FocusQuest

turning play into progress for children with
ADHD (**A**ttention **D**eficit **H**yperactivity **D**isorder)

By

Hajra Mansoor

Bachelor of Industrial Design

School of Art, Design and Architecture (SADA) National University of Science and Technology

Islamabad, Pakistan

2024

FocusQuest

turning play into progress for children with ADHD

(**A**ttention **D**eficit **H**yperactivity **D**isorder)

By

Hajra Mansoor

A Research Report

Submitted in partial fulfilment of the requirements.

For the degree of

BACHELOR'S IN INDUSTRIAL DESIGN

B.ID

Department of Industrial Design

School of Art, Design and Architecture

(SADA)

National University of Science and Technology (NUST)

Islamabad, Pakistan

2024

Declaration

This research report is the result of my own investigations, except where otherwise stated. Other sources are acknowledged by giving references.

Signed: Hajra _____ (candidate)

Date: 19th September 2024

Statement 1

I am familiar with the NUST Plagiarism Policy, and I understand the potential consequences should my graduation project and report be found to contain plagiarized content or violate this policy in any other way.

Signed: Hajra _____ (candidate)

Date: 19th September 2024

Statement 2

I hereby give consent for my research report, if accepted, to be available for photocopying and for inter-library loan and for the title and abstract to be made available to an outside organization. I authorize the school a digital copy of my report for the purposes of interlibrary loan, the supply of copies and as the archival copy for permanent retention in substitution for the original copy.

Signed: Hajra _____ (candidate)

Date: 19th September 2024

Statement 3

I understand that as per NUST commercialization policy 2020, the IP rights are protected by the guidelines of the IPO Pakistan and the ownership of all academic and research work remains the property of NUST and the patentholders, with equal rights and responsibilities.

Signed: Hajra _____ (candidate)

Date: 19th September 2024

FocusQuest

A Research Report

Hajra Mansoor

A research report submitted for evaluation to School of Art, Design and Architecture on 4th June 2024, in partial fulfilment of the requirement for the degree of B.ID.

_____	_____
(Signature)	(Signature)
Graduation Projects Coordinator	**Examination (SADA)**

2024

School of Art, Design and Architecture

National University of Science and Technology

Research Report

FocusQuest: turning play into progress for children with ADHD (**A**ttention **D**eficit **H**yperactivity **D**isorder)

National University of Science and Technology
School of Art, Design, and Architecture (SADA)

Hajra Mansoor
356739

FocusQuest:
turning play into progress for children with ADHD.

Advisor: Dr Raja Mubashir Karim

Submitted in partial fulfilment of the requirement
for the degree of Industrial Design.

June 2024

National University of Science and Technology
School of Art, Design, and Architecture (SADA)

Hajra Mansoor

Abstract:

Attention Deficit Hyperactivity Disorder (ADHD) is a condition that has an impact on a person's behaviour. People suffering from this disorder often struggle to pay attention for prolonged periods, finding it hard to concentrate without getting distracted. They are unable to manage their time properly and struggle to stay organized. Such symptoms can have an impact on a person's academic and personal life. This report thoroughly talks about the design process of an interactive and playful game developed primarily to help improve the symptoms of clinically diagnosed ADHD in children aged 7 to 8 years old in a school setting. Typically used methods may not fully engage or support every ADHD child, hence, the proposed solution intends to provide customization as each child with the disorder tends to exhibit symptoms in a different way. The developed game also allows convenient progress tracking of an individual through a mobile application. Along with this, the game also offers a series of mini games to keep the children engaged and interested. Various sessions were held with numerous educational psychologists to gather feedback as the design was being developed. Continuous usability testing was also conducted to ensure the effectiveness of the developed game. One-on-one discussions with special educationalists and clinical psychologists as well as observations of the kids interacting with the game resulted in gaining insights of success and weak points of the game.

Keywords*: ADHD treatment, tabletop game, play based treatment, garden themed game, child-friendly design, symptoms improvement, time management, organization, attention*

Table of Contents

1. Introduction:

ADHD (**A**ttention **D**eficit **H**yperactivity **Di**sorder) is a neuropsychological disorder that influences a person's behaviour. It is a chronic condition that affects numerous children and persists into adulthood. Katzman, Bilkey, Chokka, Fallu, & Klassen (2017, p.2) say, "ADHD has an estimated childhood prevalence of 4% to 7% with increasing evidence pointing to its continuation into adulthood for between 15% and 65% of individuals." This clearly supports how children with the disorder continue to suffer in adulthood as well. ADHD, in general, affects a person's ability to pay attention and interrupts countless areas of normal development. Children suffering from this disorder have difficulty arranging and organizing any sorts of items. They also tend to mismanage time and may spend too much time doing simplest tasks due to lack of concentration. As compared to their peers, children with ADHD are likely to experience academic struggles, social isolation and may display anti-social behaviour. The disorder has three main subtypes: predominantly inattentive, predominantly hyperactive, and combined. Research claims that girls mostly exhibit symptoms of inattention and are unable to focus on task whereas boys exhibit symptoms of both, hyperactivity and inattention. Boys are prone to exhibit externalized symptoms hence their symptoms are noticeable as compared to girls.

According to a study done by a psychiatric department of a hospital in Karachi, ADHD in one of the most prevalent disorders. As per the Journal of Pakistan Medical Association, ADHD continues to prevalent internationally and is also known to have high frequency in Pakistan. Various literature reviews have highlighted the highly variable rates of the disorder worldwide, with prevalence estimates ranging from as low as 1% to as high as 20% among school age children.

Several methods including psycho education, behavioural intervention and medication are used to treat the symptoms of ADHD in children. Multiple articles mention that treating ADHD is a collaboration between health care provider and the patient. In this case, the patient is a child, so parents as well as teachers are involved. My project aims to design an interactive and playful game that helps improve

symptoms of inattention, disorganization and mismanagement of time in school going children. The idea of a game was developed as children always have fun playing games, so why not introduce a series of games that help the children manage their symptoms? The game is intended to be used in more than one scenario. It can be played in special schools where children with clinical diagnosis are given admission to receive treatment along with better education. It can also be played in schools with psychological clinics to help provide comfort to children with ADHD.

During the development of the game, numerous sessions were held with various psychologists specialized in handling children with ADHD, educationalists who have been working at special schools, as well as several meetings were conducted with teachers to discuss their perception of providing ADHD friendly games to children in schools. Apart from this, as the design of the game progressed, continuous usability testing was carried out to thoroughly understand the weaknesses and the strengths. Additionally, the purpose of testing was to observe how children interacted with the game and to confirm if the game was truly effective.

2. More about ADHD

2.1 Treating ADHD

A wide range of treatments are available for managing symptoms of ADHD including medications like stimulants and nonstimulants, psychosocial interventions, parent support, neurofeedback, cognitive training as well as behavioural therapies. ADHD is a disorder that cannot be completely cured but with good management of the symptoms, it can surely be controlled. Apart from traditional available methods, various research papers argue that combining neurocognitive training - activities or tasks aimed to challenge and strengthen the cognitive abilities, with skill-based training may lead to better outcomes for children with ADHD. Following this, the designed game aims to offer various activities to improve symptoms such as ability to pay attention, memory building, organizing and sorting, as well as decision making. To simply put, it means exercising one’s thinking skills to help improve focus despite getting distracted.

2.2 Play Based Intervention

Play based intervention is a well-recognized approach in educational and therapeutic contexts. In simple terms, it is all about using guided, interactive play to help children develop social, emotional, physical, language and cognitive skills. Play is the language of childhood. Hand over a game or a toy to a child and you'll be able to see them express a range of emotions. Play based therapy uses the natural way children communicate to help them build self-esteem and handle problems – whether its dealing with ADHD, going through a tough time, or improving social behaviour Deborah B Johnson and Mary Anne Peabody (2016) highlight countless advantages of play based interventions. They communicate how play helps children express themselves when words are not clearly understood along with providing opportunity for involved adults, be it parents, teachers, or psychologists, to understand the child's inner world on child's terms and at their pace. Primary Project, established in 1957, is based on child-centered play theory and states that through play, a child can feel safe to explore their feelings, handle stress, solve problems and face challenges.

2.3 Target Audience

This game is designed to be played by seven- to eight-year-old children who are clinically diagnosed with ADHD. In their article published in 2014, "Diagnosis and Management of ADHD in Children", Barbara T Felt, Bernard Biermann, Jennifer Christner and Param Kocchar briefly explain that it is challenging to diagnose ADHD in children younger than four years old as it is difficult to distinguish their symptoms from typical behaviour for that age. Due to this reason, they mention that the suitable age to propose a reliable diagnosis is during early school years. It was also emphasized that treatments and therapies should begin as soon as a clinical diagnosis is made, prioritizing behavioural treatments over medications.

Furthermore, American Academy of Pediatrics (AAP) guidelines for treatment of ADHD suggest that parents should train in behaviour management along with proposing behavioural classroom interventions to treat the disorder in school going children. As a result, this designed game incorporates behavioural strategies, offering

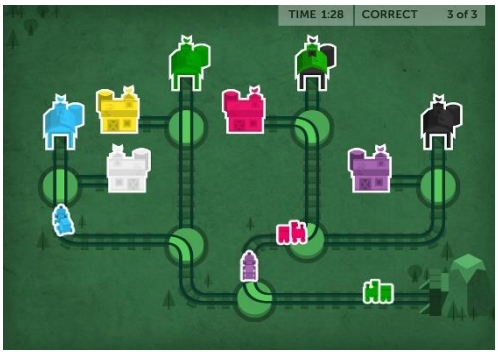
a fun and engaging way to help manage the symptoms of ADHD in children at schools.

2.4 Theoretical Framework for Game Development

To begin designing of the game, it was essential to thoroughly study relevant psychological theories. Alberta Bandura's 'Social Cognitive Theory' was one of the studied theories. This theory talks about how people tend to learn better by observing others. It sheds light on how a child's interactions with their environment, personal factors, and behaviour influences their learning. Moreover, the theory highlights how the out-turn of our actions such as rewards or punishments decide whether we will want to do that behaviour again later. One of the activities in the game required children to collect described items within the given time which reflects the cognitive theory by providing structured behavioural goals. Another way the theory was translated into the game is by offering children a reward of their choice once they complete the assigned tasks. This gives them a motivation to play the game with attention and finish the given tasks. Psychologist B.F.Skinner, in his learning theory, also explains how a reward reinforces an action or a behaviour, resulting in repetition of desired behaviour. Negative feedback for children with ADHD is highly discouraged as they are less responsive then and are prone to learn most through repetitive positive feedback. Building upon this principle, one of the key elements to be included in the game was to provide encouraging and positive feedback, be it visual or auditorial.

2.5 Existing Play Based Interventions

1. Lumosity



A brain training program with various games designed by neuroscientists to improve cognitive skills by practicing them multiple times. The games are derived from typically used tasks in cognitive psychology. To play this game, firstly users take a test to set a baseline score to check how they compare to others within the same age group. Next, the Lumosity App selects few games out of the many games, generating a personalized training program based on the score in the first level. The app can target large variety of skills including memory, attention, and problem solving.

2. CogMed

Another training software program that works as a memory training. It is used as a complementary therapy for children with ADHD. This kind of therapy aids children in remembering instructions, solve problems, control impulses and focus attention. In this program, a provider first interviews individual patient to motivate and to give instructions. The patient, player in this case, finishes series of video games such as remembering and recalling a pattern in given time.

3. TARLAN

An educational simulation game to improve social problem-solving skill of children with ADHD was developed by Atefah Ahmadi, Antonija Mitrovic, Badroddin Najmi, and Julia J Rucklidge in 2015. This game aimed to teach eight- to twelve-year-old children about social problem-solving skills. As described, firstly the child is required to think about the problem and is required to propose possible solutions in the second step. Thirdly, the child needs to think about the consequences of solutions thought earlier and finally must choose one of the proposed options in step 4.

4. Magic Labyrinth

An engaging and visually appealing tabletop game in which the players shift into the master's maze and try to collect lost magical objects quicker than a competitor. This game aims to build memory and recall skills as every player tries to avoid the labyrinth walls.

5. Infinite Runner, a BRAVO Project

This game intends to teach children to respect the instructions and rules, to be exact, the time to wait patiently, to listen actively, and to distinguish between right and wrong. Using Kinect – a tool allowing a person to control actions of the game with movement of the body, the game is projected on a big screen that makes it easy for the therapist to follow patient's performance live and carefully evaluate the progress. Provided the game scene, the player must run in place to move along the path, try to avoid obstacles on the way by moving left or right and pile up the required objects. Therapists carefully monitor the progress and measure performance upon the basis of number of obstacles avoided and number of objects collected along with the ability to follow instructions.

2.6 Gaps in the existing interventions

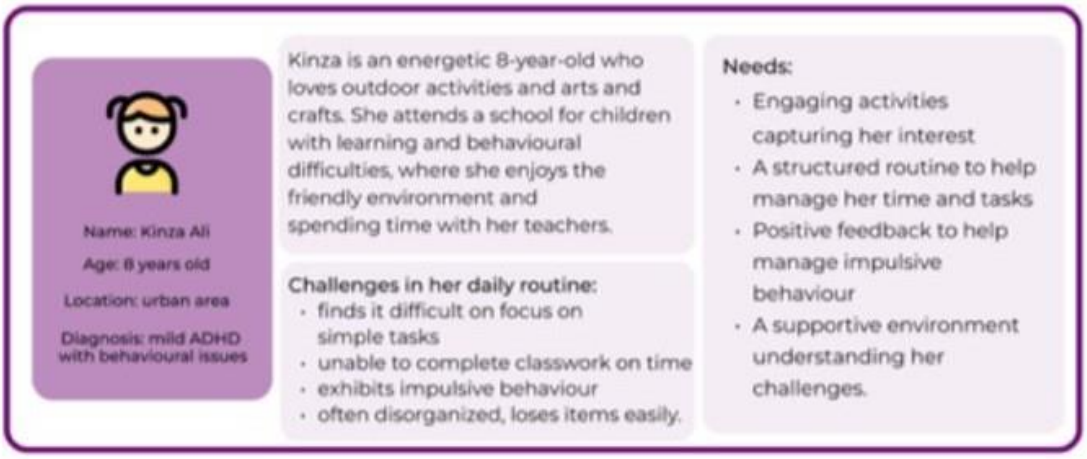
As mentioned earlier, because children are more likely to participate and concentrate while playing a game, there has been an increase in developing engaging treatment approaches. However, there are few gaps that my project aims to fill. First and foremost, there is a need for customization. The mentioned interventions follow one size fits all approach failing to address diverse needs of children with ADHD. Every child is different, some children deal with mild ADHD symptoms while others may deal with severe ADHD symptoms. Furthermore, there is limited parental and teacher involvement. For good management of the symptoms, it is essential that a strong collaboration exists between children, parents and teachers. There was also lack of reinforcements. Children with ADHD perform better when they are given constant motivation and positive feedback along with a reward of their choice.

3. User Study

In order to understand what symptoms the children with ADHD face, it was essential to meet and observe them. For this reason, various special schools teaching children with special needs as well as clinics providing therapies to children with ADHD were visited. Field observations were conducted to observe how these children interacted with their environments and to familiarize with their likings and disliking.

3.1 User Persona

Based upon the interaction with the children at a special school, the following persona was developed:



3.2 Empathy Map

It was essential to step into the user's shoes, which is why an empathy map was created to understand the pain points of the user:

SAYS	THINKS
"My desk and backpack are always messy, and I can never find anything when I need it."	*I wish I could remember things better and be more organized.*
DOES	**FEELS**
Tries to keep things organized, but often feels overwhelmed by clutter	*Overwhelmed* *Determined to do better*

4. Game Design

4.1 Solution Statement

The interactive designed game intends to enhance essential skills such as focus, time management, and organizational skills in children with ADHD. It aims to improv everyday symptoms by providing a supportive environment tailored to the unique needs of children with ADHD.

4.2 Design Objectives

The final proposed solution must follow the mentioned objectives:

1. ***Gives out tasks that require mental effort*** – activities within the game must require cognitive effort such as following verbal instructions or memory recall for mind exercise.
2. ***Offers various activities to maintain children's interest*** – the game should offer set of activities that are engaging and enjoyable, ensuring that children remain interested and invested in playing.
3. ***Aims to improve more than one symptom*** – the game addresses a range of ADHD symptoms, such as building focus, organizing and arranging, time management, following instructions and memory building.
4. ***Includes feedback mechanism*** – such mechanisms must be included to provide children with positive reinforcement and encouragement, motivating them to continue playing and striving for improvement.
5. ***Offers option to customize*** – every child is different and so the game must allow adjustments to varying difficulty levels, preferences and individual styles to cater to each child's unique requirements.
6. ***Accessibility to every ADHD child*** – the game must have accessibility features to accommodate children with varying behavioural abilities, ensuring inclusivity and equal access for all.
7. ***Provides multisensory experience*** – visual and auditory elements are incorporated into the game to engage multiple senses improving the overall gaming experience and learning outcomes.

8. ***Comes with an app*** – to allow seamless and easy tracking of every child's progress, a mobile application is to be included with the game enabling parents and teachers to monitor their progress, track achievements, and provide targeted support as needed.

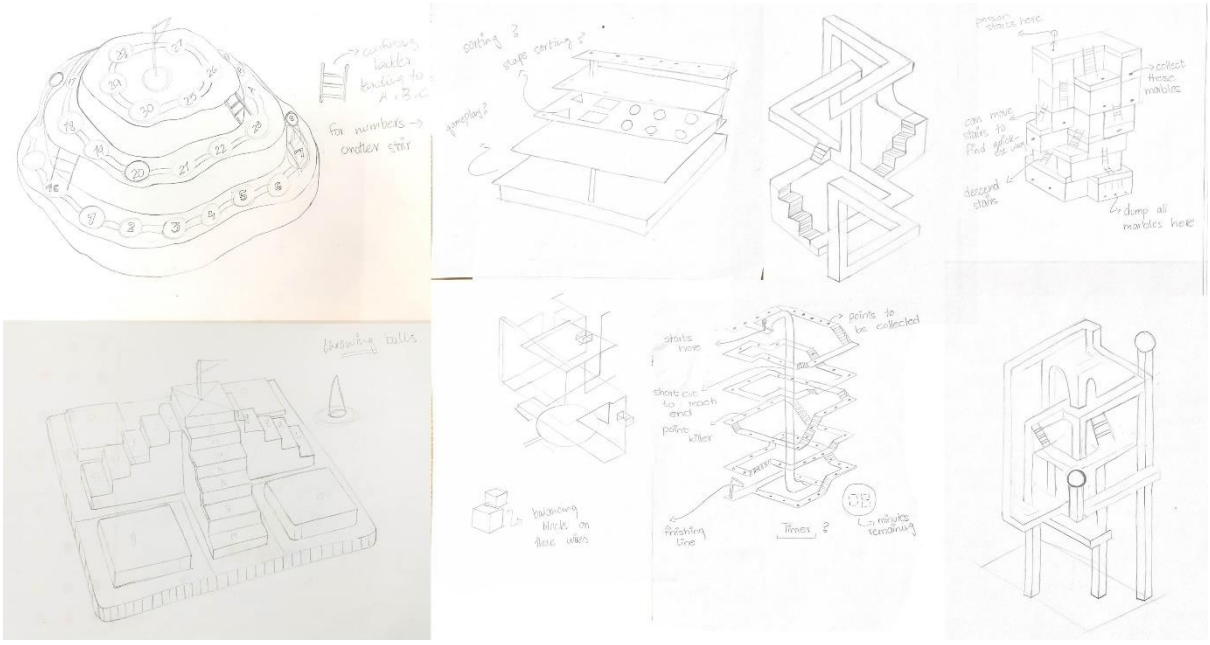
5. Game Development

5.1 Initial Ideation

In the initial ideation phase of this project, the focus was on brainstorming individual tasks or activities, each targeting a specific symptom. For example, an idea involved providing the kid with mixed up coloured blocks that the kid had to arrange and organize according to a pattern given.

5.2 Further Ideation

The next stage of ideation involved creating multi-layered tabletop games designed to improve various symptoms. This approach was mainly about designing a single game with multiple levels, each level targeting different ADHD symptoms to provide an engaging experience for children.



5.3 Some more brainstorming

At this stage, it was clear that the game would feature multiple levels, with each level aiming to help improve a specific symptom. During this phase, the idea of designing the game around a central theme was also brainstormed, linking the multi-level structure and giving it a cohesive storyline.

The attached photos display a multi-level tabletop game, centred around supermarket theme. This game comprised of three levels:

1. Organizing and arranging in limited time: children with supposed to first add fruits of their choice into the cart. They then had to arrange the selected fruits according to their colour, shapes or sizes as per instructions given. Basic organizing and arranging skills were being practiced in this level.
2. Strategy Thinking: children were given careful instructions in which it was stated that they had to move the cart from one point to another but only following the red track and not the blue one. They were also supposed to collect coins on the way and avoid getting distracted. The purpose of this level was to see if the child carefully follows the instructions despite the distractions.
3. Memory Building: in the beginning of this level, children were supposed to pick up any coloured block from the cart, listen to the sound it generated and memorize it. They were then supposed to move the cart (with the selected block) towards the shelves where once again they would hear the original sound. Upon hearing and seeing a light blink for a microsecond, children were asked to pick up the appropriate block. This level aimed to provide exercises that involve memory building.

5.4 Usability Testing

After coming up with a multi-level game centred around a theme, i.e. supermarket in this case, usability testing was conducted with children to observe their interaction and experience.

5.4.1 Usability Goals

1. Engagement: To ensure that the game is interesting and capable of holding a child's attention.
2. Clarity: To make sure instructions and objectives are quite clear and easily understood.
3. Non-overstimulation: To create a visually appealing but not overly stimulating environment to avoid overwhelming the children.

4. Ease of Transition: To confirm that there is smooth transition between levels to enhance the overall navigation and user experience.

5.4.2 Testing Methodologies

1. Observation: Observing the children as they progressed through the game to see if they can understand what to do, if they are able to interact with the game easily, where do they feel stuck and how easily are they able to shift to different levels.
2. Task Performance: Measuring how well the children perform specific tasks within the game such as completing the assigned tasks, organizing and arranging items as per instructions or remembering the verbal instructions.
3. Feedback from parents / teachers: It was essential to gather feedback from parents or teachers who have observed the children play the game to gain additional insights into the game's impact and look for areas for improvement.

5.4.3 Recruitment Criteria

Children aged seven to eight years old were selected for the testing as the game is primarily designed specifically for this age group. Participants were clinically diagnosed with ADHD and were receiving treatment from a psychologist. Children who were comfortable and interested in playing games were selected to ensure they are engaged and motivated.

5.4.4 Testing Environment

The testing was carried out at a clinic with psychologists where children were being treated.

5.4.5 Usability Testing Feedback

Some key points noted down after testing the game with the children:

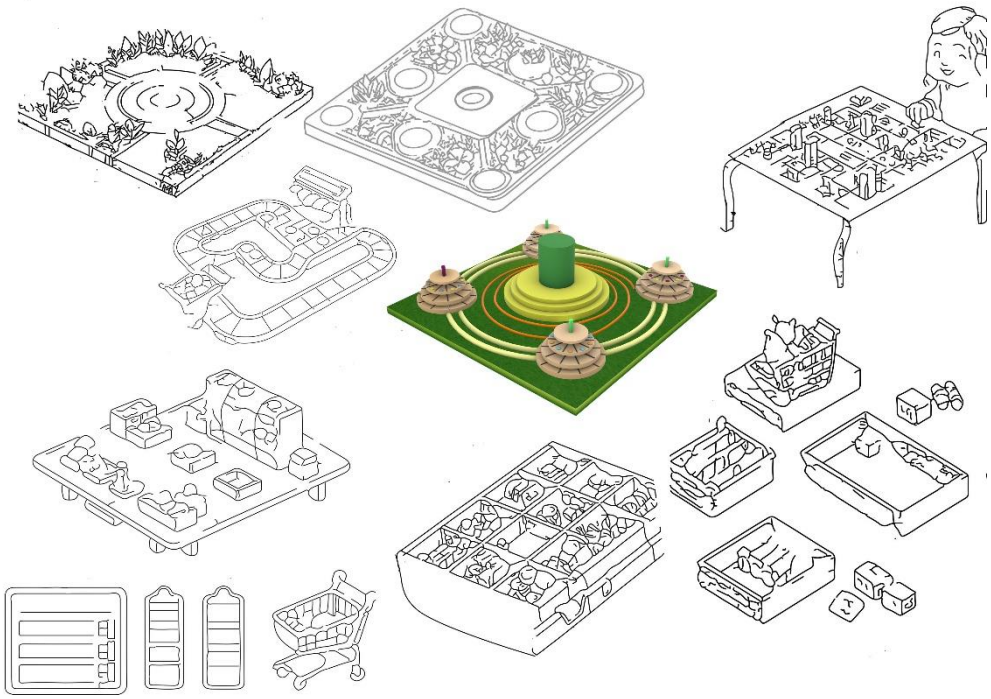
1. *Cluttered Background:* the children found the checkered background too cluttered and felt overwhelmed and distracted.
2. *Use of Wrong Colours*: the use of bright colours like red, blue, sharp tones of green were triggering their hyperactivity, making it difficult for them to concentrate.
3. *Difficult Understanding*: due to lack of coherence between the three levels, children felt confused about what are they supposed to do.
4. *Confusing transition between levels*: since the three levels were not coherent, the transition from Level 1 to 2 or from Level 2 to 3 was quite confusing, leading to negative experience.
5. *Simple Tasks:* the assigned tasks were too simple due to which the children felt bored and weren't interested in playing the game.

5.5 Refining the Solution

1. ***Better Theme***: The overall theme of the game was changed.
2. ***Simplified Background:*** The game's background was redesigned to be less cluttered, reducing visual distractions and creating a calmer environment.
3. ***Revisited Colour Scheme***: The colour scheme was modified to use more subdued tones, minimizing the risk of hyperactivity and making the game visually soothing.
4. ***Smooth transitions:*** Transitions between levels were streamlined to be more intuitive and less frustrating, helping children progress through easily.
5. ***Feedback Mechanisms***: Feedback system was introduced that provided the child with positive reinforcement and motivation.
6. ***Enhanced Task Complexity***: The tasks were made more challenging and engaging, preventing boredom and maintaining the child's interest.

5.6 Further Development

In this stage of ideation, I decided to move away from supermarket theme since children were not fond of the theme as observed in the last usability testing. Instead, I explored a garden theme after learning that the shades of green and blue have a calming effect on children with ADHD. This new concept involved creating different zones in the garden, each one focusing on specific ADHD symptoms. Instead of having different levels, as mentioned above, this theme provided a more immersive and fun experience. Each zone offered different set of tasks tailored to address different challenges.



5.7 Usability Testing

After a lot of brainstorming on designing a garden themed game and after finalizing a design out of many, it was time to validate the effectiveness of the game by usability testing. Testing was carried out with the same goals and methodologies as described earlier.

5.7.1 Usability Testing Feedback

After conducting usability testing with the garden themed game, various key points of feedback were gathered:

1. **Attraction to the vibrant colours**: the children were immediately drawn towards the game due to its vibrant colours and visually appealing garden themed game. This helped in capturing their interest.
2. **Understanding the tasks**: since the tasks were now divided into different zones, it was easier for them to understand what to do. They were able to understand the tasks, found the instructions clear and were able to easily follow what was expected of them.
3. **Navigation Confusion**: Some children found navigating between the different zones a bit confusing. It was unclear to them which zone had to be covered first. The transition between zones wasn't as intuitive as needed, which caused some disorientation.
4. **Repetition of Zones**: Some children felt bored by the end of the game due to repetition of same kind of zones.
5. **Enjoyment of flower activities**: The children particularly enjoyed the activities involving flowers. These tasks engaged the children well and seemed to be a highlight of their experience.
6. **Game size**: The overall size of the game was considered too large. This led to difficulty in handling and moving the game.

This feedback highlights both the strengths and areas for improvement, guiding further refinements to make the game even more effective and enjoyable for children.

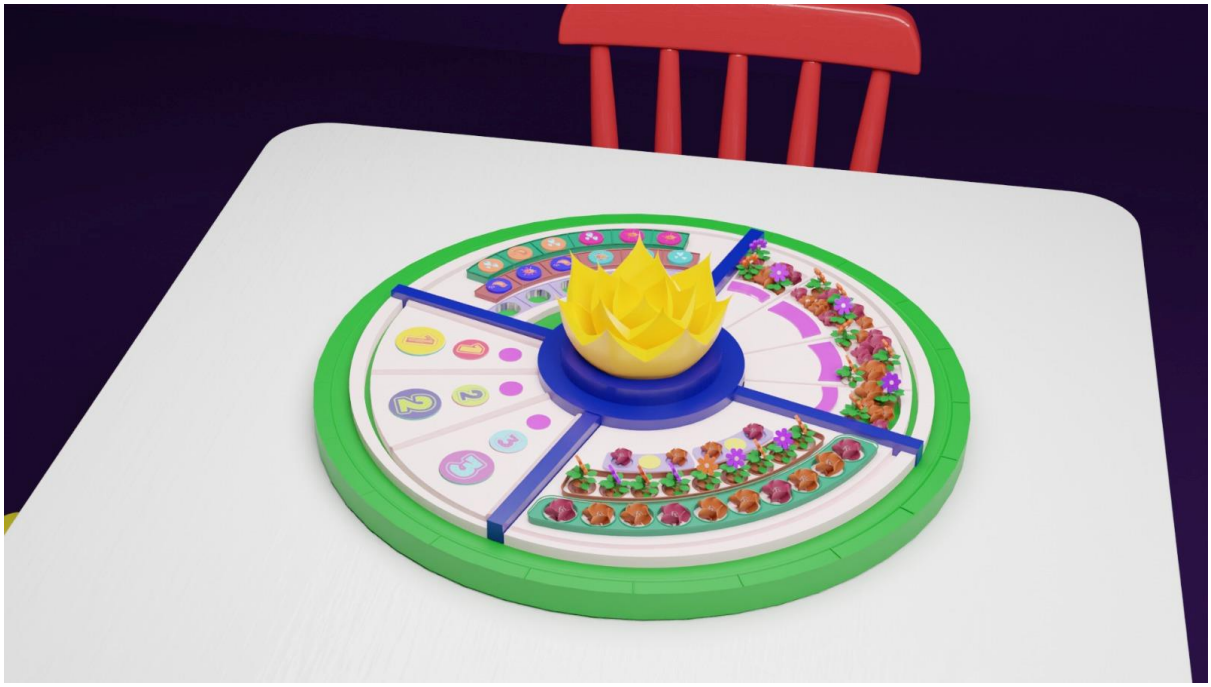
5.8 Final Proposed Solution

Based on the feedback gathered earlier, important improvements were made to enhance the effectiveness of the game:

1. Maintaining the Garden Theme: the final game followed the garden theme, which was highly appreciated for its vibrant and attractive colours.

2. Optimized Game Size: one of the major changes was changing the form and the size of the game. The new design is more compact, making it easier to handle.
3. Simplified Navigation: Improvements were made to the navigation between the four zones. Clear and intuitive transitions were implemented to help children move from one zone to another without any confusion.
4. Balanced Zone Complexity: the complexity of the four zones was carefully balanced to make sure that the game remained challenging yet manageable. This adjustment made the game less overwhelming and more enjoyable for the children.
5. Enhanced Flower Activities: based upon the positive feedback gathered, tasks involving flowers were further developed and integrated more prominently within the game. Additional interactive elements were added to make the activities more fun.
6. User-Friendly Design: overall the game's design was refined to be more user-friendly, considering the need for clear, structured and visually appealing elements.

6. FocusQuest Game



6.1 How to Play?

The game is divided into four zones:

Zone 1: Focus Begins Here – the game starts here. In this zone, children are given the freedom of picking up any flowers of their choice in the given time. This zone aims to warm up and make the child feel comfortable and at ease.

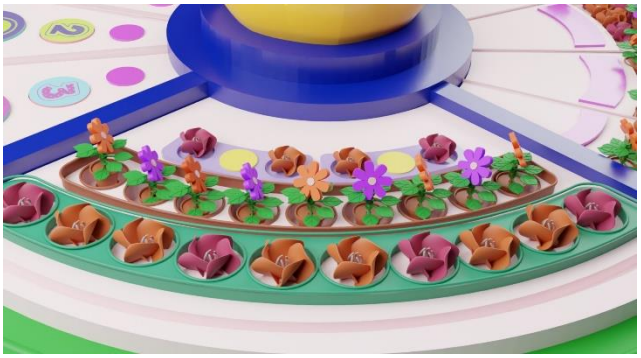
Zone 2: Creativity Blooms – children are now given instructions on how to organize and arrange the picked flowers in the last zone. They are told to arrange them by colour, by size or are given a pattern. In this zone, the aim is to teach them to arrange and organize the different items.

Zone 3: Cultivating Confidence – aims to build self-esteem in children. They are supposed to pick up numbers of specific colour as per the instruction given verbally. This zone intends to help children focus for longer period and build the tendency to listen and follow the instructions given.

Zone 4: Finding Calm – once the child has completed zone 3, they will be able to hear series of sounds, be it sound of water dropping, birds chirping or some magical sparkles. Children are told to carefully listen to the sounds first and then pick up the coins as per the pattern heard earlier. This zone aims to build memory skills in children.

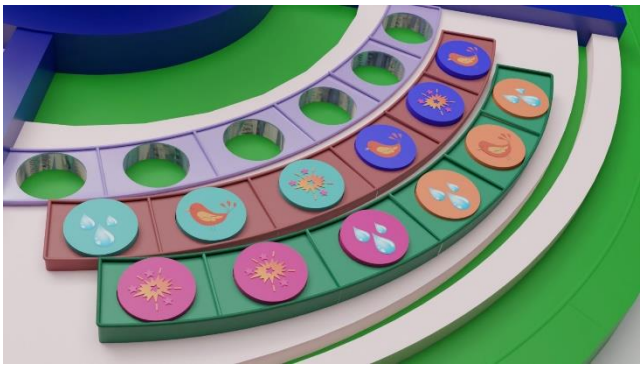
The central yellow flower provides feedback to the child, helping in keeping him / her engaged. It lights up on the completion of a zone, blinks if the child follows a pattern wrongly. The game also has auditory feedback after completion of every zone.

Zone 1: Focus Begins Here



Zone 2: Creativity Blooms!

Zone 3: Cultivating Confidence



Zone 4: Finding Calm

6.2 The App

The game comes with a mobile application for easy tracking of a child's progress. It allows parents, teachers and psychologists (if involved) to monitor the child's progress in real-time. It records data on completed tasks, calculates time spent on each task, and the areas where the child excels or struggles. Through the app, a child can collect their achievements. This can boost their motivation to play the game over and over to collect prizes. The app makes it easy to analyse data from the game sessions, making it easy for parents and teachers to understand.

6.2.1 The interface

Login Page

Profiles

Personal Profile

6.3 Manufacturing Process

The material used for all the manufacturing will be HDPE (high density polyethylene), a durable and versatile plastic. This material is known for its strength and is non-toxic, safe for children. It doesn't have any harmful chemicals or additives. It can be easily moulded into various shapes and sizes, allowing for intricate designs and detailed game components.

Usually done in 'injection moulding machine', pellets of HDPE are melted down into liquid form. The molten HDPE is injected into the prepared moulds based on the designs created. Once HDPE has cooled down, the mould is opened to release the finished parts.

6.4 Prototype

The final prototype of the proposed solution was constructed using both carving on MDF and 3D printing with PLA.

References

Reneta Kieling, Luis A. Rohde (2012), ADHD in children and adults: diagnosis and prognosis, Brazil

Maimoona Maheen, Mehak Ruqia, Muzna Mehmood, (2018), The Frequency of Attention Deficit Hyperactivity Disorder Among School Age Children of Rawalpindi, Rawalpindi Medical University

Elena de la Guia, Maria D Lozano, Victor M.R. Penichet (2015), Educational game based on distributed and tangible user interfaces to stimulate cognitive abilities in children with ADHD, Spain

Anil Chacko, Michael J Kofler, Matthew A Jarrett (2014), Improving Outcomes for Youth with ADHD: a conceptual framework for Combined Neurocognitive and Skill Based Treatment Approaches, New York

Bradley S. Peterson, Joey Trampush, Margaret Maglione, Maria Bolshakova, Mary Rozelle, Jeremy Miles, Sheila Pakdaman, Morah Brown, Sachi Yagyu, Aneesa Motala, Susanne Hempel, (2024), Treatments for ADHD in Children and Adolescents: A Systematic Review, University of Southern California

Deborah B. Johnson, Mary Anne Peabody, (2016), Primary Project: A Play Based Intervention for Early Childhood

Valerioa De Luca, Annamaria Schena, Attilio Covino, Pierpaolo Di Bitonto, (2024). Serious Games for the Treatment of Children with ADHD: The BRAVO Project, Information Systems Frontiers

Aaron Sujar, Marina Martin Moratinos, Maria Rodrgio Yanguas, Marcos Bella Fernandez, Carlos Gonzalez Tardon, David Delgado Gomez, Hilario Blasco Fontecilla, (2021). Developing Serious Video Games to Treat Attention Hyperactivity Disorder: Tutorial Guide, Madrid Spain

Greenbaum Z, (2019), A new device for treating ADHD in children

Michael J Kofler, Dustin Sarver, Sherelle Harmon, Allison Moltisanti, (2017), Working memory and organizational skills problems in ADHD, University of Virgina

Atefeh Ahmadi, Antonija Mitrovic, Badroddin Najmi, Julia J Rucklidge (2015), TARLAN, a simulation game to improve social problem solving skills of ADHD children, Iran

Research Report (AutoRecovered).docx

ORIGINALITY REPORT

8%	5%	4%	3%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Valerio DeLuca, Annamaria Schena, Attilio Covino, Pierpaolo DiBitonto et al. "Serious Games for the Treatment of Children with ADHD: The BRAVO Project", Information Systems Frontiers, 2024 Publication	1%
2	issuu.com Internet Source	1%
3	digital.unam.edu.na Internet Source	1%
4	fdocuments.in Internet Source	1%
5	Submitted to United States Educational Foundation in Pakistan (USEFP) Student Paper	1%
6	pgd.medcol.mw Internet Source	1%
7	Lecture Notes in Computer Science, 2015. Publication	<1%

8	Submitted to University of Southampton Student Paper	<1%
9	Submitted to Cardiff University Student Paper	<1%
10	www.researchgate.net Internet Source	<1%
11	vdocument.in Internet Source	<1%
12	Submitted to Buffalo State College Student Paper	<1%
13	Submitted to Victoria University Student Paper	<1%
14	concejoeducativo.org Internet Source	<1%
15	cris.unu.edu Internet Source	<1%
16	diginole.lib.fsu.edu Internet Source	<1%
17	dokumen.pub Internet Source	<1%
18	www.frontiersin.org Internet Source	<1%
19	www.aafp.org Internet Source	<1%

20	www.ncbi.nlm.nih.gov Internet Source	<1%
21	www.researchsquare.com Internet Source	<1%
22	Baek-Hwan Cho, Jeonghun Ku, Dong Pyo Jang, Saebyul Kim, Yong Hee Lee, In Young Kim, Jang Han Lee, Sun I. Kim. "The Effect of Virtual Reality Cognitive Training for Attention Enhancement", CyberPsychology & Behavior, 2002 Publication	<1%
23	Garry L. Landreth. "Play Therapy - The Art of the Relationship", Routledge, 2012 Publication	<1%
24	René Gallardo Vergara, Mónica Monserrat Gallardo. "Serious Games to Improve Attention in Boys and Girls with Attention Deficit Hyperactivity Disorder (ADHD): A Pilot Study.", Acta Colombiana de Psicología, 2023 Publication	<1%

Exclude quotes	On	Exclude matches	Off
Exclude bibliography	On		