian roots and has been played in various forms for thousands of years, and the African board game Kalaha was played in Egypt as early as the era between 1500 – 1150 B.C. The use of games in education can be seen throughout history. In 643BC, Plato wrote the Laws of games or play having a constructive role in education. In the Renaissance, Vittorino da Feltre, an essential educator of the period, re-introduced the idea that games or play played an educational role. Vittorino agreed with Plato's discussion in the Laws about using games in the teaching of mathematics and used the game of the Egyptians to reinforce his point. In the 17th century, John Amos Comenius presented a systematic theory of education, in which he viewed the game as the ideal form of learning. In the 20th century, game-based learning was introduced as a pedagogical approach at the university level in the 1970s by Jean Piaget and Lev Vygotsky (Hellerstedt, 2019).

Therefore, one must ask the question as to why board games are not in the classroom today? One can see the demise of board games in the educational setting during the 1990s. The first commercial video game was created in the 1970s and had great success in the home market. The popularity of video games rose in popularity throughout the 1980s and was introduced into the educational setting in the 1990s. Bringing video games into the classroom was the demise of the board games and their significance in the educational process. Since the onset of video games in the seventies and eighties, mainstream society has moved away from traditional board games. In a journal article by Changwon Son, Sudeep Hegde, Alec Smith, Xiaomei Wang and Farzan Sasangohar called *"Effects of COVID-19 on College Students' Mental Health in the United States: Interview Survey Study"* state today's youth harbor severe emotional and social problems that negatively affect their educational development. Children today have difficulties communicating or socializing face to face with one another. They seem only to be able to communicate via a cell phone or application. Furthermore, children today have developed a sense of narcissism, poor attention span, instant gratification, and low self-esteem that compound the problems they are having academically.

However, the development of video games should not be demonized. Video games have significance in education. Children's emotional, social, and educational development decline stems much deeper than just video games. It goes deep down to the belief systems of society as a whole. This epoch has led to a negative trend of using digital devices as babysitters, which has taken hold in the classroom. Just as it is easy for a parent or guardian to give a child a cell phone or iPad to keep them entertained, the same is happening in the classroom. Overworked and stressed teachers are using technology in the classroom to buy time so they can get work done. Unfortunately, this is not beneficial to the educational development of students because they are not being guided or taught by the teacher. Students are in school to be taught by the teacher, not the digital device. Students need one-on-one interaction with the teacher; this cannot be done any other way. This fact was proven with the COVID-19 pandemic. Students had to learn online; some successfully learned in this format. However, many were unsuccessful at online learning and fell academically and socially behind (Son, 2020).

Just as the COVID-19 pandemic affected everybody worldwide, the use of technology as a substitute for actual face-to-face learning has done the same. These social and educational problems present in America are now present in China, Europe, and worldwide. The academic world is gradually becoming smaller and smaller. There has now become a global campaign to bring back the board game in classrooms worldwide to stop this cancer (Son, 2020). Educators and researchers are rediscovering how and why board games have always been such an effective tool to educate children. There are now new advances in game design to strengthen the presence of board games in education. In a study by Alice Veldkamp, Liesbethvan de Grint, Marie-Christine P.J.Knippels, Wouter R.van Joolingen called "*Escape education: A systematic review on escape rooms in education*" in Educational Research Review, state that escape room-type board games have been employed in the classroom with remarkable results. This game style develops the child's language skills, sharpens their focus and attention span, and teaches the value of teamwork. Furthermore, escape room-designed games often integrate reading, allowing for further development of child skills.

"Children develop their cognitive, social, emotional, psycho motor and self-care skills by playing."

The integration of technology in the classroom was done with good intentions. Some of the problems that developed from implementing technology into the classroom were unseen and unimaginable at the time of its inception. Fortunately, educators see the errors in implementing technology into the classroom and making mends to correct the miscalculations. Board games are one of the primary tools used today to counter the reproductions of the miscalculations.

The Lessons of Board Games:

Understanding the inner desire for games and competition gives light to the effectiveness of analog board games to teach children. Game boards have also made great strides in children's speaking skills development. In a study, researchers look at board games to improve speaking skills and communicative language. A study conducted in Malaysia by Catherine Wong, Hui Tiing and Melor Yunus, Md. titled *Board Games in Improving Pupils' Speaking Skills: A Systematic Review* in the publication Sustainability 2021, where English is not the dominant language, the researchers looked for means of teaching conversational English. They found that games were methods to get students engaged in speaking lessons. Furthermore, utilizing games in teaching and learning alters the traditional approaches to conveying knowledge. Thus, incorporating games in learning spurs learners to be self-reliant and enriches their education in diverse areas of knowledge. This paper was played out in an ESL setting to target English language development in which they used board games. The researchers found word games to be highly effective in improving speaking skills among pupils. The study examined students' perceptions of the usefulness of board games in the educational setting.

The findings revealed that students enjoyed board games and formed a relaxing atmosphere that encouraged them to speak without the fear of making mistakes. This discovery points out that the essence of board games enables fun learning and motivates students to speak. This fact contrasts with other speaking activities that curb students from learning according to standards and everyday habits. The interviews conducted with the students revealed that board games enhanced their learning community development. The students said they had more social inter-

"The key concept is the balance of skill and challenge."

actions with their classmates through board games. Furthermore, the research found that the students could perceive different viewpoints that depend on the learning experience through peer interactions. The study undeniably proved that games help lower pupils' anxieties and create contexts in which pupils can improve speaking competence in pronunciation, fluency, and grammar (Wong, 2021).

In a study by Ana Juhasz, titled *"Primary school teachers' attitude to board-games and their board-game playing practice"* published in Acta Didtica Napocensia in 2021, looked how contemporary literature studies show constant changes in the world of learning and teaching, and over the years, game-based learning has been considered one of the most effective ways to learn new material. Research reiterates that games can secretly merge complex lesson content with prospects to practice various skills in a low-risk, engaging environment. Students benefit from experiencing an interactive classroom where they learn the material rather than memorization. Game-based learning allows students to simultaneously build their problem-solving skills while having fun throughout the process where an instructional game is well designed. The study confirmed this when the researchers looked at twenty-four teachers from six different elementary schools in Austria. The research was conducted over two months, including the researcher's observations and class participation. According to the study's findings, it was found that game-based learning in Austrian elementary schools is a common teaching practice because it is fun and productive for children. Game-Based learning means including knowledge matter of subject into games. Teachers utilized competitive games, games for developing logical thinking, video games, writing and reading development, communication development, card games, Lego games, and problem-solving games. During these games, pupils do not feel like they are learning.

Furthermore, the understanding acquired through games was retained longer than knowledge gained in other forms. This technique is successful because these educational games trick students into learning while engaging with the material. The study found this true across the curriculum in all classroom activities in different subjects (Juhasz, 2021).

"Games can enhance the social skills of students as well as improve their skills in understanding and problem solving"

The collective consensus is that game-based teaching is highly beneficial to children. Students can simultaneously build their problem-solving skills while having fun throughout the process where an instructional game is well designed. Dr. Alvin Rosenfeld, a child psychiatrist and author of the article *"The Benefits of Board Games"* published in Scholastic Parent & Child in 2022, and works with mental development daily, has shed abundant light on this subject. He states that children desire to spend time with their parents simply for fun. Children have an innate desire to bond with their parents and teacher; board games are an excellent way to form this bond. Board games directly affect children's social well-being.

Moreover, board games teach critical social skills, including communicating verbally, sharing, waiting, taking turns, and enjoying interacting with others. For example, when a child's game piece falls, they feel sad. When their game piece moves to the next level, they are proud. This point helps to provide a balance of coping skills and brings to light the benefits of board games and their positive benefits on the development of children (Rosenfeld, 2022).

Statistical evidence of the veracity of the premise for using board games to address social development can be seen in a study conducted to explore the effect of the Educational Board Games Training Program (EBGTP) on the social skill development of the fourth graders was examined by Bengü Türkoğlu, author of the study *"The Effect of Educational Board Games Training Programme on the Social Skill Development of the Fourth Graders"*, published in Elementary Education Online in 2019. EBGTP is a training program based on educational board games that aim to improve the social skills of the children used in schools in Turkey. A pretest/post-test model with a control group was used for the research since it is an accurate experimental model. The research included 80 children (40 experimental subjects, 40 control subjects). The EBGTP was used regularly and controlled for an hour a day, two days a week, for ten weeks, corresponding to 20 hours. In conclusion, the study witnessed a remarkably favorable impact on children's social skill development. The study concluded by looking at the difference in the scores of the EBGTP

"Playing analog games with a group of students, friends, parents, or siblings is an excellent way to spend an enjoyable time together."

in the pretest and post-test that the educational board games positively affect children's social skill development.

This study in the research of the project is that this study provides a solid statistical study on the effectiveness of using GBL to affect children's behavior in a school setting. The information in the study is highly viable since it provides the pretest/post-test model with a control group and experimental model data. These components support the basis for the thesis used to reveal the difference between the social skill development levels between the children participating in the EBGTP and those not participating in it. Furthermore, the statistical data from the study further strengthens the premise by providing factual evidence instead of other methods used in other studies (Türkoğlu, 2019).

Socializing is a process of making an individual a part of the community by conveying a system of social values and ideals, preparing them for the adult world. The study understood that social skills help individuals initiate, maintain, and conclude positive communication with other individuals. Having good social skills will, in turn, facilitate social acceptance by ensuring impartialness, effective communication, and inclusion. The assumption is that one will perform a productive function in the community. Teachers' overall attitude to board games and their board-game playing habits is positive due to their versatility. Educators who use board games in the classroom during play and instructional time have seen scintillant gains in academic and social skill development. In a study conducted with seventy-five primary school teachers, 57% of the teachers who work in rural schools and 43% in urban schools who taught in Romania looked at the attitudinal veracity of the teacher's perception of board games used in the classroom setting. The study utilized a questionnaire separated into sections concerning various aspects of board games. The teachers in the study used games Brain Box and Dixit to strengthen the study's validity. The results of the questionnaire concluded that teachers valued using games in the classroom because they are fun, teach logical thinking, make students creative, help them relax, are team builders, motivate students to learn, get used to speed, develop attention, teach strategies, and are childhood favorites. A common theme that resonated

"A growing body of research proves that properly designed team-based board games not only inspire learning, they encourage communication, collaboration and risk taking."

throughout the paper is that board-game pedagogy is a pedagogical method that supports the natural development of a person's playfulness. Teaching with board games positively affects the child's personality and spawns more growth than conventional teaching materials. Furthermore, board games are the most appropriate means to promote the development of a personality, community, and social integration (Juhasz, 2021). Using board games to develop literacy skills in children while playing board games has been highly successful, especially in the development of students' speaking and listening, which in turn supports reading comprehension skills. In a study by Jessica Gallo and Sara Kersten-Parrish, titled "I'm Going to Go on an Adventure": Speaking and Listening in Board Game Play" published in Voices from the Middle in 2021 revealed this actuality is because while students are playing board games, they are using their speaking and listening skills within the context of a game. Research on this theory was conducted on a group of middle school students to understand better how students use speaking and listening skills within the context of playing a game. The researchers wanted to see students engaged in an authentic conversation to assess and help develop teaching methods to improve speaking and listening skills. The board games Above and Below were chosen as the tool to accomplish the task. This game was chosen because it features a vital narrative component as each player takes on the role of a villager working on expanding their town. The players must construct new buildings, harvest goods, and recruit other players to help. Above and Below was chosen by the authors because they believe it is effective in its capacity to immerse players in a story. During the game flow, the students have to engage in conversation and collaborate; this allows the players to see the effects of their interaction. This study found that using informal opportunities in which students are allowed to argue, play, and collaborate can produce fruitful authentic conversations. It was previously thought that lessons had to be tightly structured to show students the skills they need to be successful speakers and listeners. The inverse was found to be true.

Communicating and listening is a vital abilities lacking in most children. This idea is why providing real-life scenarios that allow students to engage and use these skills is crucial. Middle school classrooms are

"We can see the potential for bringing play into the classroom with games as the tools with which to facilitate these learning environments."

natural for students to participate in speaking and listening activities daily. This study demonstrates the effectiveness of board games either in times of play or in a structured setting. In either setting, students use many literacy skills employing reading comprehension, imaginative story building, strategy development, and oral language skills. Typical classroom speaking and listening lessons do not always result in the authentic, natural conversations that occur (Gallo, 2021). The game's design is a foundational building block for the effectiveness of any game. There is an immense amount of research on this topic because it provides vital information on the design principles that appeal to children. The design elements in educational games enhance learning for children. A study by Ondřej Javora,, Tereza Hannemann, Tereza Stárková, Kristina Volná and Cyril Brom, titled "Children like it more but don't learn more: *Effects of esthetic visual design in educational games"* in the British Journal of Educational Technology in 2019 examined the effects of a learning game's visual design on perceived attractiveness and learning outcomes. Two visual designs for the game were chosen for the study—one with supposedly high esthetic value and another with a low esthetic value. Participants in the study were children between nine and eleven years old and randomly divided into two groups. Each group interacted with an assigned game version for 20 minutes and then evaluated its visual attractiveness without knowing the other version. Afterward, the students evaluated the second one using the same evaluation tool. The students were then allowed to choose a version to play independently. During this period, the behaviors were monitored to see which one would be predominately chosen; the version with high esthetic was the most favored choice. 62% preferred the high esthetic version of the game. The report discusses these findings concerning the cognitive load theory and cognitive-affective theory of learning from media. Cognitive Load Theory (CLT) is an instructional design theory examining how children process information. During learning, information must be held in the working memory until it has been processed sufficiently to pass into the long-term memory. The cognitive-affective processing system (CAPS) is a theory of personality that emphasizes the importance of situational variables and the cognitive qualities of the individual in the development of personality. The study demonstrates that it is beneficial to invest resources into developing ap-

"Based on cognitive affective theory of learning with media and cognitive load theory, visual design's influence on learning outcomes is mediated by (at least) two hidden variables: cognitive engagement and cognitive load."

pealing graphics in learning games for children. Appealing graphics can increase motivation to interact with the educational game.

Board games are highly effective in the educational development of students because of their adaptability. Researchers LauraBenton, Manolis Mavrikis, Asimina Vasalou, Nelly Joye, Emma Sumner, Elisabeth Herbert, Andrea Revesz, Antonios Symvonis, and Chrysanthi Raftopoulou discusses this fact in their paper titled *"Designing for "challenge"* in a large-scale adaptive literacy game for primary school children" published in British Journal of Educational Technology in 2021 noted adaptive learning games can have a positive impact on children's learning outcomes. However, the most essential factor in this arena of game board design is to follow the design principles that appeal to children, especially at the primary level. A study was conducted looking at designing a literacy game for three linguistically and cognitively diverse learner groups—novice readers, children with dyslexia, and children learning English as a foreign language. The author points out that designing an adaptive learning game is a complex process with many different game components. The game must be designed for an optimal challenge, which is crucial for maintaining player engagement. Personalizing learning by tailoring the game to an individual child's level or particular learning need targets each child's different cognitive ability levels. To properly adjust the game to meet individual needs, one must employ the cognitive load and cognitive-affective learning theory. This action will help maintain the proper flow of the game.

"An attention to play in classroom curriculum recognizes the play that students engage in through their out-of-school literacy practices."

Playful practices utilizing board games build on a growing area of literacy research that proposes play possibilities to alter conventional curriculum and instruction. A study observed by, Grace MyHyun Kim and Lindy Johnson, *"Playful Practices: Reimagining Literacy Teacher Education through Game-Based Curriculum Design"* published in Research in the Teaching of English in 2022, looked at two public university secondary English education courses. The students' behaviors were traced to see how the students responded to playful practices in the classroom. Data collection occurred across one academic year and included field and observation notes, written reflections, interview data, and artifacts. Findings

show the potential for game-based curriculum design in literacy teacher education. The finding showed that it encouraged collaboration, connected coursework to an authentic classroom setting, supported creative language production, and created an atmosphere that promoted learning. The areas in which the study found implications manifested in the ways to organize classroom structures and literacy learning experiences that value an interplay of youth cultures and classroom curricula. This point brings to the light beneficial aspect that can support the development of games by educators and developers. Many problems surface in educational games because the developer does not understand the user. This idea is essential because the game design must target children. Eliza Avdiu, researcher and author of *"Game-Based Learning Practices in Austrian Elementary Schools"* published in Educational Process: International Journal, in 2022 states how contemporary primary schooling supports game-based learning goals that provide opportunities for developing reading skills, reinforcing writing skills, and helping children become self-motivated and self-directed. Games make learning concepts more palatable for students and provide learners with a platform for their creative thoughts to bounce around. As pedagogical devices, games are considered extremely useful, as they can enliven teaching topics and are seen as especially effective for dealing with problem-solving and learning key concepts Research conducted in the study looking at the education system in Kosovo saw dramatic increases in academic achievement with the implementation of game based teaching. At the time of study, Kosovo was facing contemporary reform changes in education. They were moving from the inherited traditional system to a children's activity-oriented form of teaching centered around game-based learning. The study was comprised of twenty-four teachers from eight different elementary schools to gain a true picture of the affective game based teaching had on assimilating on knowledge in the classroom. Data collected was based on the descriptive analysis of the teachers' opinions, as well as observation of their teaching by the researchers. The results showed that the importance of integrating game-based learning in elementary education lies in changing the position of the pupil in the school. There must be a sense of joy while using the games in the classroom. This sense of joy enables free expression; thus, the student can learn without fear.

"The balance of challenge and ability is an important prerequisite for achieving flow state."

However, the study's results also presents a challenging picture and brings to light some of the problems that may occur when attempting such a drastic change in the educational delivery model. Many issue centered around inadequate teacher training, lack of textbooks and teaching aids, inadequate school facilities, and large numbers of pupils in the classroom.

Board Game Design:

The validity of the usefulness of board games in the classroom leads to the design of the games. Analyzing the similarities between digital and analog games. A technique used in many classroom settings involves the students creating their games, this concept was brought to light by the research conducted by Elisabeth Gee and Earl Aguilera in 2021 and published in a paper titled *"Bridging the Analog-Digital divide: Critical Literacies and Procedural Design in Young People's Game-Making Practices"*, published in Pedagogies: An International Journal. This method has proven to be highly beneficial to the overall development of students. The game-making technique employs procedural literacy and critical literacy practices when creating games. Procedural literacy is associated with understanding the logic of computer programming. Procedural plays a role in many everyday life experiences, from policies that guide education in schools to rule systems that govern legal and judicial processes. Critical literacy refers to the use of print and other media communication technologies to analyze, critique, and transform the social norms, rule systems, and practices governing the social fields of everyday life. The implementation of a design process is needed to shape meaningful experiences through acts of play. A case study examined a group of boys from thirteen to seventeen participating in a library-based board game-making workshop. The students were placed in teams to develop concepts for a game. Their first task was to create their game's goals and rules, which led to prototype game materials. Each team was provided dice, notecards, and plastic tokens of varied shapes, markers, and paper. The participants engaged in critical literacy practices when asked to address a social issue through game design. The report demonstrates how participants engaged with ideological dimensions of procedural literacy through design-centered discourse can create viable games. Furthermore, the findings sug-

"Play is central even to games or products whose primary function is to teach, rather than to entertain."

gest that viewing game-making through the lens of procedurally can be a productive way to explore critical literacy practices concerning contemporary social issues.

When creating a game, one must place the user front and center. Mark Schlichting, author of Understanding Kids, Play, and Interactive Design: How to Create Games Children Love, discusses the point of view extensively. This book provides guides for creating games that children would play and enjoy by employing a framework to follow in creating games for children. The first point is that play is what children do and how they learn. It is imperative because it is a fundamental biological and psychological function that supports our health and well-being in countless ways each day, lowering our stress, helping us learn new skills, or facilitating cordial relationships. In addition to social skills, children develop motor skills, spatial sense, creativity, organizational and classification skills, observational skills, abstract thinking, and hand-eye coordination through play. Designs need to teach and be enjoyable. The psychologist Peter Gray states that two connections between play and learning are helpful for interactive designers to consider: First, that curiosity is complementary to play, motivating exploration and learning; second, that an exploration process often precedes play—a child will explore a new item or device, then, gaining confidence, will begin to play with it. The key takeaway for a designer is that a toy or game must offer opportunities for exploration and rewards for curiosity. These qualities will encourage play. Once these two areas have been determined, the creation of the actual game can begin.

A study similar to the book by Joyce Schnieders and Kathy Schuh. *"Parent-child Interactions in Numeracy Activities: Parental Scaffolding, Mathematical Talk, and Game Format"* published in Early Childhood Research Quarterly in 2022 investigates the learning achievement of Chinese reading comprehension and its effects on students' anxiety, flow, and acceptance of this board game. The results confirm that educational board games can improve learners' achievement, motivation, concentration, and interpersonal interaction. The researchers developed the board game "*Story of Court*" with a cognitive design to improve Chinese reading

"Designing serious games is a difficult task, and knowledge of game design solely is not sufficient to develop an effective serious game."

mastery. The design of the game is centered around a sorting component. The game requires the student to read and understand the context of the cards and then sort the card into the proper classification. Once this is done, the student formulates the stories to meet the task objective and win the game. The game has a real-time evaluation feature; this permits the student to get answers to complex vocabulary and give correct responses. The study looked at thirty-eight high school students. The research started with a pretest and concluded with a post-test to determine the game's success. Learners' flow and acceptance were also measured before and after the game. The results showed that the educational board game *"Story of Court"* can help the learning of classical Chinese and is a valuable tool to improve reading comprehension. The flow theory is a state of high concentration. People in a flow state will have four characteristics: accomplishing tasks smoothly, sensing the time goes by swiftly, being unknowing of other events going on around them, and deeming themselves to be comfortable and content. A state of flow can help enhance task execution and learning results. When students are in a state of flow, they have a high level of participation, interaction, and feedback. This matter is a critical component when designing a board game.

"The game is a resource that appears to arouse curiosity, contributes to motivation, and generates greater learning interest."

A considerable amount of detail and forethought must be done to create a serious game which discussed by Bill Kapralos in his paper "Learning about serious game design and development at the K-12 level" published in The International Journal of Information and Learning Technology in 2021. A serious game is a term used in the game development arena to note games whose primary purpose is education and training instead of entertainment. The use of serious games in various educational and training applications is becoming widespread. This circumstance is thought to have resulted from the current generation of learners spending significant time playing video games. Considering this observation, the nature of how a child learns is an important finding. Designing serious games is complex, and knowledge of game design is insufficient to develop an effective serious game. One must have a strong foundation in the subject matter being addressed to design a game that focuses on specific knowledge or skills. The study looking at these delineating factors observed that many serious games had been dismissed for their poor design and lack of instructional design. They often prove inferior to the traditional learning method intended to replace the serious game. Therefore, to

create a serious or effective game, the game's design must have a strong foundation upon which to build. The foundation must be comprised of subject area knowledge and insight into what appeals to the intended age group.

To test the affectedness of an analog board game, one must compare it to its digital counterpart. Such a study was conducted to investigate differences in the behavior of the same educational game but in digital and analog formats. The study examined thirty-nine parents' and students' behavioral actions when playing certain games. The study looked at literacy and mathematical skills using the actual game and placement in the game. The study noted that longitudinal studies have found that children's early numerical skills strongly predict their later mathematical performance in school.

Furthermore, critical numerical skills that start to develop before formal schooling include counting, mapping skill knowledge, estimation, measuring, and number patterns. This factor often has to involve some sore of scaffolding. Scaffolding consists of an adult controlling the elements of a task that are too hard for the child to finish alone. The previous instructional factors were adhered explicitly to in the study because they were the primary skill sets that needed to be addressed. The results concluded that the analog board game had higher learning rates and knowledge retention. The analog game has more engagement in counting, spatial words, and estimations compared to the electronic format. This study provides strong evidence of the effectiveness of board games as vital educational tools to be utilized in the classroom.

Board games have long been highly successful in teaching children with disabilities (Kapralos, 2021). In a study, Andressa Tripiana-Barbosa and Silvia Regina de Souza demonstrate titled "*A Board Game for the Teaching, Reading, and Writing to Intellectually Disabled People*" published in Behavior Analysis: Research and Practice. American Psychological Association in 2015 discusses how the use of board games can aid in teaching children with disabilities. The study shows that board games can be a vital tool in the classroom. The research looked at the effect analog board

games have on teaching six intellectually disabled individuals reading and writing. The study began with a pretest to gain a baseline to work from and determine the outcomes' success. The pretest evaluated students' ability to use printed and spoken words, picture identification, and syllables. In the post-test to determine the vitality of analog games, all participants showed an increase in the percentage of teaching words read correctly. There was high variability in the percentage of correctly read words regarding generalization. Regarding the results of the dictation test, three of the six participants showed an increase in the percentage of teaching and generalization words correctly written. Overall, there was a significant increase in each student's reading and writing abilities. The results of this study demonstrate the effectiveness of analog board games in the ability teaches special needs children. The results further strengthen the premise of the goal of the thesis to unveil the significance of analog board games in the classroom (Tripiana-Barbosa, 2015).

Additionally, the research points out that the board games do not have to be commercially bought, many teachers use their knowledge and experience to develop their own games. It was pointed out that homemade games were more effective in some instances because the teacher could target a particular area of need (Juhasz, 2021).

The following are key components that make a successful game for children:
- Bright colors grab attention. Bright colors capture a child's attention.
- Create engaging visuals that prompt inquiry. This element is about creating a "What is that?" effect. Design something that makes kids curious enough to want to look further and interact with learning more (Schlichting, 2016).
- Tap into instinctual play patterns. Play patterns are a child's natural approach to experimenting with new experiences and learning.
- When a designer taps into a play pattern, kids instinctively figure out what to do (Schlichting, 2016).

Conclusion:

The overall consensus of this review is that analog board games are highly desired and effective in the classroom. The literature presented supports the theory as an essential tool for instructing learners. Board games are advantageous to their appropriate development and general well-being of students. Furthermore, the evidence supports the idea that board games offer opportunities for early learning, help boost language skills, sharpen children's focus, and teach the value of teamwork and quiet anxiety. Integrating board games with reading allows a child to learn better and become lifelong learners. In this literary review, the research examined demonstrates how board games improve reading skills and provide specific suggestions for the more acceptable use of board games to assist learners in improving their reading skills.

Summary of Findings
Case Study #1
Project Name

"I'm Going to Go on an Adventure: Speaking and Listening in Board Game Play".

"I'm Going to Go on an Adventure: Speaking and Listening in Board Game Play" by Jessica Gallo, an assistant professor of English education at the University of Nevada, Reno, and Sara Kersten-Parrish, an assistant professor of literacy education at John Carroll University performed a researched base study on the board game *Above and Below*. The board game *Above and Below* was designed by Ryan Laukat and published by Red Raven Games. The game has received numerous awards by academic entities for its educational effectiveness in aiding in the development of literacy skills since its conception. *Above and Below* melds town-building and storytelling together where the players vie to construct the most sufficient village above and below ground. In the game, the players conscript villagers with unique capabilities and have them perform jobs such as surveying a field, exploring a cave, harvesting resources, or constructing houses. At the end of the game, the player with the most well-developed village wins. During this process, the players must use critical thinking, communication, and literary skills to be successful.

Above and Below has attracted attention in the academic world since its conception in 2015. The game has earned a reputation for helping increase students' literacy skills via role-playing, verbal communication, and comprehension. The game accomplished this task by immersing players in a storyline style of game playing. Hence, the researchers, Gallo and Kersten-Parrish, aimed to investigate the truthfulness of the assertions. Furthermore, the researcher desired to understand how students use speaking and listening skills within the context of a game aided the development of literacy skills. The study group examined middle school students playing the game *Above and Below* in a classroom setting. The researchers examined how students engaged in an authentic conversation to assess and help develop teaching methods to improve speaking and listening skills. A significant feature of the design of *Above and Below* is

that it creates a vital narrative component as each player takes on the role of a villager working on expanding their town.

During the game's flow, the students engage in conversation and collaboration, allowing the players to see the effects of their interaction. However, this uncontrolled behavior brought about the unpredictability of the conversational data, which caused difficulty obtaining concrete data references. Nevertheless, in hindsight, this mitigating factor resulted in the findings from this study to be revised from prior preconceptions. The initial thinking was about how students come to understand conversation and discussion skills. Before conducting the study, it was believed that speaking and listening activities had to be tightly structured to show students the skills they need to be successful speakers and listeners. However, through this study, it is understood that informal opportunities for students to argue, play, and collaborate can produce fruitful and strong meaning-making through authentic conversations.

Furthermore, the findings demonstrate that using board games in classrooms can provide exciting narrative environments for authentically engaging in speaking and listening, thus increasing literacy skills. The research also noted that speaking and listening is an interpretive opportunity to foster outside structured and rigid speaking tasks.
The conclusion highlights the potential for bringing play into the classroom with games as the tools to enhance the learning environment. The primary goal of the thesis project is to design a board game to increase comprehension skills. This study examines developing comprehension skills utilizing a relaxed game flow of *Above and Below* Furthermore, the case study discusses how these games of conversation and collaboration lead to developing comprehension skills. Allowing the students to argue, play, and collaborate can produce a fruitful authentic conversation. Hence, these findings are vital to the conception of the proposed thesis project because it provides a working model to look upon for the final deliverable. The theorized game needs to be designed around an atmosphere of fun while still engaging in aiding in the development of literacy skills. The concept will be a gamification-styled game based on literacy skills. Players must to be engaged in the flow of the game and unambiguous to the notion that they are developing their literacy skills.

Case Study #2
Project Name
"The Effect of Educational Board Games Training Programme on the Social Skill Development of the Fourth Graders."

In the case study titled "The Effect of Educational Board Games Training Programme on the Social Skill Development of the Fourth Graders" by Türkoğlu, Bengü, who is a faculty member in the primary education department at Necmettin Erbakan University in Turkey, conducted a study based on the board game *Dixit* and its effect on developing social and literacy skills in students. *Dixit* is a French card game using a deck of cards illustrated with dreamlike images where players try to select the card that matches the title suggested by the "storyteller." The study used the board game *Dixit* in conjunction with the Educational Board Games Training Program (EBGTP). The EBGTP is an educational program used to improve the social and literacy skills of the students in schools in Turkey.

 The board game *Dixit* is a French card game created by Jean-Louis Roubira and illustrated by Marie Cardouat. Libellud published the board game in 2008, and it has won many educational awards and accolades for its focus on improving literacy skills in students. The basic progression of the game begins with each player being given six random cards. Players then take turns being the storyteller, who looks at the six images in their hand, makes up a sentence or phrase that might describe it, and says it aloud. The storyteller aims to describe their card ambiguously enough that not all other players will recognize the card from the description. The storyteller then shuffles the card described with their other cards and places them face up on the table. The players then try to guess which picture the storyteller was describing. The storyteller scores points if some, but not all, players guess correctly. The other players score points individually for correctly guessing the storyteller's card. This process is repeated until the last card is drawn, then the player with the most points is the winner. The game ends when the last card has been drawn.

 The study was initiated by conducting a pretest/post-test model with a

control group was used for the research since it is an accurate experimental model. The research included 80 children (40 experimental subjects, 40 control subjects). The EBGTP was used regularly and controlled for an hour a day, two days a week, for ten weeks, corresponding to 20 hours. In conclusion, development contributed to the use of the board game *Dixit*. The study concluded by looking at the difference in the scores of the EBGTP in the pretest and post-test that the educational board game positively affected children's social and literacy skill development.

The study stressed the belief that the development of strong social and literacy skills is essential in making an active individual in the community. By having these core skills, the student is prepared for the adult world. The study understood that these skills help students initiate, maintain, and conclude positive communication with other individuals. Having strong core skills will, in turn, facilitate social acceptance by ensuring impartialness, effective communication, and inclusion in the community. Gaps in knowledge presented in the research surface in the study group. The study group did not look at the special needs population. Further research on the effects of the Educational Board Games Training Program on other population groups would benefit the program's affectedness.

However, the results of this study demonstrate the effectiveness of analog board games in the ability teaches special needs children. The results further strengthen the premise of the goal of the thesis to unveil the significance of analog board games in the classroom. The findings in this paper align with the premise of the thesis project. The study's investigation and information unveiled will provide critical insight into the design of the board game.

Case Study #3
Project Name
"A Board Game for the Teaching, Reading, and Writing to Intellectually Disabled People"

The case study titled "A Board Game for the Teaching, Reading, and Writing to Intellectually Disabled People" by Tripiana-Barbosa, Andressa, and Silvia Regina de Souza investigates the use of analog board games as a tool to increase literacy skills in special needs children. Each of the study's authors is a professor and maintains a terminal degree in their specialty, and the American Psychological Association published the findings. Specifically, the authors looked at the effect analog board games have on teaching reading and writing to six intellectually disabled individuals using the board game *AbraKedabra: Constructing Worlds*. The board game *AbraKedabra* is a sight word development game utilized in many primary and special needs classrooms. The game explicitly targets sight word recognition and sentence development which are the basis for reading comprehension. The board game, *AbraKedabra*, includes forty-six squares as follows: sixteen syllable family squares, six bonus squares, ten-figure squares, four task squares, one library square, two "does not know how to spell" squares, three "does not know how to read" squares, two "does not have to write" squares, one school bus square, and one start square. The forty-six squares of the board game *AbraKedabra* teach the relationships between the printed word and a group of syllables, the printed word, and the figure, the figure and a group of syllables, the printed word and the word written by the participant, the spoken word and the figure, the printed word and the word spoken by the participant, and the printed word and oral spelling. In addition to these relationships, the game makes it possible to relate the figure to the spoken word using printed syllables. The game begins by giving three printed words to each player, who will read them aloud. Next, the student will use their printed word cards and the squares on the board game to construct a word and match them with the corresponding figure on the board. Other words will be constructed and paired up with the figures during the game. The game ends when the printed words are constructed or matched with the corresponding figures. The winner is the player with the greatest number of words constructed

and matched with the figures.

The study was initiated with a pretest to gain a baseline to work from and determine the outcomes' success. The pretest evaluated students' ability to use printed and spoken words, picture identification, and syllables. In the post-test to determine the game *AbraKedabra*, it was shown that there was an increase in the percentage of teaching words read correctly by all participants. The study's results revealed high variability in the percentage of correctly read words regarding generalization. Regarding the results of the dictation test, three of the six participants showed an increase in the percentage of teaching and generalization words correctly written. Overall, the case study directly sights a correlation between the use of the board game *AbraKedabra* and a significant increase in each student's reading and writing abilities.

The findings in this paper align with the premise of the thesis project. The outcome demonstrates that significant improvements are possible by employing the board game *AbraKedabra* to develop literacy skills in special needs students. Furthermore, the study demonstrates the adaptability of board games when challenges arise. For example, in this study, some students could not read; therefore, the teacher read the word to the student, who repeated the word. This action demonstrates flexibility and the ability to tailor the game's construct to help develop literacy skills in special needs students. Overall, this case study looks at the board game *AbraKedabra* and its ability to aid in developing literacy skills. This fact is a critical point for the design of an analog game for the thesis project. The results of this study demonstrate the effectiveness of analog board games in the ability teaches special needs children. The results further strengthen the premise of the goal of the thesis to unveil the significance of analog board games in the classroom.

Visual Analysis #1
Project Name
Trekking The National Parks

Trekking The National Parks is a highly rated board game, first released in 2014. The game is one of the best-selling educational board games and an award-winning game that received the Parent's Choice Award from Mensa. Trekking The National Parks was created by Charlie Blink, a national parks fanatic with his wife (Fig. 1.1). Together as a couple, the two traveled to every national park in the United States to gain background knowledge to make the game. The game appeals to a wide range of people and is said to be one of the best board games for children ages 8 to 12. The game's basic premise is for the players to traverse the game board and explore the different state parks in the United States. While the players are playing the game, they move around the board, collecting cards and stones for each national park. The players can trade them to claim that park when they have enough matching cards. The game is over for whoever gets six park cards first, or all the park stones are gone.

The visual solution applied to this game is incredibly appealing. The illustrations and graphics are visually attractive to the eye. The illustrations execute presences of detail and personality, with highly detailed graphics throughout the game's design, from the board to the cards to the package design. This attention to detail creates a visually appealing design to the eye that possesses both form and function. The details in the graphics and illustrations further enrich the design by the color palette chosen for the game. The color palette has strong tonal qualities that exemplify the detail in the illustrations, especially in the package design. The combination of details in the illustrations and graphics with the color palette gives the design of the game a powerful balance. The solid visual presence is brought together in the overall shape and form of each part of the game. The overall design of the game enables the game to have a broad market audience and presence. Hence, the board game's topic, the United States national parks, appeals to the science enthusiast and history buff. The game celebrates the vast beauty of the national parks and educates the individual differences in each park. This aspect of the game further solidifies
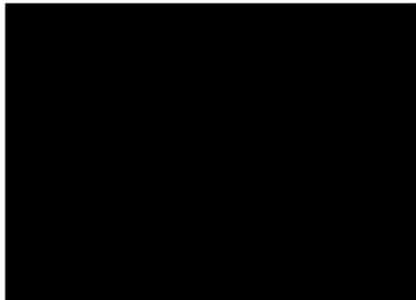
the strong presence in which the game has in the classroom.

The game has creative pawns and player pieces which points to a high understanding and presence of semiotics and iconography from the design point of view. This attribute is fully present in the specialized game pawns and pieces. The pawns are in an abstract tent, symbolizing camping and exploring the national parks. The specialized pawns represent each player and traverse across the board as the game progresses. Exceptional attention to the development of creating a unique learning experience is mainly present in the design of the player pieces or pawns (Fig. 1.2). This element in the design aspect is a crucial element desired for the proposed game because the pawn represents the individual nature of the player. The player's pawn says a lot about the individual, whether a shape, color, or creature.

Furthermore, the comprehension questions are another critical element in the functional qualities of the overall design. Trekking The National Parks have highly quality card designs that are equally visually appealing. The font choice and typographical usage allow for strong readability, which in turn helps strengthen literacy skills. Hence, Trekking The National Parks was selected for its prominence and established market presence, especially as a verified champion in the classroom (Fig. 1.3). This game will furnish an exceptional framework and approach to construct the proposed game for the thesis project. The proposed game will first be able to draw upon the game flow. The smooth and uncumbersome flow incorporated into the game is an example of the attention to functional design present throughout the game's design.

This visual analysis of Trekking The National Parks brings to light vital elements necessary to create a board game that is successful in its goal of helping develop reading comprehension skills in the student in grades three through five. This game has excellent elements in its design that will aid in the execution of the desired task.
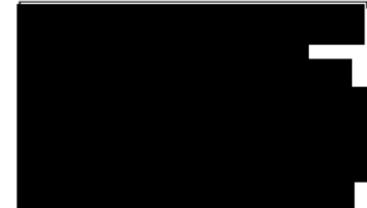
Visaual Analysis #2
Project Name
Tall Tales: The Game of Infinite Storytelling

Tall Tales: The Game of Infinite Storytelling is a reading comprehension board game for children four and up. An award-winning game, including the prestigious Dr. Toy Award 2016, the Scholastic Parent & Child Gold Star Toy Award 2016, and PAL Award. There are several ways to play this storytelling game. The game was published by SCS Direct Inc., founded in 1998. The company started as a niche marketing company focused on a single category. After over two decades, SCS Direct has evolved into a robust consumer products powerhouse that develops products across the toy, baby, housewares, home improvement, and outdoor living markets. *Tall Tales: The Game of Infinite Storytelling* is a designed, developed, and published SCS Direct and brings back the classic magic of imagination in a new and exciting family game (Fig. 2.1). This creative, non-competitive storytelling game is for people of all ages.

The game concept is unique and stands alone from the competition by allowing up to five different gameplay methods. The game includes fifty detailed pieces, twenty-four full-color story cards, and a story bag to store game pieces. The Basic Tales method of playing the game is for one player to reach into the story bag and draws eight-story pieces one at a time. The player then begins telling a tall tale using one of the pieces drawn until all the pieces are included in the story. The story can be as wacky or fun as one's imagination will allow. When the story is over, all the pieces go back into the story bag, and the next player draws to start their tall tale.

Another method of playing the game is called World Tales. The game flow of this method follows the Basic Tales directions. However, after drawing eight-story pieces, the player chooses one story place card and uses the card as an environment for their tall tale. As one tells their story, they place their story pieces on the story place card as used. A similar method of playing is called Taller Tales. In this method, a player chooses a number nine to fifty and announces it to the other players. The game progresses like the Basic Tales method; however, the story continues until
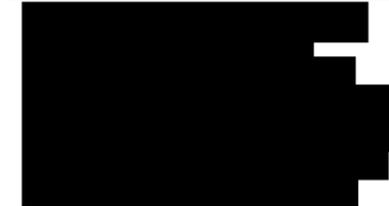
the number of pieces chosen is achieved. The final method to play the game is called Group Tales. In this method, each player draws two or more story pieces, making the total number of pieces among all players between ten and twenty. The first player chooses one piece they have drawn and begins the story (Fig. 2.2). Once the first player uses their piece in the tale, they pass the story onto the second player, who continues, using one of their pieces. The story passes from player to player until all players have used up all their pieces. Story place cards may be added for an added challenge . The final method of playing the game is called Marathon Tales. This method is similar to Taller Tale; however, the primary difference is that the number chosen is always fifty, which is the same number of pieces in the bag or game. In this method, there are many variations, and the main game flow is for the story to travel from player to player using the game pieces as their tall tale prompt.

 The multiple methods and flow of this game reflect the facts brought to light by MarkSchlichting in his book "*Understanding Kids, Play, and Interactive Design: How to Create Games Children Love*", published by Taylor & Francis Group in 2016. In his writing, he discusses the importance to creates an atmosphere that is relaxed, fun, and free from formal structure (Fig. 2:2). The design of *Tall Tales: The Game of Infinite Storytelling* holds to this point of view, for one can tell the game designer understood the material and subject matter they were targeting. Games often fail in this area because they are designed more visually than functional or vice versa. This point reverberates in Bill Kapralos' paper, "Learning about serious game design and development at the K-12 level," published in *The International Journal of Information and Learning Technology* in 2021. He states, "Designing serious games is difficult, and knowledge of game design is insufficient to develop an effective serious game. Many serious games have been dismissed for their poor game design and lack of instructional design. They often prove inferior to the traditional learning method that the serious game was intended to replace".

 This point of view is evident from the functional and visual aspects of the game. The graphics are engaging and invite the audience to play. The color palette works well with the semiotics and iconography in the individual
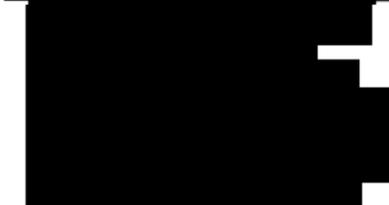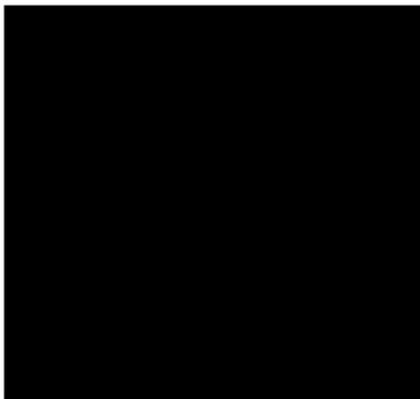
cards and package design. Furthermore, employing a wide variety of playing pieces used as story prompts is an imaginative alternative to simple card prompts. The typographical usage is minimal throughout the design; however, this is true because of the nature of the game. The game utilizes almost all visual clues. The only actual use of type is on the package design; the choice and layout have strong readability qualities. The design of the game is solid, encompassing both form and function. The visual aesthetics are strong with a wholeness of the components creating a sense of cohesiveness and flow from one component to another. This point is further carried out in the illustration card designs, which form a strong visual with the game's design.

 The concept and visuals that comprise the makeup of this game will provide essential guidance in the creation of the thesis project. The thesis project aims to create a game that will aid students in increasing their reading comprehension skills. Therefore, the storytelling concept of *Tall Tales: The Game of Infinite Storytelling* aligns with the proposed project's goals. Furthermore, the game's visual aspects align with the preferences of the proposed game's target audience. Hence it will provide strong reference points to key off.

Visaual Analysis #3
Project Name
Capture the Flag: Reading Comprehension Game
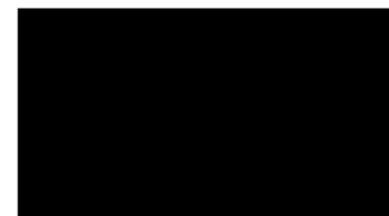
Capture the Flag: Reading Comprehension Game is developed and marketed by Lakeshore Learning, a highly credited educational instructional material company in the education world. The game explicitly addresses the development of reading comprehension skills, the primary goal of the thesis project (Fig. 3.1). The game has a medieval maze theme in which players must answer comprehension questions to capture flags. Players read short passages and answer skill-building comprehension questions covering the main idea, vocabulary, and inference. Each correct answer lets players move through the maze toward the finish. The overall concept, physically and visually, aligns with the theorized conception for the proposed board game. This analysis aims to answer critical questions that

will provide the wisdom and knowledge to create a similar game. Specific aspects of *Capture the Flag* will be investigated, especially in the spectrum of game flow, game board design, question cards, pawns, and package design.

Ethelyn Kaplan started Lakeshore Learning in 1954; the company grew from a toy store she had dreamed of opening. Educators began calling her for supplies, and she soon discovered a higher purpose in serving teachers. Lakeshore has grown from that first brick-and-mortar store to a leading developer and retailer of top-quality educational materials for early childhood programs, elementary schools, and homes nationwide. Today, the company has a thriving e-commerce business, a national sales division, catalogs, and 60 retail locations across the United States.

A primary factor for choosing *Capture the Flag* for analysis and as a contributor of support for the premise of this thesis is its smooth game flow, board design, and target genre (Fig. 3.2). The board game focuses on building reading comprehension skills by employing questions covering the main idea, vocabulary, and inference. This task is accomplished by implementing short reading passages and related question and answer activities. These key learning objectives are addressed in a game format that exemplifies gamification. Gamification in education means educators apply game design elements to an educational setting to make learning more engaging. The gamification theory in education is that learners learn best when having fun. Gamification is becoming increasingly used in educational settings because it breaks complex tasks into a more relaxed environment that is more conducive to learning. Furthermore, the game designers' implementation of this strategy into the design motivates students and makes them more engaged with the subject matter.

Developing a solid sense of gamification in *Capture the Flag* is done using a standard-sized game board and standard game pieces. The board game is eighteen inches square, with fifty question cards, eleven flag pieces, four pawns, and a single dice. This strategy permits a smooth and uncumbersome game flow. The standard size board elements are confusing; this element is constructive when working with students. The graphics employed in the game design contribute enormously to the game's con-

cept and aid in smooth game flow. However, one may be overwhelmed by the design of the game's layout at first, but once one understands how the game is played, most misconceptions are dismissed.

There is little use of typography on the board; this has both positive and negative contributions to the game's design. The game title is in the middle with the "start" and "finish" on opposite sides. On the one hand, the positive attributes of the lack of typography may elevate stress levels for students who cannot read. On the other hand, the lack of typography may cause confusion in the game's flow. Furthermore, the font choice works with the theme of the design; however, the choice is predictable, and its use has been exhausted in the design world. A more unknown and creative font would provide a sense of individualism and creativeness. The current font choice emulates a cookie-cutter design style.

In contrast, the typography utilized in the game cards and reading passages is highly effective. The font choice possesses strong readability. This aspect is critical to the game's functionality, especially since one of the key goals of the game is to strengthen literacy skills. A font choice that was difficult to read or decipher would significantly hamper the game's overall design.

Looking at the pawns and other game pieces, one gets a recurring cookie cutter feeling in the design. The paws are typical standard game pieces with no sense of design consideration given to their appearance. The same is said about the coins players receive when they answer a question correctly. The coins are printed on cardboard with little design thought (Fig. 3.2). The game would emulate a more holistic feel if the designers gave as much design to these game items as they did with the board and card designs. The same observations are evident in the package design. The package design is industry standard and thus lacks a sense of creativity and individuality. Adjusting the appearance of the design would allow the game to stand out among other games, thus increasing its market presence.

Overall, the analysis of *Capture the Flag* answers several key questions. The analysis provides insight into the flow of this game. This factor is

beneficial since the game is similar to the theorized project game. The game's employment of reading comprehension cards is similar to the design theorized project game which will provide certain aspects to be incorporated into the final design.

The issue of using the industry standards individual game pawns dilemma is given light. It is understood that using cookie cutter pieces keeps the overall cost down; however, it diminishes the individual and creative feel of the game. This factor provides grounds for more thought on how these standard game pawns are slightly altered to create visual interest while keeping production costs down. Finally, the curtails into the package design, an industry-standard size. Again, how may the industry standard package design be altered to be more visually and individual while maintaining the industry standards. The analysis of *Capture the Flag* brings to light the debate on using industry-standard game paraphernalia over uncommon, more creative game paraphernalia.

Conclusion
The evaluation of the additional research methods provided great insight into the true benefit of board games in the classroom. Therefore, the information gained from this study will aid in developing the visual solution for this thesis. The research provided examples of commercial board games unitized in the classroom and discussed their benefits and drawbacks. Content of this caliber will further propel the development of the board game. Thus the visual solution will possess both form and function, enabling students to increase their reading comprehension skills.

Design Process
Overview
The visual solution will create a board game that targets students in grades three through five, ages eight to eleven, and reading comprehension skills. The board game will be comprised of the following deliverables: game board, comprehension cards, pawns, dice, and package design. In order to execute a successful visual solution, several critical components must have strict attention. These components are as follows; typography, color, and illustration. Avoiding or misrepresenting any of these critical components will, in the end, strongly affect the final solution's game flow and functionality.

Typography
Typography is a critical element for the successful construction of the board game. Typography will primarily be preset in the game board, comprehension cards, and package design. The critical factor that must be considered when working with typography is readability. Readability is critical in designing the game components because it catalyzes the game's flow. A vital activity of the game is for the student to read the comprehension passage on the card to the other players. If the font used in the passage does not possess readable qualities, such as a clear distinction between similar letters, the game's comprehension, and flow will be dramatically affected. This critical factor will carry over into the game board and package design. The same font used on the comprehension cards will be the same used throughout the game deliverables. Hence this will provide constancy and predictability in the design, further influencing the game flow and functionality. Typography is a driving force behind the game's design that must be visually pleasing to the eye with very few distractions. The following elements will aid in determining the fonts employed in the final design, which will be an integral component of the design.

Color
Color is a crucial element that will aid in the game flow and visual aesthetics of the board game. Color employed in any design is a critical element that must have a high value. The use of color carelessly can exhibit the wrong feel for the design, thus diminishing its effectiveness. The color used in the design of the proposed board game deliverable will set the

game's tone and feel. The target audience for the game are children aged eight through eleven. Therefore, the color palette will be receptive to this group. A study by Fei Lyu, Rui Xi, and Yujie Liu titled "Color Design in Application Interfaces for Children" noted the following "Color is the most sensitive element in people's visual perception of objects. Studies have shown that when a user encounters a target object, the color will attract the main visual attention within the first 20 seconds" (Lyu), 2021. Hence, the color will play an integral role in the game's flow and the student's engagement. The color employed in the design will be vibrant and possess vitality. These qualities in color will enable the other components to perform more effectively. By employing color theory and the physiological factors encompassing color, the graphics and illustrations will again play a vital role in the successful deliverables of the game.

Illustration

Illustrations or graphics employed in the design of the deliverables for the game will be highly visually engaging to the target audience. The images used in the solution are probably one of the critical elements of the entire design. Before anyone reads the title on the package design, they will first see the graphics or illustrations. Therefore, the illustrations and graphics must possess a visual quality that will create a desire for engagement with the game. If the imagery throughout the game design is highly inviting to players, they are far more likely to play the game for an extended amount of time, even if they are unsuccessful. This physiological factor is evident in numerous studies; the more visually appealing the graphics and illustrations are to the target audience dramatically affects the time a player will engage in a game, no matter style of the game. Hence, the illustrations and graphics used in the game will be designed around these principles. This action will permit a solution that targets the audience with the strongest desires for success.

Conclusion

One must keep in mind that all design components do not work independently of one another but instead must work together seamlessly for maximum effectiveness. A successful design solution will possess each element, each playing a balanced role in the solution without being overbearing. Attention to detail in every aspect of the solution will create a design that possesses both form and function to obtain the goals outlined in the beginning.

Chapter 3:
Visual Process

Visual Solution
Overview

The visual solution for this thesis requires it to assist in developing reading comprehension skills by using an analog board game. Creating a comprehensive brand campaign allowed for developing an innovative solution. The final solution consists of a game board, comprehension cards, pawns, dice, and package design; each plays a specific role in the overall design and flow of the game. Careful consideration was taken in the design of each deliverable to maximize each role in the game.

The intentional use of illustrations and graphics that were visually appealing and engaging to students in the third through fifth grade allowed for a solution to be generated. Furthermore, the illustration and graphics were created to work holistically with the color and typographical elements. This action allows an analog board game to be visually receptive to the target audience and aids in developing reading comprehension skills.

Sketches
Overview

Sketches were an integral part of the ideation process of the development of the deliverables. Before creating the sketches, a mood board was created for inspiration and guidance to create a successful board game. This phase provided a solid start to assist in visualizing and developing the feel of the game. A primary concern in this phase was establishing the flow of the game. Flow occurs when the player is interacting and engaging in the process of playing the game. Game flow is an essential aspect of games because it is essentially how the game is conducted. A person undertaking a task might find it beneficial to ensure the rules are clear, the task is appropriate for their skills, they are receiving timely feedback, and they minimize distractions (Dennis. 2017). Research states, "Achieving a state of "flow" is an overarching aim of games which ensures optimal challenge within the game is essential for maintaining engagement." (Benton, 2021). A technique employed to mentally place oneself in the student's mind while playing the game allowed for creatvity to spawn and establish the game's flow. This action allowed one to gain a user's perspective, investigate the user experience, and help to develop a game that students would like to play while simultaneously developing comprehension skills. In Mark Schlichting's book Understanding Kids, Play, and Interactive Design: How to Create Games Children Love, he stresses this concept and states, "Play is central even to games or products whose primary function is to teach, rather than to entertain." By mentally mimicking the play, the student would be experiencing the learning aspect of the game could be developed by feeding off of the experience. This factor is significant because it provides the mindset for developing the deliverables for the board game. During the sketch phase, the relationship between play and learning was at the forefront of each design decision. It was imperative to investigate all facets and possibilities to develop the most comprehensive solution. Each item was conceived in various forms, allowing for a much richer and more in-depth design.

Sketches
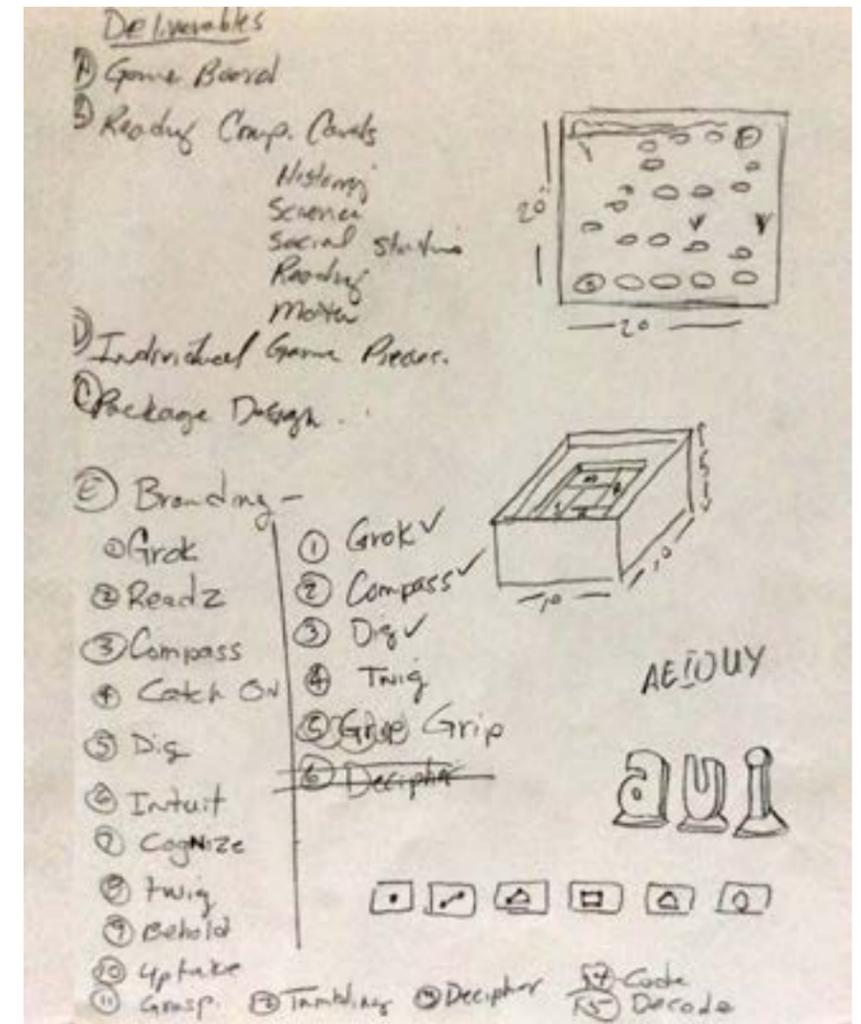
Sketches - *Brainstorming and Ideation for deliverable concpets for the baoard game Grok.*

Branding
Overview

Brand creation's primary intent is to create a name and design that will set this board game apart from the competition. The name of a particular product is key to its success. Utilizing a framework to create the brand for the board game produced the name work Grok. The framework process was detailed and ascertained information about the game to focus on the name that signified the brand as its own. (Branding, 2022).

This process enlisted brainstorming activities, mind mapping, and rapid ideation methods to further stimulated the creative process. Proposed concepts for the game evolved from these actions. These activities created a series of thumbnail sketches for the design of the board game and a list of possible names for the game. The theory perpetuating the game's name was formalized by analyzing popular games to which this target audience is attracted. It was noted in the research that most games had a short, catchy name, not the standard or common names such as Dixit, Trekking, and Boggle. The thesaurus provided a list of possible names synonymous with reading and comprehension.

Creating the thumbnail sketches and a list of possible names for the game allowed for an assessment to determine the feasibility of each to solve the established problem and meet the goals outlined in the beginning. Four board game layouts were selected from the thumbnail sketches and developed in rough sketch forms. The list of possible names for the game was reduced to four possible finalists and are as follows: Compass, Dig, Grok, and Twig. Each name is short, catchy, and grabs the target audience's attention. These candidates were developed into rough sketches for branding the game; this activity provided additional visual analysis of each name's personality and feel for the game. After further evaluation, the word Grok was selected as the name for the game. The word Grok possesses a unique background that further supports the proposed game's direction. It means to understand profoundly and intuitively. Furthermore, according to the Merriam-Webster dictionary, Grok may be the only English word derived from the Martian language. The word was first introduced into the American vocabulary by Robert A. Heinlein in 1961 in his science fiction novel Stranger in a Strange Land. Since then, Grok has been adopted by America's youth culture.

Branding

The following demonstrates its use in today's culture:

One of the best ways to grok it is through this experiment involving different colors of light.
— Rhett Allain, Wired, 8 Oct. 2021

The way to really grok the power of play is to play yourself.
— Ashoka, Forbes, 6 Oct. 2021

The goal of this information-gathering effort is to grok the scale and scope of the problem, as well as potential solutions.
— Megan Molteni, Wired, 7 Oct. 2020

Branding - *Alternative names, Sketches and Ideation for the baoard game Grok.*

Branding

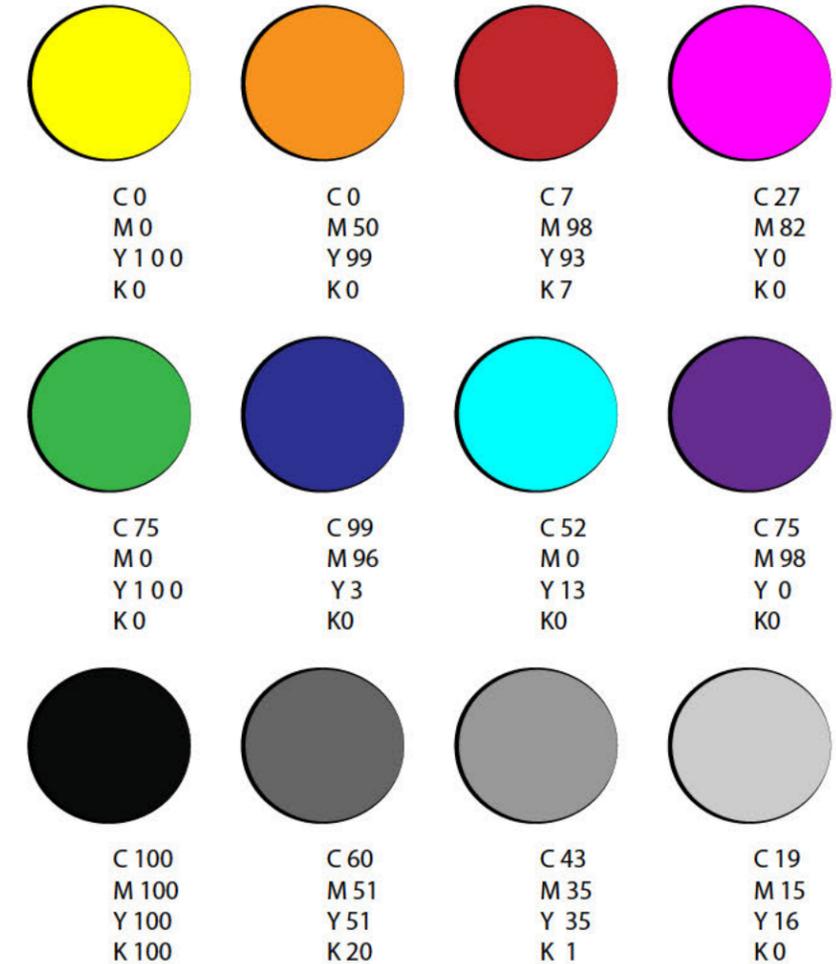Branding - *Sketches and Ideation for the baoard game Grok.*

Branding - *Color samples for the baoard game Grok.*

Color Palette
Overview

The color palette generated for the solution is devised by evaluating the assimilated images from the mood board in the ideation portion of the project. The journal article titled Color Design in Application Interfaces for Children, states that "Color is the most sensitive element in people's visual perception of objects" (Fei, 2021). This aspect is the foundational belief in the establishment of the color palette for the project. This action allowed for a color consensus for the deliverables. The assimilation of harmonious colors palette for these images brought to light that the target audience, students in grades three through eight, generally granted bright and vivid; these colors in comic book-style illustrations. Similar colors are found in students' popular video games, book bags, and clothing. Relying on the color palette as the guide of standards for the project allowed for familiarity and increased the game flow. Consistent in style, size, and color, players can easily connect to the game's flow (Schlichting, 2016). The board game uses intense earth colors contrasted against shades of black in a vivid tonal range. In order to create a sense of depth, shades were produced by muting the colors. This technique provides depth and form while maintaining the same color consistency in the designs.

Color Palette

C 0 M 0 Y 100 K 0	C 0 M 50 Y 99 K 0	C 7 M 98 Y 93 K 7	C 27 M 82 Y 0 K 0
C 75 M 0 Y 100 K 0	C 99 M 96 Y 3 K 0	C 52 M 0 Y 13 K 0	C 75 M 98 Y 0 K 0
C 100 M 100 Y 100 K 100	C 60 M 51 Y 51 K 20	C 43 M 35 Y 35 K 1	C 19 M 15 Y 16 K 0

Color Pallette - *Color swatches for the baoard game Grok.*

Typography
Overview

Typography is an integral component of both the aesthetic and functional aspects of the design of the board game. A profound study of fonts with high readability rates was assessed to ascertain the best font to use in the game. Fonts with high readability rates are accessible for the eyes to read the copy without delay or misinterpretation of letters. Considerations vary from font to font since each possesses its personality, such as fun, sophisticated, or contemporary (Sawyer, 2020). Furthermore, the chosen font must be paired with a comparable font in which both accentuate each other. This technique must allow the fonts to work together and complement the other visual elements in the design (Adobe, 1989).

The typography in the brand is hand drawn; therefore, the selection for the other fonts used in the design had to work aesthetically with the brand design. A display typeface and text typeface balance the solution's readability and design. Readability in the design of the fonts chosen held high prominence in their selection to be used in the design solution.

The display typeface is CCBiffBamBoom (sans serif) and Adobe Caslon Pro (serif). This combination of font choices allows for a sense of playfulness with organization font, which expresses the target audience's personality. The fonts are used primarily on the game compression cards and package design. The key to using fonts that complement one another is allowing a high readability rate. This factor is vital since the project aims to increase reading comprehension skills.

CCBiffBamBoom is the sans serif font chosen for the project, which will primarily play the role of headline and subhead text. The font has two different styles, which lend itself to being very versatile in the layout of the deliverables for the project.

Adobe Caslon Pro, the serif font chosen for the project, is a traditional font with a very high readability rate, making it a great choice to be used in the text on the comprehension cards. In addition, the font is used in the student's textbooks; therefore, the students are familiar with using the font to read. The font has several styles, which also lend themselves to being versatile.

Typography

CCBIFFBAMBOOM
ABCDEFGHIJKLMNOPQRSTUVWXYZ
ABCDEFGHIJKLMNOPQRSTUVWXYZ

CCBIFFBAMBOOMOUTLINE
ABCDEFGHIJKLMNOPQRSTUVWXYZ
ABCDEFGHIJKLMNOPQRSTUVWXYZ

Adobe Caslon Pro - Regular
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz

Adobe Caslon Pro - Bold
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz

Typography - *Fonts used in the baoard game Grok.*

Illustration
Overview

TThe illustrations used in the design of the board game aid in framing the theme and engaging the students to interact with the game. Research has concluded that it is highly beneficial to have appealing graphics in learning games for children. Graphics that are more appealing to the target audience, in this instance, the students, can increase motivation to interact with the educational game (Javora, 2021). This idea is expressed in the cognitive-affective theory of learning, where motivation is mediated by increasing or decreasing the amount, such as thinking, reasoning, or remembering (Huang, 2020). The illustrations used in the project as designed to motivate the student to interact with the board game directly.

Unity is defined as an overall inner order and consistency of all visual elements; it is an underlying premise for the illustrations and design elements—Grok's overall theme centers around a Camelot-type setting. Research conducted in the early stages of the project noted that images or graphics that appealed to the target audience significantly increased the participation rate in the game immensely. Therefore, illustrations play a vital role in the board game's success (Schlichting, 2016). The imagery employed in the game is graphic, similar to other games and graphic novels of the students. The illustrations are created with bright colors contrasting against strong tones of black that provide a sense of playfulness and present the board game in a relaxing tone. The illustrations are void of clutter and easy to process visually. The imagery is visually appropriate for the target audience. Special attention is given to avoiding controversial imagery that may offend a player or student. This critical aspect is implemented in the flow of the game. It is a critical design element that psychologically affects the players to create a desire to play the game furthering the use of the cognitive-affective theory of learning.

Illustration

Illustration - *Images used in the baoard game Grok.*

Chapter 4:
Final Solution

Intorduction
Overview

This project aims to demonstrate how analog board games can help develop reading comprehension skills in grades three through five when used as educational tools. Research has shown that board games enhance students' social skills and improve their comprehension and problem-solving skills (Avdiu, 2019). Board games are also exceptional life skills teachers; research shows that game rules mimic real-world behaviors and actions, such as taking turns and sharing. Implementing board games in the classroom increases the probability of reinforcing their behaviors (Tripiana-Barbosa, 2015).

The solution for the thesis project uses gamification combined with core reading comprehension techniques to develop a board game that engages the students (Seaborn, 2014). Gamification is a teaching technique that turns an instructional lesson into a game-type scenario. This technique is an excellent resource that arouses curiosity, contributes to motivation, and generates greater learning interest (Tripiana-Barbosa, 2015). An engaged student is a student that is ready to learn. This factor is supported by the research finding that active state involvement, which facilitates active involvement, will motivate students; this approach eliminates boredom (Avdiu, 2019).

The final deliverables demonstrate a holistic approach to addressing the goal by combining multiple academic subject areas into a single game. Grok targets the core subject areas taught in the classroom today: reading, science, math, and history. Similar games only focus on a single subject, such as the board game Trekking The National Parks. The solution developed can empower educators, game developers, and educational entities to utilize analog board games in the educational process.

The solution to the problem entailed the creation of an analog board game containing the following components: game board, comprehension cards, pawns, dice, and the package design. Each deliverable plays a vital role in the game's effectiveness and possesses a visual presence that transcends throughout each piece. A key design element behind each component is simplicity. A teacher needs simple and easy teaching devices to use in the classroom. More time or patience must be needed to explain a multi-faceted, complicated game. Hence, the more complicated a game is, the less likely it will be used in the classroom (Schlichting, 2016). Simplicity is intertwined throughout the deliverables for Grok.

The creation of deliverables was developed with traditional and current design techniques. The use of hand draw sketches was initially used for the ideation and development of visual cues for the overall look and concept of the board game. This action allowed brainstorming and content development to be visualized. The

final designs utilized Adobe Illustrator, Photoshop, and Indesign, the versatility of these applications allowed for congruence of design elements to be present in aspects of the project, from the illustrations, color palette, and typography. Each deliverable plays a vital role in the effectiveness of this design solution. Neither element works or stands out as a sole player in the game. The final solution has all components working in tandem. Grok has been developed into an analog board game that can help develop reading comprehension skills. Grok's final components evoke a fun-loving, adventurous personality, appealing to children ages eight to eleven.
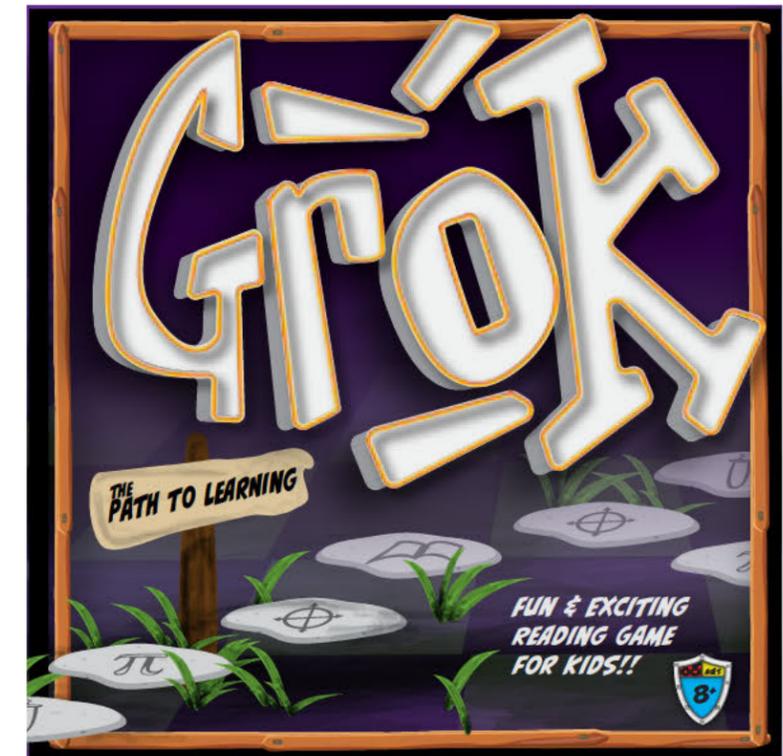
Grok - *Package Design Cover*

Game Board
Overview
The game board design for Grok, as with the other components, is simple and goal-oriented. The game board follows Bill Kapralos in his paper titled "Learning about serious game design and development at the K 12 level.". The author outlines a specific mindset to create board games that teach what he phrases as Serious Games. The mindset is grounded around the belief that the creator of the game must have both skills in game development and knowledge of the content area the game is targeting. Educational board games that are not designed around these components are found to be inferior and produce little cognitive development (Kapralos, 2021).

In addition to the game having a direct link to education, a well-conceived game takes into account the typical behaviors of the players and designs the flow around this belief. The flow theory is described as having specific characteristics centered around a state of high concentration. A key characteristic is an ability to accomplish tasks smoothly without minimal hindrances. Concerning the game board, this may be how the pawns move around the board; this action should be almost second nature. Another characteristic of good flow is that the player loses the sense of time and is thoroughly immersed in the game's play. These two characteristics lead to contentment and comfort (Ji, 2021). The establishment of a game possessing these characteristics is imperative to allow the development of reading comprehension skills.

Simplicity, goal-oriented, and good flow are the core driving force behind Grok's game board development. The typical board game goes around in a circle, similar to Monopoly. To alter this course, the game board for Grok is a simple maze. An intricate maze would be problematic for the students and teacher since the underlying problem is comprehension. The simpler the maze, the better for the student having difficulties comprehending either oral or written comprehension (Gee, 2021). The final layout of the game board is a simple maze with a couple of different directions.

The visual imagery used on the game board possesses the color and tone preferred by the target audience. This factor was a primary challenge in creating the visual feel for the game board. Many educational game boards appear to target grades kindergarten through second grade. The visual feel of a game can significantly affect how the user interacts with the game. When developing a game is essential, they view it through the lens of the user (Gee, 2021). Employing this theory in the game's development allows Grok's designs to meet the visual interests of the target audience. The imagery of the game board is based on the style of the Camelot-type setting, utilizing appropriate images in a manner that allows the design of Grok to drill down and meet the user's core needs.

Game Board

Grok - *Game Board*
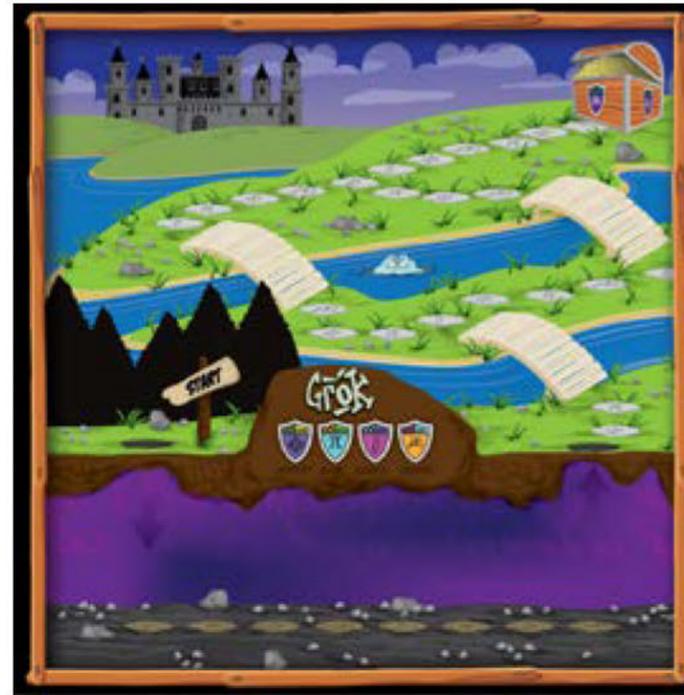
Grok - *Game Board Detail: Upper Left Corner*

Grok - *Game Board Detail: Center Left*

Grok - *Game Board Detail: Bottom Left Corner*

Grok - *Game Board*

Grok - *Game Board Detail: Center*

Grok - *Game Board Detail: Top Right Corner*


Grok - *Game Board Detail: Center Right Corner*
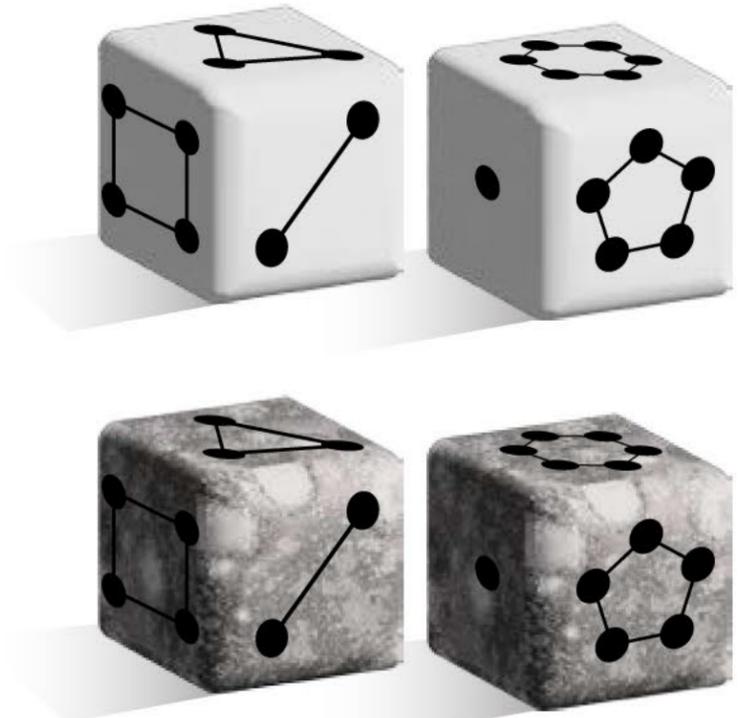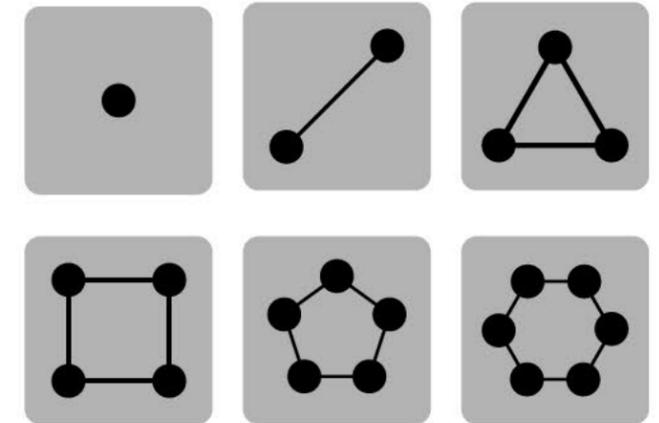
Dice
Overview

The vision behind the dice for Grok had to meet the vision and project goal for the thesis project. The vision was to create a different style from the traditional or standard form. The final design dice had to meet the project goal of implementing as much learning as possible into every aspect of the game's design. This vision and goal guided the design for Grok's dice to use the six-side standard form; however, the numbering system uses point to line plane teaching method. This instructional method reinforces math skills and shapes recognition. The order goes as follow: 1 = point, 2 = line, 3 = triangle, 4 = square, 5 = pentagon and 6 = hexagon. Introducing vital math skills in the game's design enables reinforcing other math standards such as counting, estimation, measuring, and number patterns (Schnieders, 2002). This simple adjustment to the standard dice design promotes interest to encourage game interaction.
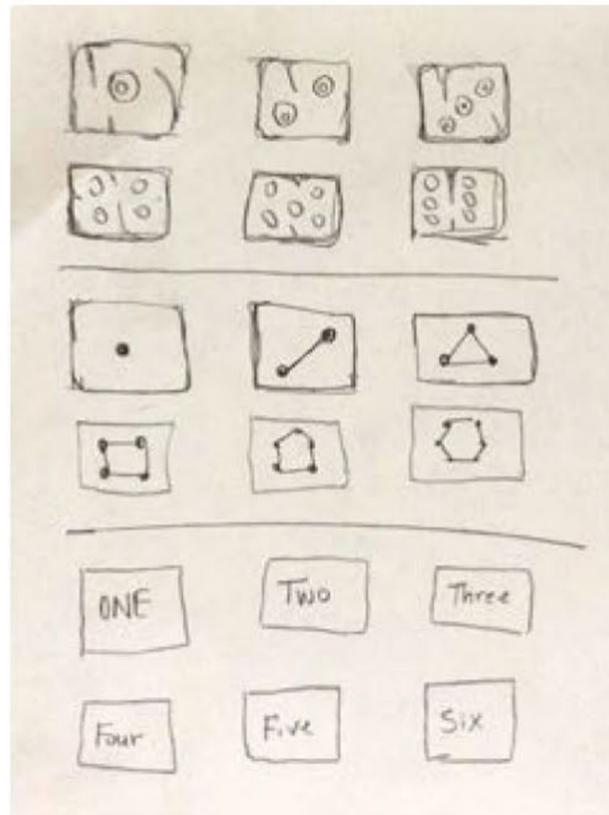
Grok - *Dice Design*
Rough Sketches

Dice

Grok - *Dice Design*

Pawns

Overview

Pawns are the individual player makers that move about the board during the game. The concept for the pawn designs incorporates learning in all aspects of the game. In this instance, the inspiration draws upon the traditional chess pawns. The traditional chess pieces provide familiarity and comfort to the game's play due to their presence in various other games adding to the game flow. The base of the traditional chess pawn combined with a shield creates an individualistic marker. The shield motif is a common element used in various applications throughout the design of the other deliverables. This congruency of design elements with other deliverables ties the pieces together. The shape and form of these pawns increase the interest level and desire to interact with the game. Furthermore, this design has a low center of gravity to prevent them from falling over or moving during the game. The following design elements add to the game flow and enhance the user experience for game mechanics. Design elements should blend and reinforce the game's teaching goals in a meaningful form(Gee, 2020).

From the education and learning standpoint, each pawn has a letter vowel; a, e, i, o, u, and y in its shield. This design element allows for teachable moments and reinforces vowel recognition. Furthermore, the colors of the pawns correlate to the primary and secondary colors, which is the second level of opportunity for teachable points.

At first look, the pawns' design is spartan. This factor allows the pawns to interact with the other deliverables harmoniously. However, when examined further, one can see the subtle details in the design. The design of the pawns combines sublet details with a simple shape to create player pieces that create a desire for interaction with the game.

Grok - *Pawn Design*
Rough Sketches

Pawns

Grok - *Pawn Design*

Coins

Overview

The coins play a vital role in Grok by determining the game's outcome and reinforcing money skills. Studies have found that children's early numerical skills strongly predict their later mathematical performance in school (Schnieders, 2022). Integrated math skills into the game flow give real-life relational quality to the game. Board games can aid in strengthening number and shape recognition, grouping, and counting in math (Rosenfeld, 2005). The coin's design was created by altering the design of the traditional round coin. During the ideation stage of the coin design, there was an idea to alter the circular design to an alternate shape, such as an abstract or multi-faceted coin.

Further deliberation on this idea brought to light that this may hamper the flow of the game by adding confusion since most students are familiar with a circular coin. The circular coin is much more relatable to real life. The front of the coin has the Grok brand, and the reverse side has the tagline for the game, "The Path to Learning." The role of the coins comes into play in the game's flow when the player answers the comprehension question correctly. The game has several ways to determine the winner; one of the ways is that the one with the most coins at the end is the winner.

The Grok coins allow for additional teachable moments by allowing the reinforcement of money skills to be learned and reinforced. Using the coins to add to the development of math skills addresses the project's fundamental goal of incorporating as many learning touchpoints as possible. Furthermore, the use of money can further redevelop authentic real-life learning.

Grok - Coin Design
Rough Sketches

Coins

Grok - Coin Design

Comprehension Cards
Overview

Comprehension cards play a pivotal role in the effectiveness of Grok as a tool to be used in the classroom. These cards are used in the flow of the game. There are four sets of cards, one for each subject: history, math, reading, and science. Each comprehension card has a question that correlates to the stones on the game board, marked with a subject, either history, math, reading, or science. As the players move around the board and land on a stone, they read the corresponding reading passage to the player to their right. In order to maximize readability and comprehension, the card's design had carefully developed readability and comprehension.
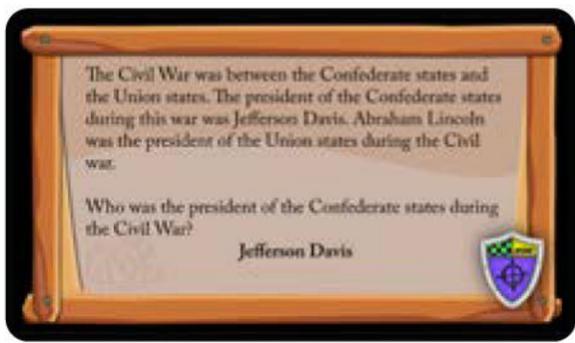
On the back of the card is the comprehension question and answer location. Adobe Caslon Pro is the font used in this application because of two key reasons. First, Adobe Caslon Pro has a high readability rate. This factor makes it easy to read and comprehend the text when used in a paragraph. In addition, the font is used in the student's textbooks; therefore, the students are familiar with using the font to read. The font has several styles, which also lend themselves to being versatile. These key reasons are why Adobe Caslon Pro is a great choice to use in the comprehension cards' text. Typographical choices should always be driven by purpose, audience, and subject, even more so for students, whether a different book or worksheet. Fancy, complex fonts will cause confusion and frustration to the student, ultimately stressing them out and having them shut down, refusing to learn. Typefaces with larger x-heights are generally easier to read than those with short x-heights, especially in the case of children. (Bessemans, 2016).

The visuals accompanying the text content elements are used throughout the other deliverables. This action allows the designs from each part of the project to work in tandem with one another. The colors behind the text are muted to prevent any difficulty in seeing the text. The front of the card follows suit with the back by incorporating visuals used throughout the project. In this instance, the supporting shield icon on the game board is placed on the front. The simplistic design of the form and back of the comprehension allows the design to work in harmony with the other visual elements.
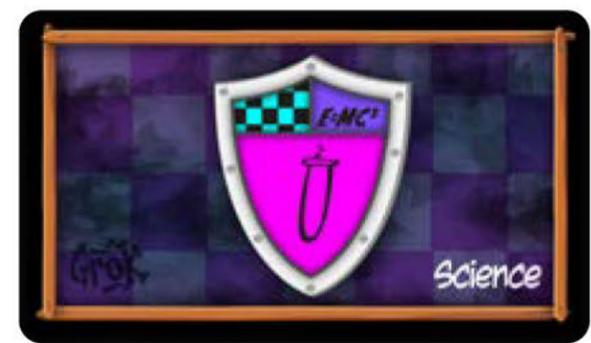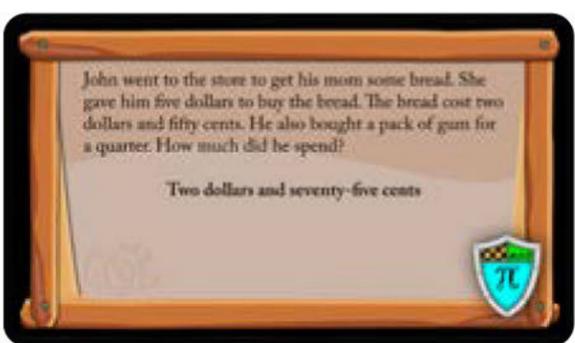
Comprehension Cards

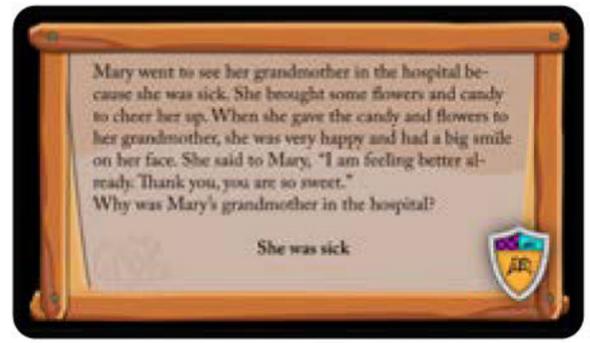Grok - *Comprehension Card*
Front and Back

Grok - *History Comprehension Card*
Front and Back

The Civil War was between the Confederate states and the Union states. The president of the Confederate states during this war was Jefferson Davis. Abraham Lincoln was the president of the Union states during the Civil War.

Who was the president of the Confederate states during the Civil War?

Jefferson Davis

Grok - *Science Comprehension Card*
Front and Back

Animals that eat other animals are called carnivores because these animals eat meat. Animals that do not eat other animals are called herbivores because they eat plants. A cow eats only grass. Is a cow a herbivore or a carnivore?

Herbivore

Grok - *Math Comprehension Card*
Front and Back

John went to the store to get his mom some bread. She gave him five dollars to buy the bread. The bread cost two dollars and fifty cents. He also bought a pack of gum for a quarter. How much did he spend?

Two dollars and seventy-five cents

Grok - *Reading Comprehension Card*
Front and Back

Mary went to see her grandmother in the hospital because she was sick. She brought some flowers and candy to cheer her up. When she gave the candy and flowers to her grandmother, she was very happy and had a big smile on her face. She said to Mary, "I am feeling better already. Thank you, you are so sweet."
Why was Mary's grandmother in the hospital?

She was sick

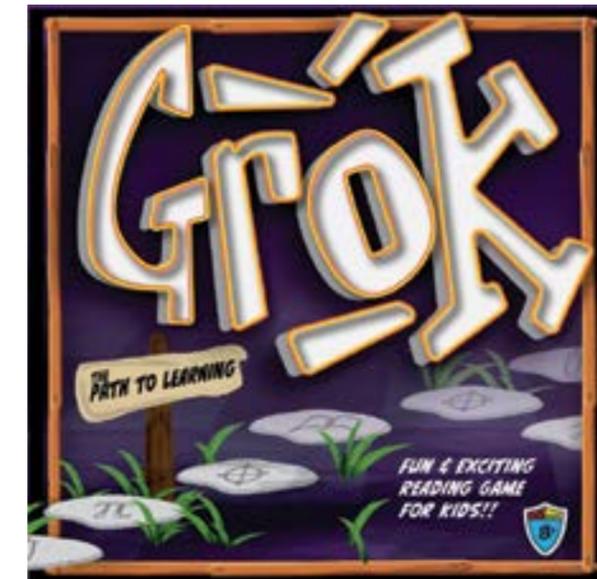## Package Design

Overview

The package design for Grok is one of the most critical deliverables. The package design will be the initial thing that evokes a desire to play the game. The package design can make or break a game as far as marketability. Therefore, the package design follows four key principles of package design. One, it can compete and win shelf presence. Two, the design of the package is eye-catching and engages the customer. Third, the package design communicates to the customer precisely what Grok is. Finally, the OOBE, or Out of Box Experience, is the experience customers have when they take the product out of the box (Mattos, 2019).

The overall visual design of the package evokes the same imagery present in other elements of the game design. The color and visuals transcend the design of deliverables to create a harmonious design in which no single element possesses the most attention. The cover of the package design has the Grok brand with the same visual elements on the game board, i.e., the shield, stepping stones, colors, and font usage. The back of the game's container displays the game board and elements. This particular element provides an advertising element to entice the target audience to play and purchase the game. This element in the design of the deliverables is invaluable to the game's marketability. The sides of the game continue to assist the back of the container in providing game content information and adding the consumer's interaction, playing, and purchasing of the game.

The design contents are strategically designed inside the box to maximize space. Today's teachers do not have the luxury of staying in a single classroom their entire carrier. Very few repeat the same grade or school from year to year; therefore, today's teachers must be ready to move at the end of each school. A board game package design that takes up too much space is less likely to make a move. This factor contributed mainly to the design of the contents of the game. The dimensions of the package are ten inches square by four inches tall. These dimensions upgrade to the standard ten by twenty by two-inch box design. The Grok box design allows the game to be easily transported and the contents to be more secure. The conventional game box design is cumbersome, and the box can quickly come open during transportation. Inside, the lower portion of the box is filled with graphics to carry over the game's design. A one-inch ledge borders the outside edge of the bottom of the package design. The game board's folding mechanics allows it to be folded into a square and placed on the ledge in the box. This feature allows the game board to rest securely without moving around and getting damaged. One, each border around the interior of the box also creates a hole to place the comprehension question and content boxes. The content boxes also have the same corresponding graphics for each making them easily identified while playing and setting up the game. The six boxes fit neatly and securely in place.
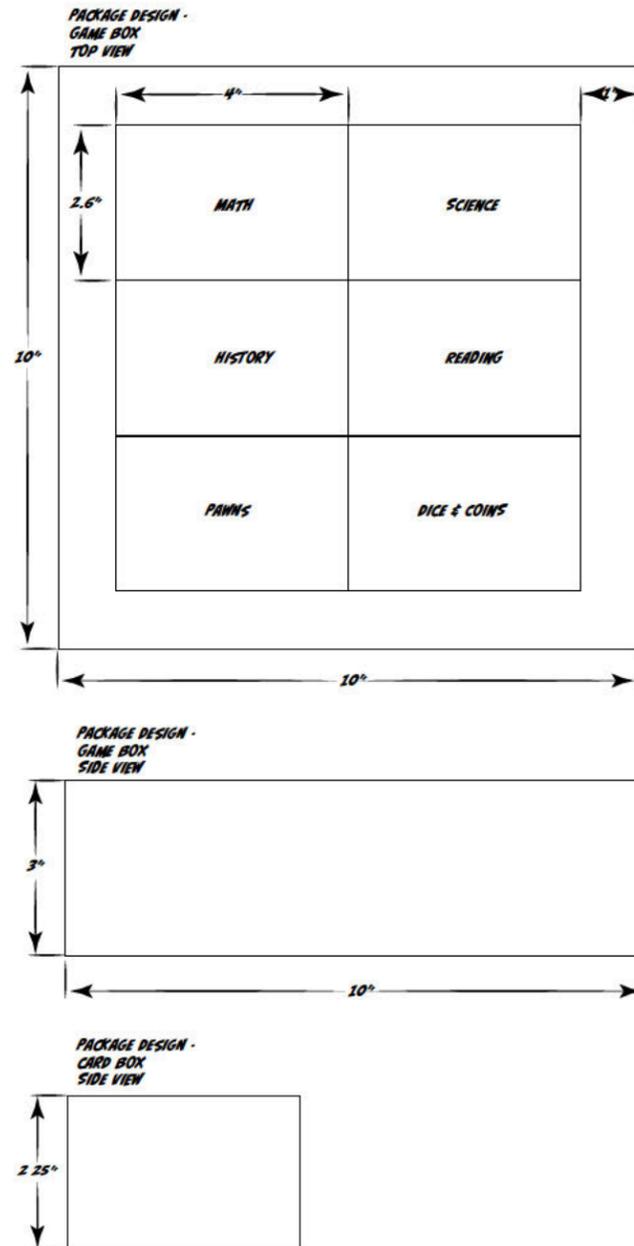
The package design has been meticulously designed to allow all the game contents to fit neatly and securely in a ten-by-ten box. Furthermore, the package design is adorned with the same graphics seen throughout the game's design. These two aspects of the package design encompass the concept of form and function to a high level.

Grok - *Package Design*
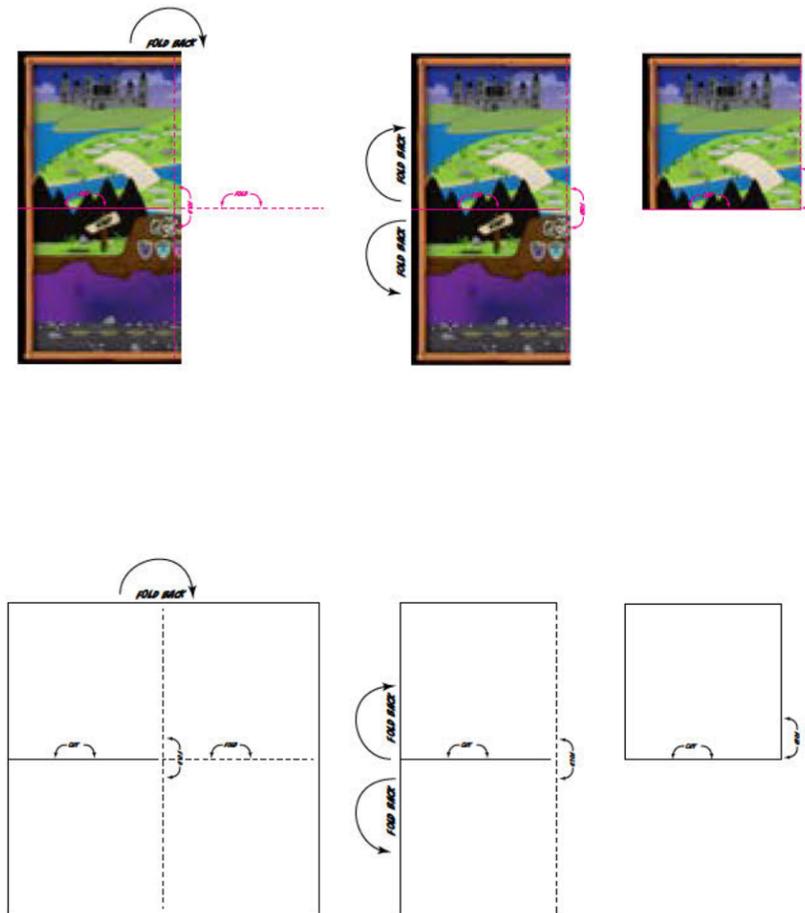*Front and Back Cover of Box*

Package Design

PACKAGE DESIGN -
GAME BOX
TOP VIEW

MATH	SCIENCE
HISTORY	READING
PAWNS	DICE & COINS

4"

4"

2.6"

10"

10"

PACKAGE DESIGN -
GAME BOX
SIDE VIEW

3"

10"

PACKAGE DESIGN -
CARD BOX
SIDE VIEW

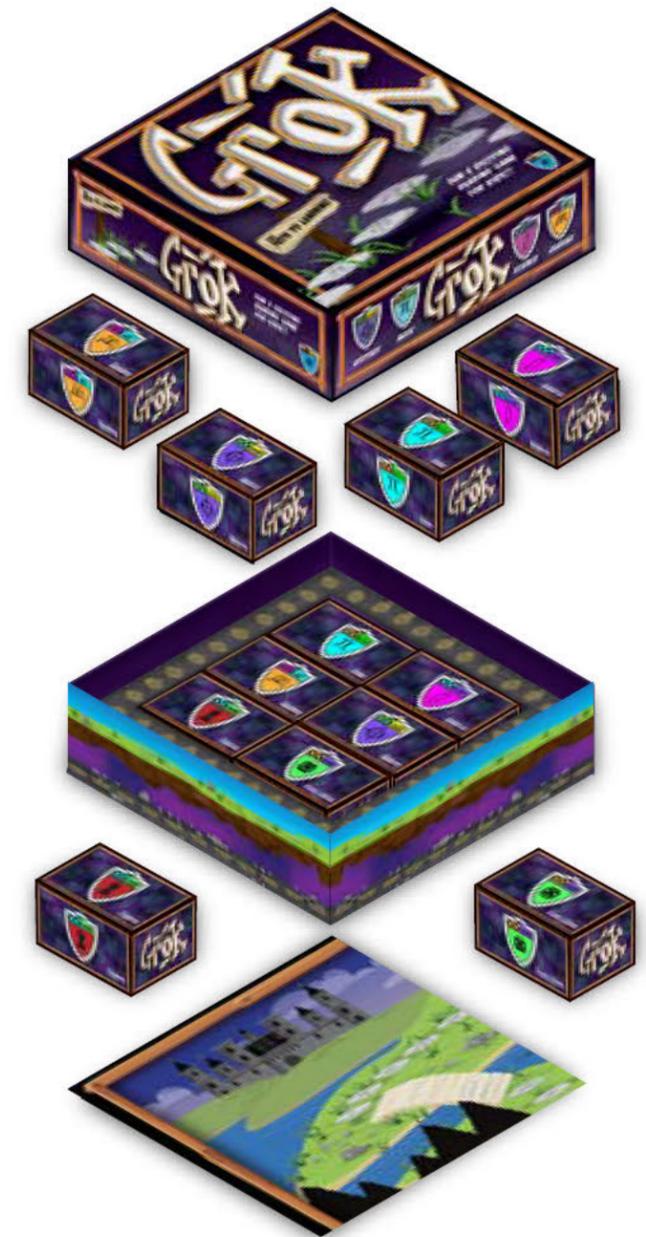2.25"

Grok - *Package Design – Layout*

Grok - *Package Design
Front and Back Cover of Box
Mock-Up*

Package Design

Grok - *Package Design*
Game Board

Package Design

Grok - *Package Design ~ Contents*

Chapter 5:
Conclusion

Defense

The thesis was initiated by investigating the increase of students in grades three through five with reading comprehension deficiencies. The research showed that one-third of Americans could not read, which is not just a problem in America. This factor is a global problem with ramifications that affect the daily lives of people around the world. The daily lives of those who cannot read are a struggle. They live in a constant state of survival, and their quality of life is far less than the literate population. The research revealed techniques to help increase reading comprehension skills, especially for those in the target group. One of those techniques is the use of analog board games.

The use of analog board games is one of the most beneficial techniques to address the problem; however, with the increase in technology, they are slowly being replaced. The analog board game is one of the essential tools that must be brought back into the classroom. Board games in education can impact children's emotional, social, and educational development in monumental forms. Board games are highly beneficial to children's proper development and overall well-being. They offer opportunities for early learning, help boost language skills, sharpen children's focus, teach the value of teamwork, and soothe anxiety. Furthermore, integrating board games with reading allows a child to boost comprehension and reading skills.

The thesis aimed to develop an analog board game to address reading comprehension skills in grades three through five. The deliverables or content of the board game consisted of the following: game board, comprehension cards, dice, pawns, and package design—this task combined lesson content with gamification to develop a board game that engages the students. Research has shown that an engaged student is a student that is ready to learn.

The critical feature Grok possesses over the competition is its cross-curricular component. As discussed in the research's visual analysis and case study section, it was pointed out that most games target a single niche; social studies, reading, or problem-solving. Grok incorporates all four core subject areas; math, reading, science, and social studies. This aspect establishes a holistic approach to addressing students' reading comprehension deficiencies in grades three to five. Furthermore, this aspect aligns with current educational trends of creating a classroom learning environment that is conclusive to all subject areas. This holistic approach to education intertwines the core subject areas into one entity. Grok eliminates the time-consuming task of the teacher searching for missing elements to incorporate into the lesson.
 Grok's effectiveness in empowering educators, game developers, and educational entities to utilize analog board games in the educational process needs further

investigation. One of the knowledge gaps that led to the thesis is the lack of research on specific games in the commercial market used in the classroom that explicitly addresses reading comprehension skills. Therefore, the next step for the Grok is production and testing in the classroom. The data gained in the further study can highlight what components of the game are effective and what components need adjustment. Through further product development and testing, Grok could be a pivotal solution to helping end the reading deficiencies in students.

Final Thoughts

 There is no such thing as coincidence, which is evident in this thesis's development on the use of analog board games in the classroom. Looking back at the beginning of this journey, I can see how God has placed all the events in my life to create Grok. Simultaneously, I have worked as an educator in the classroom and freelance graphic designer for over twenty-five years. I genuinely love both, and I am blessed and humbled by the opportunity to do both. Using both skill sets to create an analog board game is highly rewarding. I hope to further the development of Grok, to bring it from a theoretical game to an actual game affecting real people.

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