

Design Thinking Process for DOST STARBOOKS: Whiz Challenge

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ABOUT THE CLIENT

The Department of Science and Technology (DOST) is the lead government agency in the Philippines tasked with directing, coordinating, and implementing policies, programs, and projects related to science and technology [1]. Its mandate covers a broad range of sectors, from education and industry to health and disaster resilience, all with the goal of using innovation to support national development and improve the quality of life of Filipinos [1].

Under DOST is the Science and Technology Information Institute (DOST-STII), which serves as the agency's official information arm. DOST-STII plays a key role in collecting, managing, and disseminating credible Science, Technology, and Innovation (STI) information across the country [2].

In line with this, DOST-STII's mission focuses on [2]:

- Providing credible and inclusive STI information through resource sharing and efficient delivery systems;
- Promoting public awareness, understanding, and appreciation of STI and its role in national development; and
- Empowering key stakeholders as partners and advocates in building a culture of STI.

To fulfill this mission, DOST-STII developed STARBOOKS, short for Science and Technology Academic and Research-Based Openly Operated KioskS [3]. STARBOOKS is the country's first offline digital library designed to bring S&T learning resources to communities that lack reliable internet access. Installed in schools, libraries, and public centers nationwide, it provides free and ready access to a wide array of educational materials, including science references, research papers, instructional and livelihood videos, K–12 learning modules, and financial literacy resources [4]. These materials are sourced from the DOST-STII Library and its institutional partners [3]-[4].

ABOUT THE PROJECT

To further promote scientific literacy and student engagement, the STARBOOKS Whiz Challenge was introduced as a gamified educational platform that complements the STARBOOKS project [3]-[4]. Developed by DOST-STII, this application aims to make learning about Science, Technology, Engineering, and Mathematics (STEM) topics more enjoyable, especially for students attending DOST events, science fairs, and public exhibits.

The STARBOOKS Whiz Challenge is a standalone, offline quiz-based application that runs on STARBOOKS kiosk setups [3]-[4]. It primarily features a solo quiz game where players answer multiple-choice questions on various STEM topics, aligned with the Grade 1 to 12 curriculum. It allows players to choose a difficulty level: Easy, Average, or Difficult, and answer a fixed set of questions accordingly.

A unique feature of the Whiz Challenge is its badge and reward system. After completing a quiz:

- Players who answer all questions correctly earn a badge for the chosen difficulty level.
- Once a player collects three badges in the same difficulty, they become eligible to claim a physical reward, such as educational tokens or small prizes at the DOST booth.

This simple reward-based gamification approach motivates students to try multiple times, review their knowledge, and improve their performance, all while having fun. It transforms the traditional quiz experience into something more interactive, competitive, and goal-driven.

The STARBOOKS Whiz Challenge is currently deployed during DOST-led public events, science exhibits, education fairs, and outreach activities, where STARBOOKS kiosks are physically set up. Because it works offline, the system remains accessible and functional even in venues with no internet connectivity, ensuring equal participation from students in both urban and rural areas [3]-[4].

Through this initiative, DOST-STII continues to reinforce the value of accessible, innovative learning tools, empowering the next generation of Filipino learners to explore science and technology with curiosity, confidence, and excitement [5].

STAGE 1: EMPATHIZE

The Empathize stage focuses on understanding the needs, motivations, pain points, and experiences of the stakeholders involved with the STARBOOKS: Whiz Challenge application. The goal of this stage is to immerse the team in the users' perspectives and the context in which the product is used, allowing us to identify both explicit requirements and latent needs.

For this project, the team sought to understand the perspectives of three main stakeholder groups:

1. **The STARBOOKS project team** – responsible for the vision, development, and maintenance of the application.
2. **Potential administrators** – such as teachers or librarians from STARBOOKS-partnered schools who may manage the application or assist players.
3. **End-users (players)** – primarily students from elementary to senior high school who interact with the application during events, fairs or in partner institutions.

Due to project constraints and limited access to partner schools, direct interviews with administrators and student players were not possible during this stage. Instead, insights were gathered from:

- **Ms. Marievic V. Narquita** – STARBOOKS Unit Head
- **Mr. McGyver C. Basaya** – STARBOOKS Lead Programmer, with access to both the player and admin perspectives

These interviews provided a baseline understanding of the application's current goals, user demographics, and functional scope.

1.1. Interview with the Clients



Figure 1 DOST-STII Building



Figure 2 Interview with STARBOOKS Team

On April 30, 2025, the team went to the DOST–Science and Technology Information Institute (STII) building in Taguig City for our first face-to-face meeting with the STARBOOKS team. This was our chance to ask open-ended questions and really dig deeper into the “why” and “how” of the Whiz Challenge app. The team came prepared with a list of questions focused on its purpose, audience, and limitations, as well as ideas for improvements.

For this section, Table 1 below shows the summarized questions and answers from our interview with Ms. Marievic V. Narquita, the unit head of STARBOOKS.

Table 1 Interview with Ms. Marievic V. Narquita (STARBOOKS Unit Head)

#	Question	Answer
1	Why did DOST-STII create the STARBOOKS: Whiz Challenge app?	The app was made mainly to entertain students and visitors during DOST events and science fairs. It's also a way to get them interested in Science and Math through a fun quiz game.
2	In what contexts or events is the app usually played?	It's mostly played during exhibits, science fairs, and DOST outreach programs. It's also available in some schools and libraries that have STARBOOKS kiosks.
3	Who are the main players of the app?	Mostly students from elementary, high school, and senior high school. They usually get to play it during events or when they visit places with a STARBOOKS kiosk.
4	How do players usually access the app?	The app is available offline in kiosks prepared by the organizers at events or installed in schools.
5	What are the app's main strengths or appealing features for players?	Students like the competitive quiz style and the scoring system. It's also easy to use, so players can start right away without needing a lot of instructions.
6	What challenges or limitations have you observed in the current app?	Right now, it only has a solo quiz mode with badges. There aren't other game modes to keep players engaged for long. It also can't track scores or player progress over time.
7	What kind of feedback have you received from students or teachers about the app?	There's no formal way to gather feedback yet, but during events, students seem to enjoy playing. Some have casually mentioned they'd like more variety in the games.
8	What improvements or new features would you like to see in future versions?	More game modes, especially player battles, a better-looking interface, a reward system that makes students want to keep playing, and features for tracking performance and scores.

9	How does the STARBOOKS team measure the success of the Whiz Challenge app?	Mostly by observing how many students play and/or claim rewards during events and how engaged they look.
10	How does the Whiz Challenge app align with STARBOOKS' mission?	STARBOOKS wants to make science and technology resources more accessible, especially in areas with fewer opportunities. The app supports this by making learning more interactive and enjoyable for students.

During the same meeting, the team also got the chance to talk to Mr. McGyver C. Basaya, lead programmer for the Whiz Challenge app. Since he has direct experience working on the code and has access to the admin panel, his answers gave us both a technical view and an idea of how the app is managed from an admin's perspective.

The questions for him covered the current features, technical setup, limitations, and what it's like for possible admin users such as teachers or librarians. Table 2 below summarizes his responses.

Table 2 Interview with Mr. McGyver C. Basaya (STARBOOKS Lead Programmer)

#	Question	Answer
1	What is your role in the development of the Whiz Challenge app?	I worked on programming the game, integrating the quiz logic, and setting up the admin panel features.
2	Can you describe the main features available in the current version?	The current app has a solo quiz mode with Science and Math categories. It awards badges based on performance. The admin panel allows adding and editing quiz questions.
3	How is the app usually set up during events?	It's installed on desktop PCs and can run offline to avoid internet issues.
4	Does the app collect any player data or statistics?	Yes, the admin can see the whole list of players and their badges on each kiosk.
5	How are quiz questions managed in the current system?	They're stored in a local database that's part of the app's offline package. Admins can add or edit questions through the admin panel.
6	What technical limitations have you observed with the current app?	Since it's offline, any updates to the questions need to be done manually.

		on each kiosk. Also, the players can only access their profiles on the same kiosks they logged into because syncing is not possible.
7	Are there any security or stability issues that need to be addressed?	Since it's a local setup, the quiz content can be edited directly if someone has access to the admin panel.
8	What improvements would you like to see from a development perspective?	Adding different game modes, improve interface, track performance, view analytics, and a way to sync data across different kiosks.
9	How long does it usually take to update or prepare the app for an event?	If it's just changing questions, it can be done in a few minutes. But if there are new features or bug fixes, it depends on the complexity.
10	What do you think admins like teachers or librarians would find challenging in using the current system?	Since there's no analytics or tracking, admins can't see the overall performance of users. Also, the interface is simple but not very modern, so it might not be as engaging for them to use regularly.

1.2. Personas

Personas are fictional yet realistic representations of key users, built from real data, interviews, and observations. They help the design team visualize who they are designing for, not just in terms of demographics, but also behaviors, goals, frustrations, and motivations. By putting a “face” and “story” to the users, personas make it easier to keep their needs at the center of every design decision.

For the STARBOOKS: Whiz Challenge project, the team developed two types of personas:

- **Actual Personas** – These were based on real interviews we conducted with members of the STARBOOKS team. For this stage, we created profiles for Ms. Marievic V. Narquita, the STARBOOKS Unit Head, and Mr. McGyver C. Basaya, the Lead Programmer. Both play important roles in the app’s creation and maintenance, giving us valuable insights into the purpose of the application, its current challenges, and their vision for its improvement.
- **Theoretical Personas** – These were created to represent the types of users we couldn’t directly interview due to access limitations. These include possible admins such as teachers or librarians, and players who typically interact with

the app during DOST exhibit fairs. The goal of these personas is to anticipate their needs, frustrations, and expectations based on secondhand information from our interviewees, combined with our own user research and assumptions.

By working with both actual and theoretical personas, we ensured that our design process addresses both the confirmed needs of stakeholders we spoke to and the likely needs of those we couldn't directly reach but will ultimately use or interact with the application.

Persona 1: Ms. Marievic V. Narquita (Actual)



Ms. Marievic V. Narquita

Role:
Unit Head – STARBOOKS,
DOST-STII

BACKGROUND

- oversees the STARBOOKS program nationwide
- ensures that STARBOOKS reaches communities in remote areas
- coordinates with local government units, school heads, and librarians to facilitate deployment and training

GOALS AND MOTIVATIONS

- Ensure that STARBOOKS remains accessible and useful, even in offline settings
- Increase engagement among younger audiences
- Maintain the quality and accuracy of STEM content

FRUSTRATIONS / PAIN POINTS:

- Difficulty in monitoring user engagement
- Limited ways to measure whether students are actually learning from STARBOOKS

TECH SKILLS & HABITS:

- Not directly involved in coding or programming
- Uses common project management tools like document, email, and messaging apps

STARBOOKS WHIZ CHALLENGE NEEDS:

- Additional game modes to increase user plays
- Implement player battle features for better user engagement
- A simple way to check overall game usage, to see if the app is achieving its learning goals

Figure 3 Persona 1

Persona 2: Mr. McGyver C. Basaya (Actual)



Mr. McGyver C. Basaya

Role:
Lead Programmer –
STARBOOKS, DOST-STII

BACKGROUND

- lead developer of the current STARBOOKS app
- ensures the system is stable, bug-free, and compatible with the hardware used in kiosks

GOALS AND MOTIVATIONS

- Ensure that STARBOOKS runs smoothly across all kiosks
- Incorporate new features that keep the system modern while staying resource-efficient
- Reduce downtime and improve ease of maintenance

FRUSTRATIONS / PAIN POINTS:

- Hardware limitations in some deployments
- Variability in technical skills among librarians and teachers
- Challenges in updating and syncing content in offline environments

TECH SKILLS & HABITS:

- Strong programming and troubleshooting background

STARBOOKS WHIZ CHALLENGE NEEDS:

- A game system that is lightweight but engaging
- Modular design so new games or quizzes can be added without heavy rework
- Data syncing across different kiosks for easy admin management

Figure 4 Persona 2

Persona 3: Chloe Ramirez (Theoretical)



Chloe Ramirez

Role:
Grade 5 Student –
First-time STARBOOKS
Visitor at Science Fair

BACKGROUND

- a 10-year-old elementary student visiting the science fair with her classmates
- curious with the booths and activities
- this is her first time seeing the STARBOOKS kiosks

GOALS AND MOTIVATIONS

- Try fun activities she's never done before
- Win tokens or prizes
- Play something she can easily understand in a few minutes

FRUSTRATIONS / PAIN POINTS:

- Gets bored quickly if there's too much reading
- May lose interest if the game is too hard right away
- Easily distracted by other booths

TECH SKILLS & HABITS:

- Knows how to use tablets and mobile games
- Prefers games with instant rewards or effects

STARBOOKS WHIZ CHALLENGE NEEDS:

- Eye-catching visuals
- Short game sessions
- Fun sound effects or animations that make the experience memorable

Figure 5 Persona 3

Persona 4: John Ray Santos (Theoretical)



**John Ray
Santos**

Role:
Grade 8 Student –
Public High School
(STARBOOKS User)

BACKGROUND

- a 14-year-old student in a public high school
- his school has a STARBOOKS kiosk in the library
- enjoys interactive learning

GOALS AND MOTIVATIONS

- Understand Science and Math topics in a way that feels fun and less stressful
- Compete with classmates and earn badges

FRUSTRATIONS / PAIN POINTS:

- Reading long text on the kiosk feels tiring
- STARBOOKS kiosk is too "serious" and doesn't feel exciting
- Limited time in the library because of other activities and class schedules

TECH SKILLS & HABITS:

- Very familiar with using gadgets and social media
- Can quickly learn new game mechanics if they're similar to ones he already plays

STARBOOKS WHIZ CHALLENGE NEEDS:

- Mini-games that make Science and Math feel like a challenge, not a lecture
- A way to track progress, earn rewards, and compare scores with classmates
- Colorful, animated interface that doesn't look like a plain educational app

Figure 6 Persona 4

Persona 5: Mr. Carlo Mendoza (Theoretical)



**Mr. Carlo
Mendoza**

Role:
Teacher at the
Science Fair

BACKGROUND

- accompanies a group of students from his class to the science fair
- He wants them to explore as many educational booths as possible
- He appreciates tools that can make his subject more engaging in class

GOALS AND MOTIVATIONS

- See if STARBOOKS can be integrated into his teaching
- Find ways to keep students engaged
- Discover free or low-cost educational platforms

FRUSTRATIONS / PAIN POINTS:

- Limited time at each booth due to tight schedules
- Students tend to skip the academic booths
- Hard to monitor all students at once during the fair

TECH SKILLS & HABITS:

- Comfortable with computers
- Open to trying new teaching tools if they're easy to adopt
- Often looks for free digital learning platforms

STARBOOKS WHIZ CHALLENGE NEEDS:

- Quick demo mode showcasing features without long setup
- Clear handouts or flyers explaining how schools can get STARBOOKS
- Option to show student leaderboards or instant quiz results for group engagement

Figure 7 Persona 5

Persona 6: Ms. Liza de Vera (Theoretical)



**Ms. Liza de
Vera**

Role:
School Librarian –
Public High School

BACKGROUND

- manages the school library and is also in charge of the STARBOOKS kiosks
- assists students in using the app
- reports technical issues to DOST-STII

GOALS AND MOTIVATIONS

- Increase student engagement with STARBOOKS
- Make the library not just a place for research but also for interactive learning
- Reduce the number of times she has to explain basic kiosk navigation to students

FRUSTRATIONS / PAIN POINTS:

- Students quickly lose interest if the content looks too academic
- Some students are shy to ask for help and end up not using STARBOOKS at all
- Limited training on troubleshooting

TECH SKILLS & HABITS:

- Comfortable using basic computer applications
- Relies on IT staff or DOST-STII when technical problems are too complex
- Uses social media to promote library activities

STARBOOKS WHIZ CHALLENGE NEEDS:

- Simple, attractive game interface that doesn't require long explanations
- Easy system maintenance with minimal technical steps
- Features that encourage friendly competition among students to boost kiosk visits

Figure 8 Persona 6

1.3. Empathy Maps

Empathy maps are visual tools that help the team step into the shoes of each persona and see the system from their perspective. An empathy map captures what a persona might say, think, do, and feel in a given context, along with their goals and pain points.

By exploring these dimensions, we can identify not only the functional needs of our users, but also their motivations, frustrations, and expectations. This helps guide design decisions that are user-centered and grounded in real scenarios.

Empathy Map 1: Ms. Marievic V. Narquita (STARBOOKS Unit Head)



Figure 9 Empathy Map 1

Empathy Map 2: Mr. McGyver C. Basaya (STARBOOKS Lead Programmer)



Figure 10 Empathy Map 2

Empathy Map 3: Chloe Ramirez (First-time Exhibit Visitor)



Figure 11 Empathy Map 3

Empathy Map 4: John Ray Santos (STARBOOKS User)

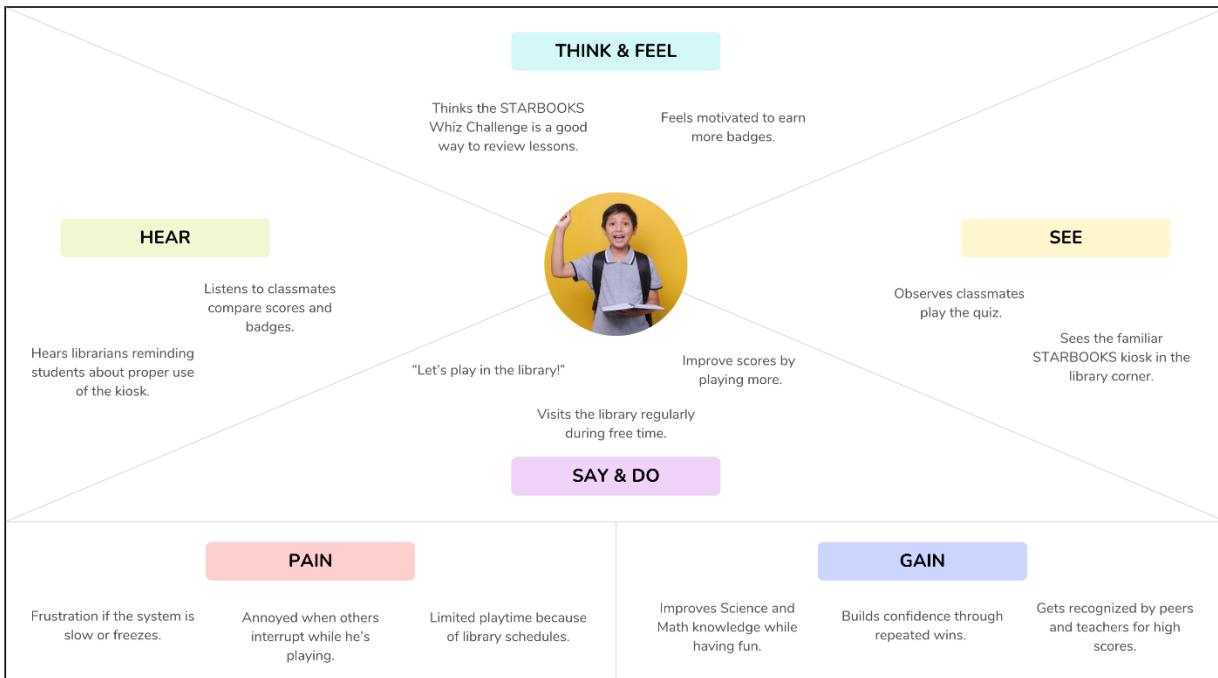


Figure 12 Empathy Map 4

Empathy Map 5: Mr. Carlo Mendoza (Teacher at the Science Fair)

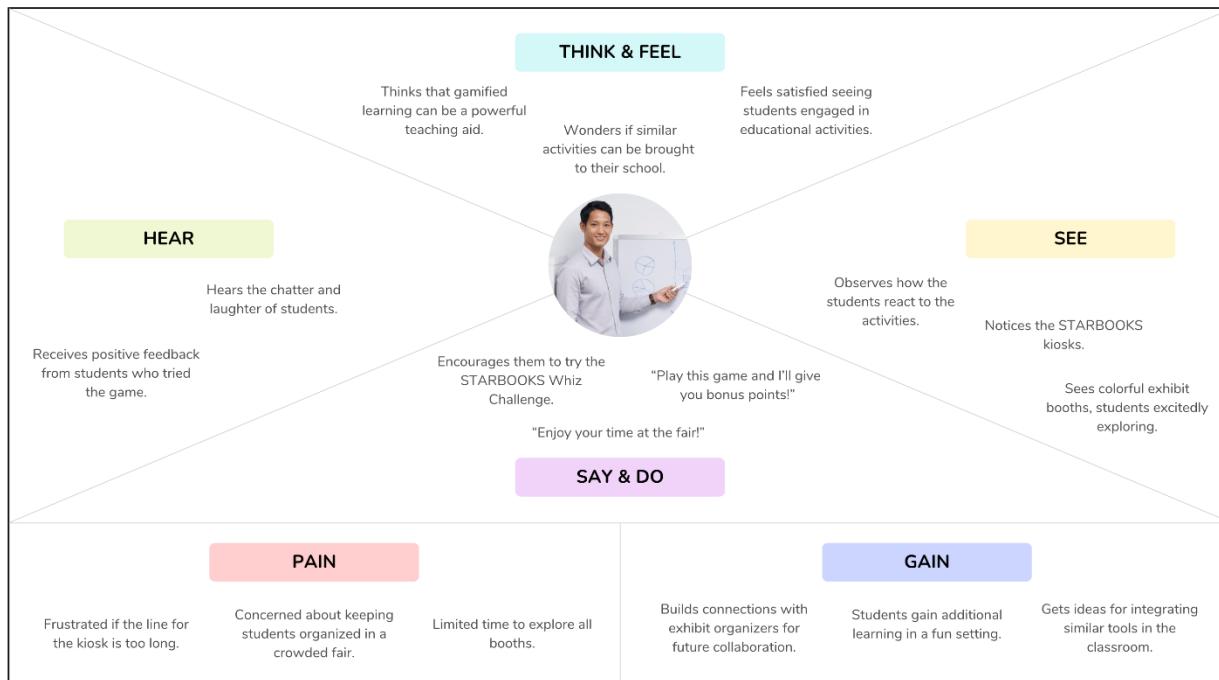


Figure 13 Empathy Map 5

Empathy Map 6: Ms. Liza de Vera (School Librarian)

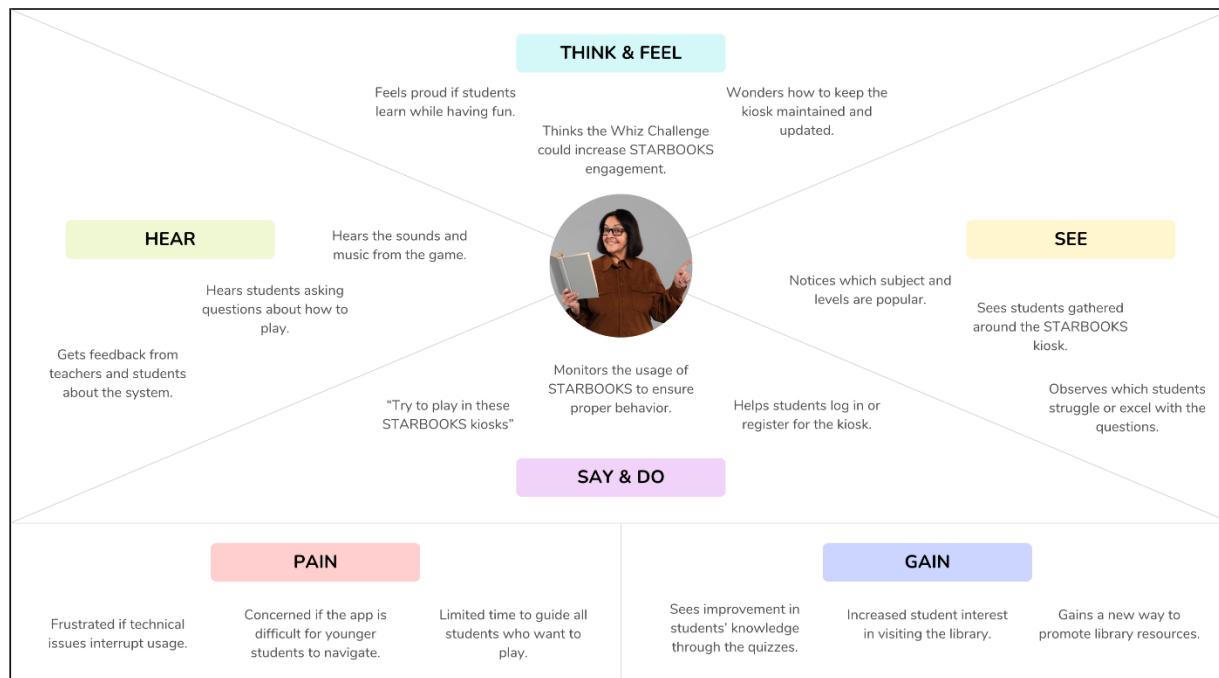


Figure 14 Empathy Map 6

1.4. Pain-Gain Analysis

Pain–Gain Analysis is a simple, yet effective tool used to identify the challenges (pains) that users face and the benefits (gains) they expect or experience when interacting with a system. By mapping out these factors for each persona, the team can better understand user needs, frustrations, and motivations. This helps in prioritizing features, improving user experience, and ensuring that the final product delivers maximum value while minimizing obstacles. Table 3 shows the summarized pain-gain analysis with the six personas.

Table 3 Pain-Gain Analysis

Persona	Pains	Gains
Ms. Marievic V. Narquita (STARBOOKS Unit Head)	Balancing educational goals with engaging gameplay; Time constraints for managing project; Limited budget/resources	Delivering an educational tool that works offline; Showcasing innovation during exhibits; Enhancing STARBOOKS appeal
Mr. McGyver C. Basaya (Lead Programmer)	Risk of technical issues during exhibits; Time pressure for development; Ensuring smooth performance offline	Creating a polished, bug-free system; Positive feedback from players
Chloe Ramirez (First-time Exhibit Visitor)	Difficulty understanding controls at first; May feel intimidated by questions	Fun, memorable exhibit experience; Learning without realizing it; Earning badges
John Ray Santos (STARBOOKS User)	Limited time to play during breaks; Difficulty answering harder questions	Enjoyable learning during free time; Comparing scores and badges with friends; Improving Science and Math skills
Mr. Carlo Mendoza (Teacher)	Keeping students engaged in large groups; Limited time for each student to try the system	A ready-made learning tool; Students excited about Science & Math; Easy integration into class visits
Ms. Liza de Vera (School Librarian)	Technical issues disrupt usage; Younger students struggle with navigation; Limited ability to guide all players	Higher student interest in library visits; Students improve knowledge while having fun; New way to promote library resources

Insights:

Looking at all the pain–gain results from the six personas, we noticed a few patterns that kept coming up:

1. Common Pains Across Personas

- **Getting started and figuring things out** – First-time users often have a hard time figuring out how to play right away without someone guiding them.
- **Limited time** – Teachers and students usually only have limited time to try the games, whether it's during a class trip to the fair or quick breaks in the library.
- **Possible tech issues** – Both the project lead and lead programmer are concerned about how the system will handle heavy use during exhibit days.

2. Common Gains Across Personas

- **Fun while learning** – Everyone appreciates that the games mix enjoyment with Science and Math lessons, making the subjects feel less intimidating.
- **Rewards and competition as motivation** – Badges and prizes keep students and visitors coming back for more tries.
- **Good image for schools and exhibits** – Teachers, librarians, and project leads see the system as something that can help promote their school or exhibit as modern and engaging.

3. Implications for System Design

- Make the onboarding process very simple so that even first-time or younger users can try without much help.
- Design games to be short and easy to replay, so visitors can enjoy them even with limited time.
- Focus on strong offline performance and have quick ways to fix issues during busy exhibit days.

STAGE 2: DEFINE

The Define stage is about making sense of all the information the team gathered during the Empathize phase. Here, we sort through the insights, group related problems together, and identify the core challenges that our STARBOOKS: Whiz Challenge application needs to address. This step helps us move from raw observations to clear, actionable problem statements.

2.1. Clustering Problems

The team scheduled an online meeting to consolidate the findings. Using a collaborative Canva whiteboard, each member listed the problems identified from the empathy maps and pain–gain analysis. The board quickly filled with sticky notes, each representing a specific user concern or frustration. Once all problems were listed, the team began grouping them into clusters based on common themes. This visual grouping shown in Figure 15 allowed everyone to see overlapping issues across different personas and pinpoint the most critical problem areas to address moving forward.

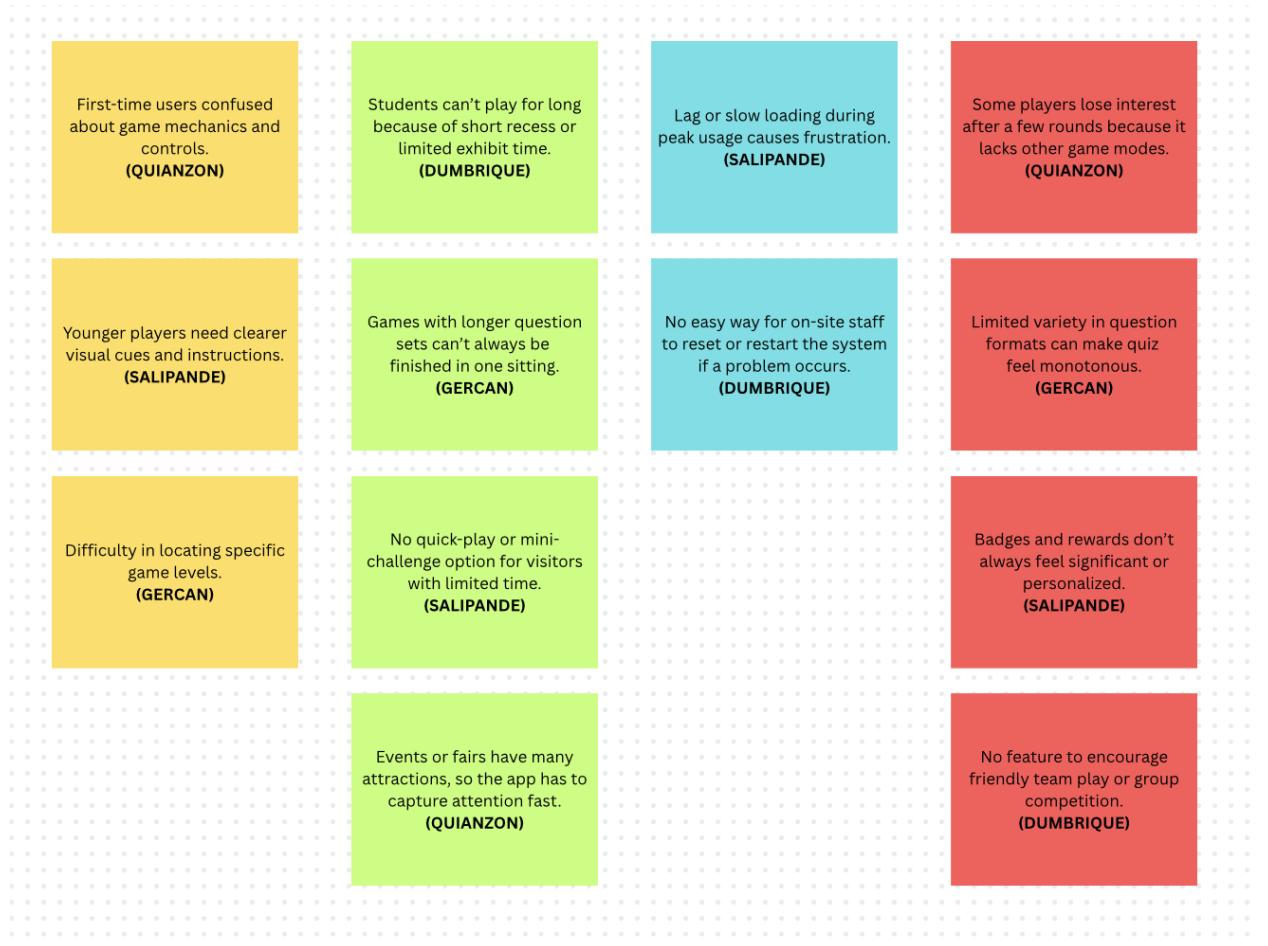


Figure 15 Clustered Problems

2.2. “How Might We” Questions

From the problem clusters, the team reframed challenges into open-ended “How Might We” questions to spark solution ideas:

1. How might we design the game interface so that even first-time or younger users can start playing without needing detailed explanations?
2. How might we simplify navigation so that key features are easy to find in just a few clicks?
3. How might we use universally familiar icons or visuals to help players understand actions without reading long text?
4. How might we structure game sessions so players can enjoy and learn from them even with only a few minutes to spare?
5. How might we let players pause and resume games without losing progress?
6. How might we ensure smooth, stable, and offline-ready gameplay during high-traffic days or in areas with limited internet access?
7. How might we make it easy for on-site staff to troubleshoot without technical training?
8. How might we keep players coming back by making the experience rewarding, competitive, and varied over time?
9. How might we balance educational content with fun gameplay mechanics so learning feels natural?
10. How might we make achievements and badges feel more meaningful to players?

STAGE 3: IDEATE

The Ideate stage focuses on generating a wide range of creative solutions based on the problems and opportunities identified in the previous stages. At this point, the team shifts from problem-definition to idea-generation, aiming to explore multiple possibilities without immediately judging or narrowing them down. The goal is to encourage free thinking, build on each other's suggestions, and combine different perspectives to come up with innovative yet feasible concepts for the improved STARBOOKS: Whiz Challenge application.

3.1. Brainstorming Session

The team gathered once again in an online meeting to exchange ideas and propose creative yet practical features for the application. Using a collaborative whiteboard, everyone contributed freely without filtering or judging the ideas at this stage.

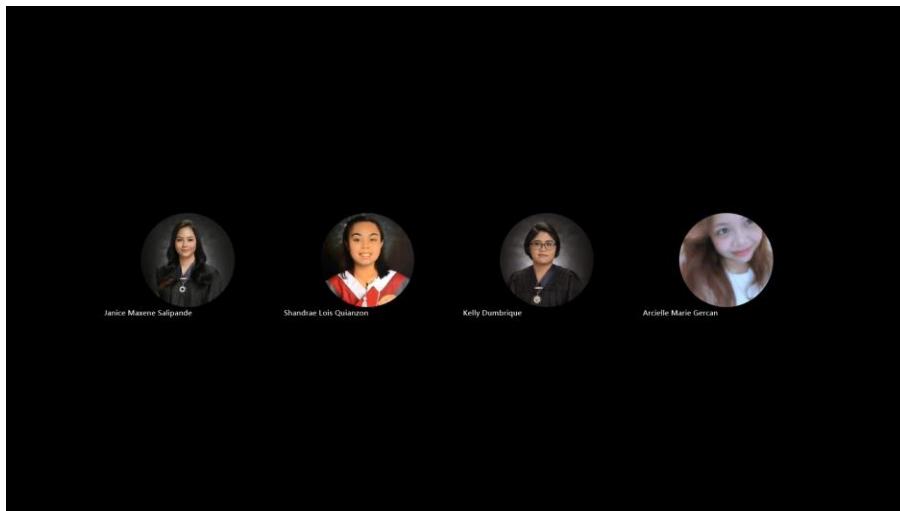


Figure 16 Brainstorming Session

3.2. Crazy 8's

Following the brainstorming session, the team proceeded with a Crazy 8's exercise to rapidly explore a wide range of design possibilities for the application. Each member was given eight minutes to create eight quick sketches, one per panel, capturing potential features, interface layouts, or user experience improvements.

Crazy 8's of Kelly Dumbrique



Figure 17 Crazy 8's of Kelly Dumbrique

Crazy 8's of Arcielle Marie Gercan



Figure 18 Crazy 8's of Arcielle Marie Gercan

Crazy 8's of Shandrae Lois Quianzon

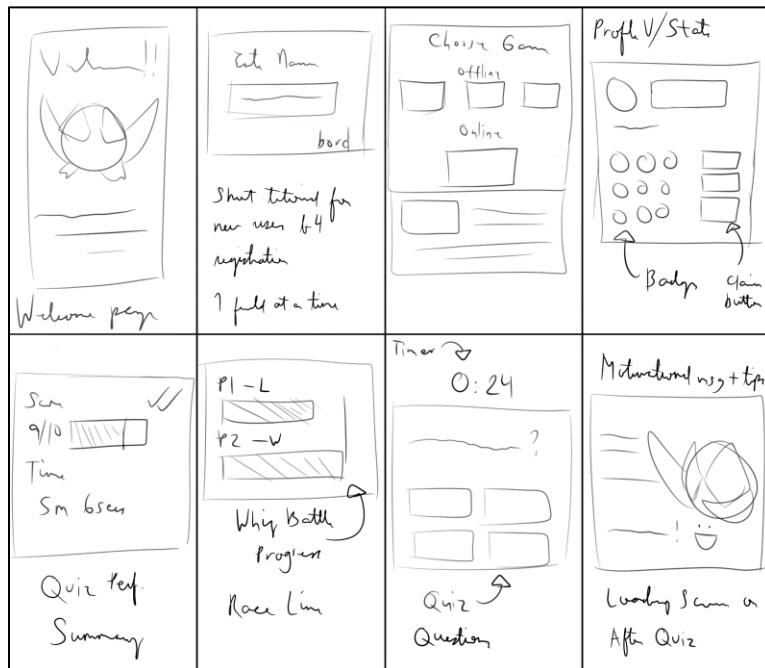


Figure 19 Crazy 8's of Shandrae Lois Quianzon

Crazy 8's of Janice Maxene Salipande

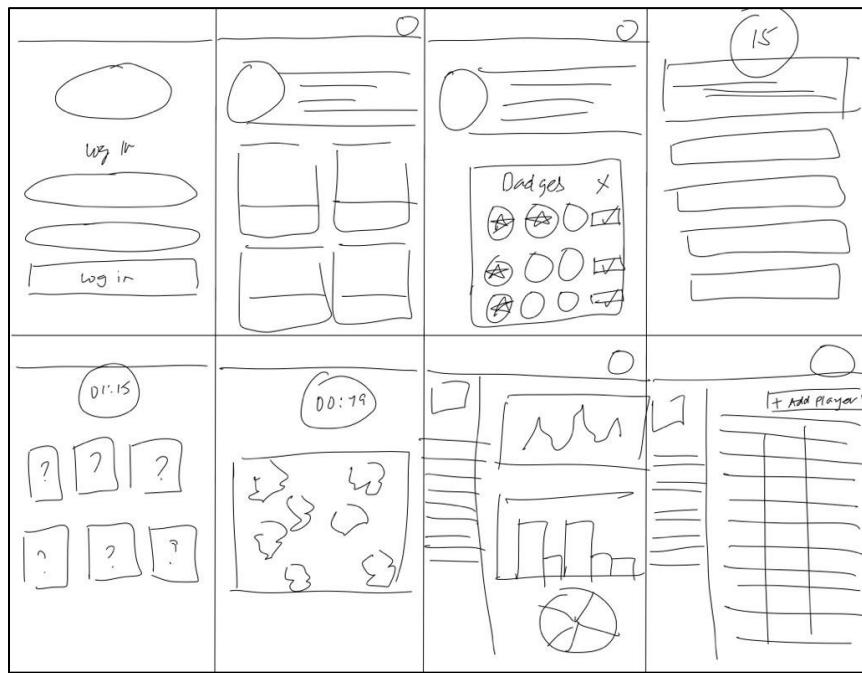


Figure 20 Crazy 8's of Janice Maxene Salipande

3.3. Post-it Voting

After generating a wide range of ideas through the Crazy 8's exercise, the team moved on to the Post-it Voting activity to identify the most promising concepts. Using the same shared Canva whiteboard, each idea from the Crazy 8's sketches was placed into a virtual "idea gallery" where all members could review them. Every participant was given a set number of virtual sticky-dot votes to allocate to the ideas they felt were most impactful, feasible, and aligned with the goals of the project. The highest-voted ideas as shown in Figure 21 were then marked for further development in the next design stages.

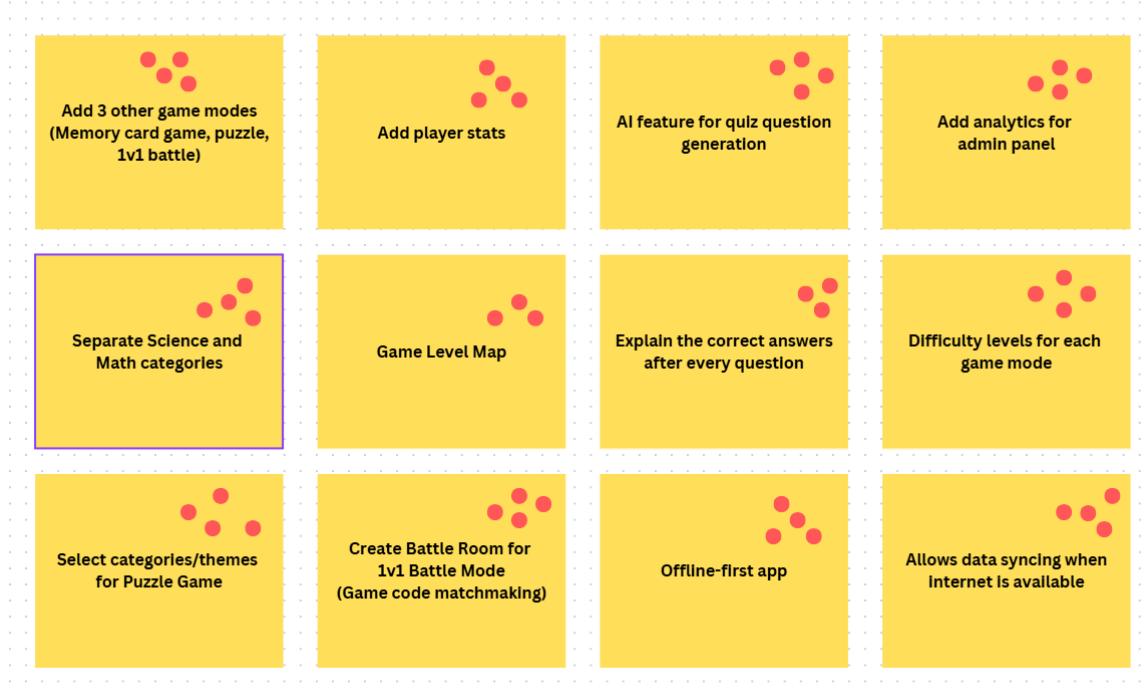


Figure 21 Post-it Voting

3.4. Desirable, Viable, Feasible

Following the Post-it Voting activity, the team evaluated the top-voted ideas against three core innovation criteria: Desirability, Viability, and Feasibility.

- **Desirable** refers to how well the idea meets the needs, wants, and preferences of the target users.
- **Viable** examines whether the idea can be sustained over time, considering factors like resources, costs, and long-term benefits.
- **Feasible** looks at the practicality of implementing the idea given the current technical skills, available tools, and timeline of the project.

This activity helped the team filter out ideas that were exciting but unrealistic and prioritize those that were both innovative and achievable within the project constraints. The resulting selection as shown in Table 4 would form the foundation for the prototype development phase.

Table 4 Desirable, Viable, Feasible

Idea	Desirable	Viable	Feasible
Add 3 other game modes (Memory card game, puzzle, 1v1 battle)	4 YES	4 YES	3 YES; 1 NO
Add player stats	4 YES	4 YES	4 YES
AI feature for quiz question generation	4 YES	4 YES	4 YES
Add analytics for admin panel	4 YES	4 YES	4 YES
Separate Science and Math categories	4 YES	4 YES	4 YES
Game Level Map	4 YES	4 YES	2 YES; 2 NO
Explain the correct answers after every question	4 YES	4 YES	4 YES
Difficulty levels for each game mode	4 YES	4 YES	4 YES
Select categories/themes for Puzzle Game	4 YES	4 YES	4 YES
Create Battle Room for 1v1 Battle Mode (Game code matchmaking)	4 YES	2 YES; 2 NO	2 YES; 2 NO
Offline-first app	4 YES	2 YES; 2 NO	2 YES; 2 NO
Allows data syncing when internet is available	4 YES	2 YES; 2 NO	2 YES; 2 NO

STAGE 4: PROTOTYPE

After finalizing the most promising ideas from the ideation stage, the team moved forward to the prototyping phase. This stage focused on transforming selected concepts into tangible, testable representations of the STARBOOKS Whiz Challenge app. Using the prioritized features from the DVF analysis, the team began creating wireframes and mockups to visualize the app's interface, flow, and functionality.

4.1. Storyboarding

For the storyboarding phase, the team mapped out the user journey of the STARBOOKS Whiz Challenge from start to finish. Instead of jumping straight into detailed UI design, we focused on telling the story of how a typical user would interact with the application in real-life scenarios.

**Storyboard 1: Exhibit visitor playing the Whiz Challenge mode
(made by Janice Maxene Salipande)**

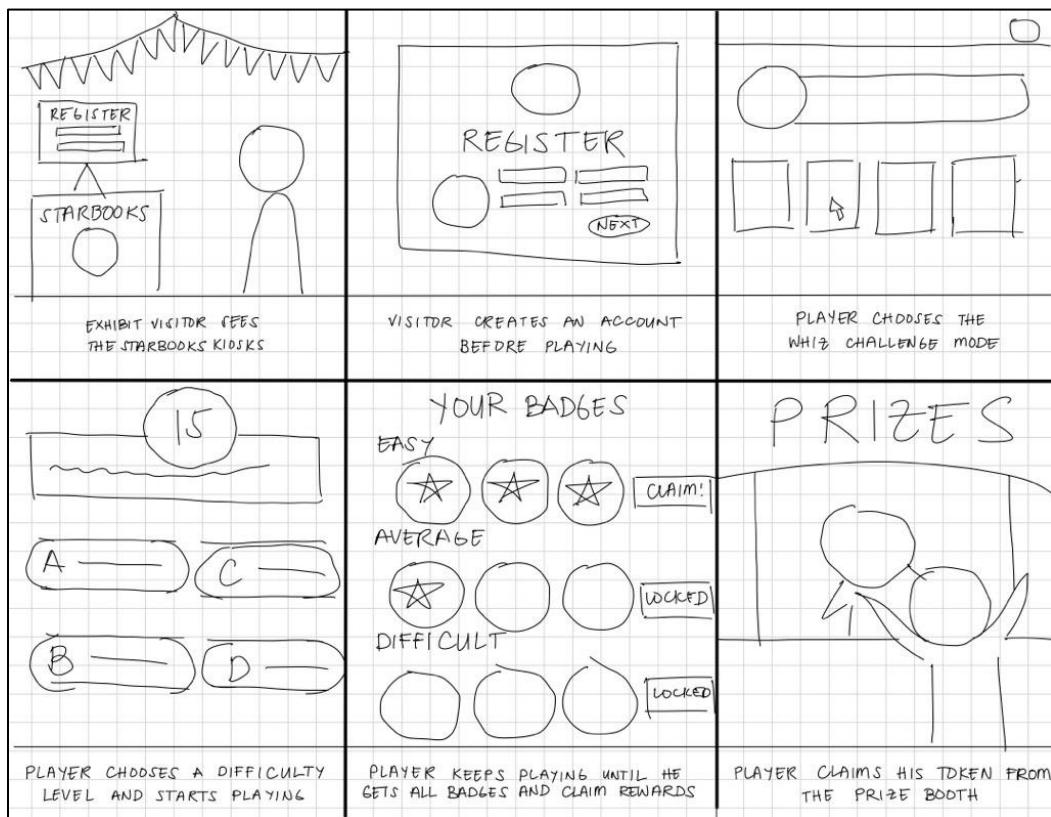


Figure 22 Storyboard 1

**Storyboard 2: Exhibit visitor playing the Memory Match and Jigsaw Puzzle modes
(made by Arcielle Marie Gercan)**

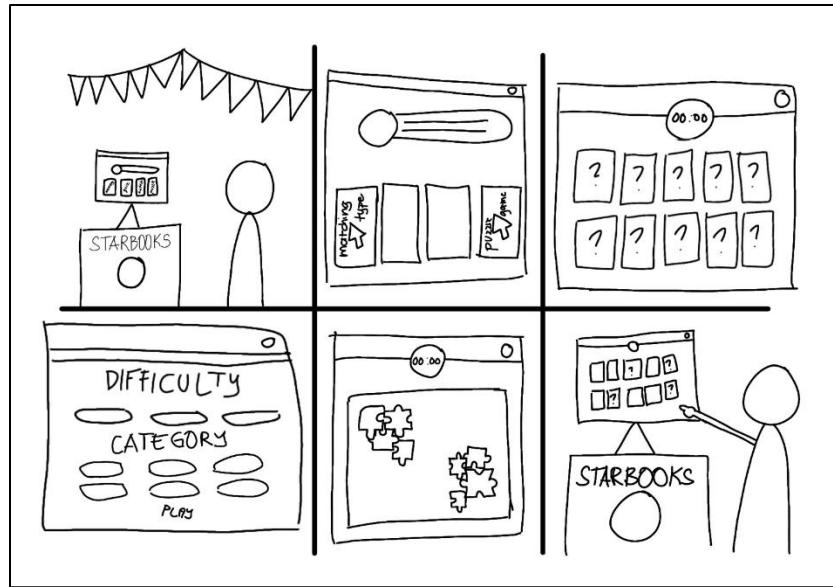


Figure 23 Storyboard 2

Storyboard 3: High school students playing against each other in the 1v1 Battle mode (made by Shandrae Lois Quianzon)

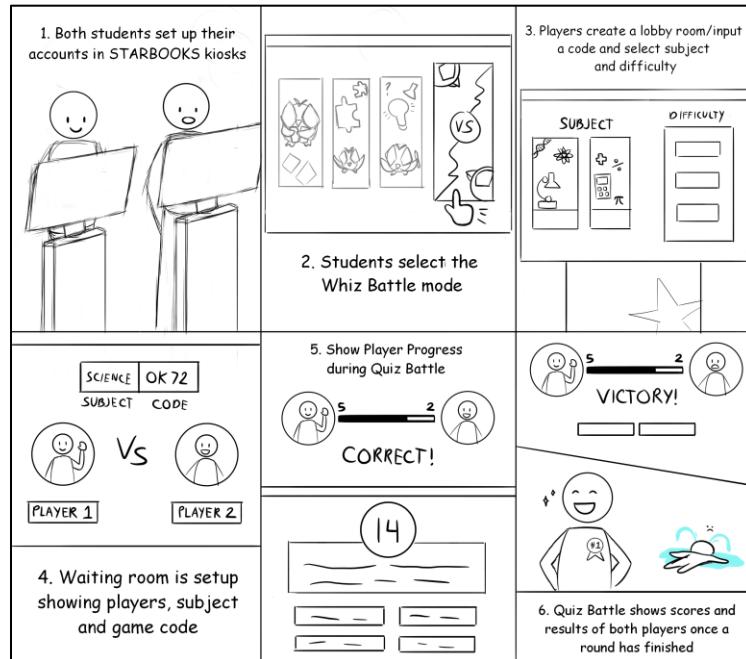


Figure 24 Storyboard 3

Storyboard 4: Librarian adding questions and viewing analytics in the admin panel (made by Kelly Dumbrique)



Figure 25 Storyboard 4

4.2. Wireframing

With the storyboard complete, the team moved on to wireframing to start translating the user journey into a tangible app layout. Using Figma, the team created low-fidelity wireframes as shown in Figure 26 that mapped out screens such as the login/register pages, homepage, game mode interfaces, player stats interface, and admin dashboard. These wireframes helped clarify how users would move through the app and ensured the team was aligned on functionality before diving into detailed design.

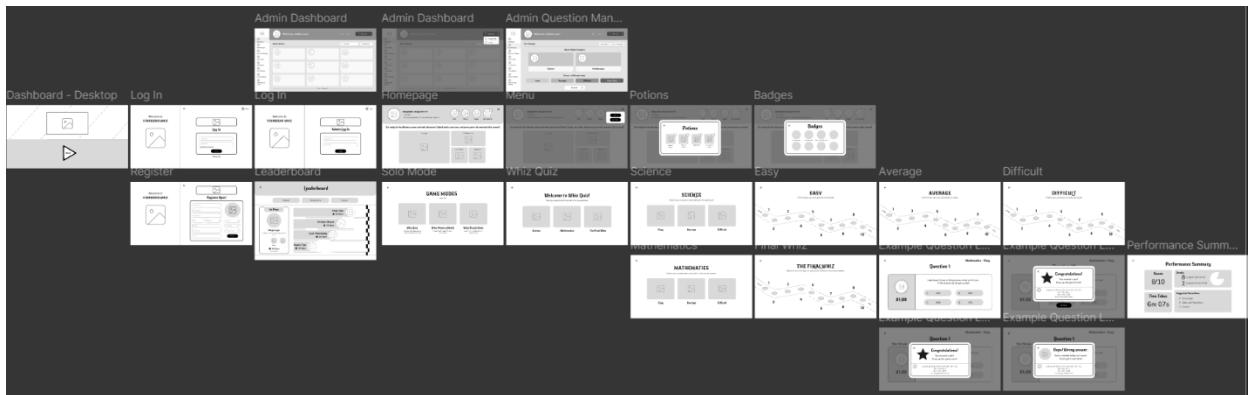


Figure 26 Wireframes

4.3. Mockup Design

After finalizing wireframes, the team progressed to creating high-fidelity mockups that brought the STARBOOKS Whiz Challenge interface to life with colors, typography, icons, and visual branding. The mockups were designed to be visually appealing while maintaining usability, ensuring clear readability for students and administrators alike. Through several iterations in Figma, the team refined UI elements, making sure the overall experience was engaging and easy to navigate. These mockups serve as a detailed guide for development and help stakeholders visualize the final product before coding begins.

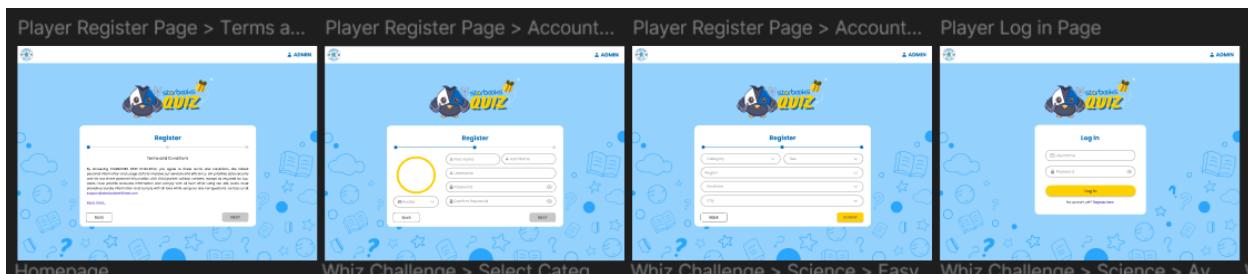


Figure 27 Register and Login Pages

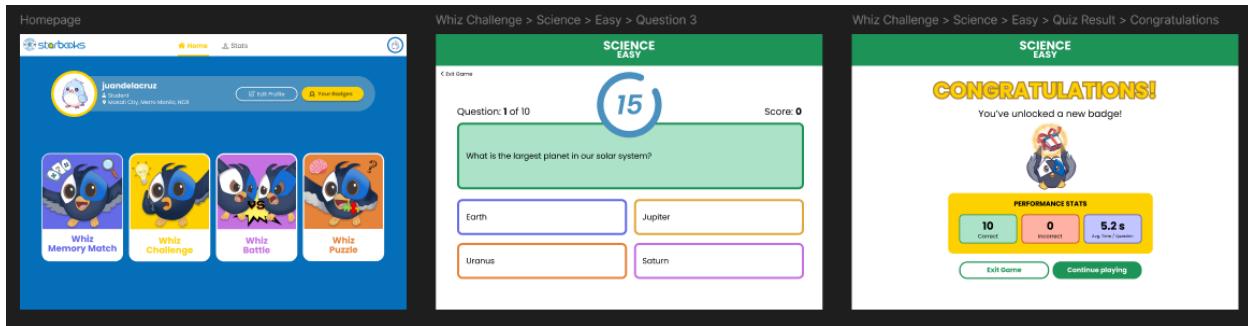


Figure 28 Whiz Challenge

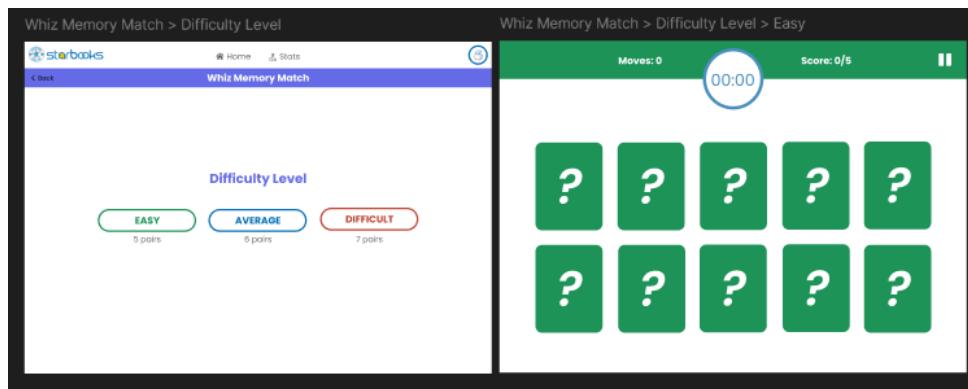


Figure 29 Whiz Memory Match

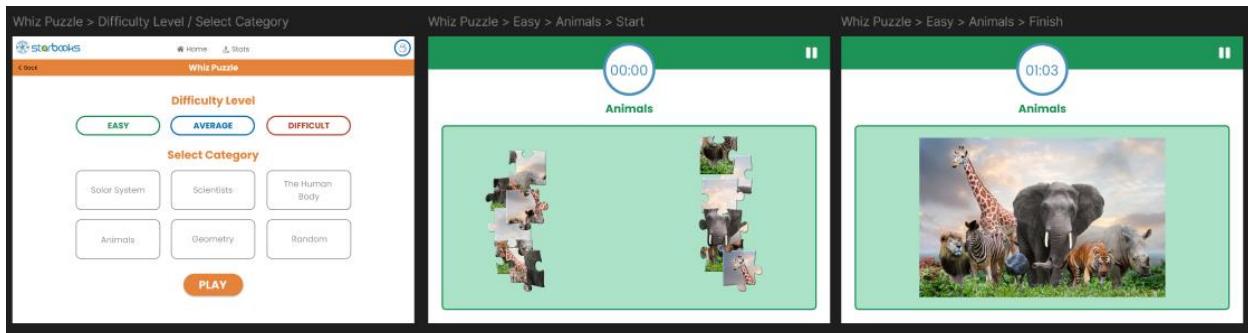


Figure 30 Whiz Puzzle

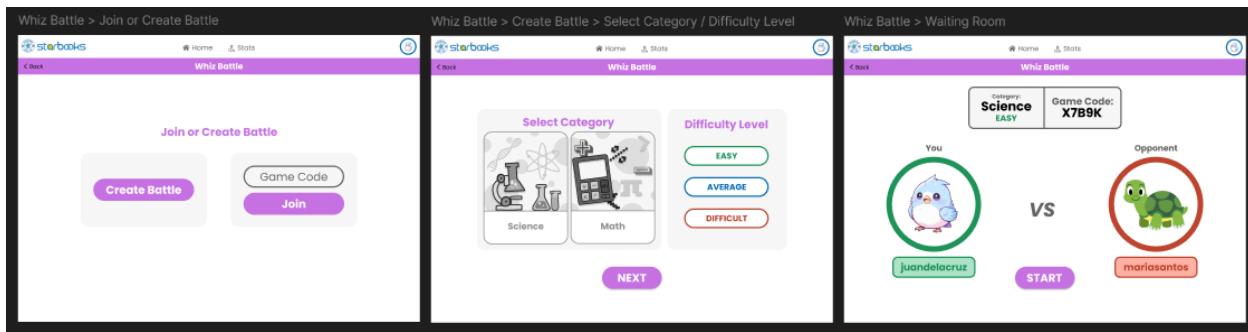


Figure 31 Whiz Battle

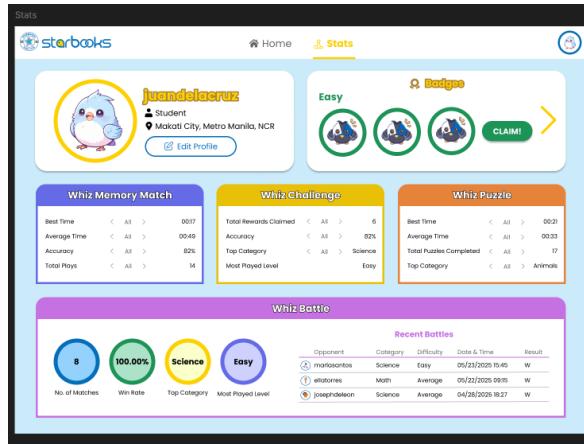


Figure 32 Player Stats

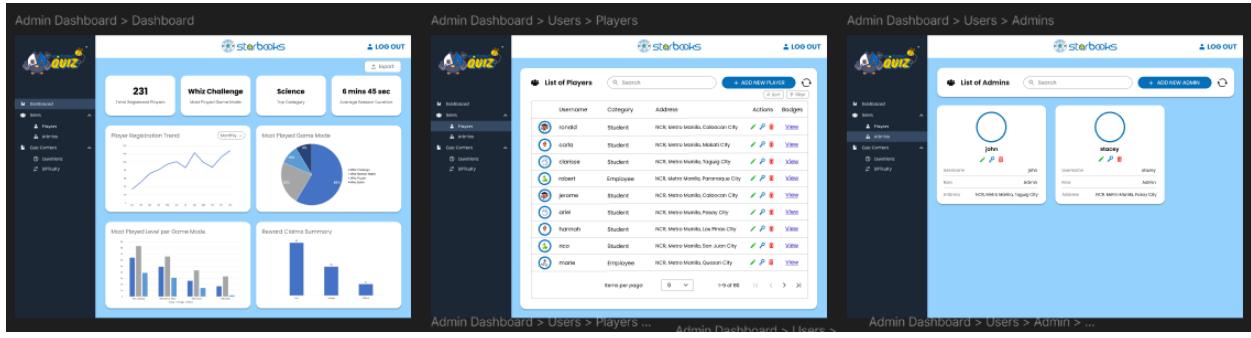


Figure 33 Admin Dashboard

STAGE 5: TEST

The final stage of the design sprint focused on validating the STARBOOKS Whiz Challenge prototype with real users to gather feedback before moving into full development. The goal was to identify any usability issues, unclear features, or improvement opportunities early on.

For this stage, the team held another onsite meeting on May 20, 2025 with the STARBOOKS team to present and review the completed mockup designs. This session served as an internal validation step to ensure that the planned features, interface layouts, and overall user experience aligned with the STARBOOKS project's objectives. Since the focus was on securing approval and feedback from the project stakeholders, the mockups were shown only to the STARBOOKS team and not yet to the target end-users (players and admins). Their insights and suggestions were documented, with the aim of making refinements ahead of the June 9, 2025 final defense, ensuring that the team would be fully prepared for the presentation.



Figure 34 May 20, 2025 Meeting

5.1. Feedback

During the meeting, the STARBOOKS team provided positive feedback as well as constructive suggestions for improvement. They appreciated the color scheme, assets, and visuals, noting that the design truly looked like a game intended for children. They also liked the game level map concept, which they felt would make progression more engaging for players.

For **enhancements**, they suggested the following:

- **Add more cards for the Memory Match Game Mode** in each level to increase challenge.

- Include **categories for the Puzzle Game Mode** so players can choose themes.
- Incorporate a **racing-style visual while players compete in the 1v1 Battle Mode** to make the gameplay more exciting.

Additionally, Mr. Basaya provided the team with a folder containing all official assets, visuals, icons, and sound effects to be used in the final design. The team also conducted a screen recording of the current STARBOOKS app to study its existing layout and features, helping guide improvements and add more details to the mockup designs.

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