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Designing a Digital Companion Progressive Web App Incorporating Augmented Reality for the Tabletop Roleplaying-Game *World of Discordia* for Educational Application in Schools

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Abstract

This thesis investigates the potential of a digital companion, specifically a progressive web app (PWA), for the tabletop role-playing game (TTRPG) *World of Discordia* to enhance its developmental benefits within an educational context in schools. The aim is to subsequently create a comprehensive concept and design document for the tool's development. Playing TTRPGs offers a range of benefits for youth, including language and communication skills, problem-solving, and social abilities. To make this more widely known and utilized, the European non-profit organization *Dragon Legion* launched a project called *The RPG Initiative*, which aims to integrate TTRPGs into school curricula across Germany, Austria, and Iceland with their system *World of Discordia*.

This research explores how a digital companion app can simplify the game process without restricting the educational and social advantages of TTRPGs, while specifically addressing the needs of student players and game directors (GDs). Key research questions focus on the potential of digital support to fulfill these needs without distracting from the traditional offline TTRPG gameplay experience. Through literature review, existing studies on TTRPGs in education and best practices in UI/UX design for children and teenagers are examined, while minding regulatory frameworks present in German schools. The possibilities of utilizing augmented reality (AR) functions to support the offline TTRPG gameplay are also explored.

In close collaboration with *The RPG Initiative*, in which I will be a facilitator, a two-layered design approach is pursued that combines User-Centered Design and Participatory Design. The design process is shaped by research through a stakeholder needs analysis and evaluated by user testing in the school *Birklehof*. The resulting tool is conceptualized as a PWA. Throughout the design and prototypical development process, iterative feedback loops are employed to assess the usability and feasibility.

The result is a holistic concept presented to the *Dragon Legion* for the development of their digital tool for *World of Discordia*, offering suggestions for future research and implementation in schools.

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List of Abbreviations

AG	Arbeitsgemeinschaft (eng.: working group)
AR	Augmented Reality
COPPA	Children's Online Privacy Protection Act
D&D	<i>Dungeons & Dragons</i>
DM	Dungeon Master (Game Master in <i>Dungeons & Dragons</i>)
GD	Game Director (Game Master in <i>World of Discordia</i>)
GDPR	General Data Protection Regulation
GM	Game Master
IAP	In-App-Purchase
NPC	Non-Player Character
PC	Player Character
PD	Participatory Design
PWA	Progressive Web App
RPG	Role-Playing-Game
SSI	Semi-Structured Interview
TTRPG	Tabletop Role-Playing-Game
UCD	User-Centered Design
UI	User Interface
UX	User Experience
VTT	Virtual Tabletop
WoD	<i>World of Discordia</i>
WYSIWYG	What You See Is What You Get
XdN	Expression for rolling polyhedral dice in TTRPGs where X is the number of dice and N the type of dice by the number of faces

1 Introduction

Before diving into the needs analysis and design process, it is important to first establish an understanding of the subject of this work and why it matters. This introductory chapter covers the basics of tabletop role-playing games (TTRPGs), their benefits for young players, and the *Dragon Legion's RPG Initiative*, which forms the real-world basis for this research. In addition, the focus of this work is presented with the most important research questions and the underlying methodology.

1.1 Tabletop Role-Playing Games

Due to their complexity and diversity, role-playing games (RPGs) form a separate category in the gaming world. Among these, tabletop role-playing games (TRPGs)[...] have a number of features that could be potentially used for human skills and personal development. A TRPG refers to the progressive creation in a small group of players of a type of collaborative narrative animated by a game master, in which each player takes on a main role.
(Daniau, 2016, p. 3)

Note that while Daniau refers to them as TRPGs, the abbreviation TTRPG will be used in this work. Arguably, the first TTRPG that became popular was *Dungeons & Dragons (D&D)*, originally released in 1974 (BBC News, 2014; Roll20 LLC, 2016). As of 2020, more than 50 million *D&D* players to date were estimated with a 40% female and 60% male player base. “As far as age goes, 24% of players – the largest group – are between the ages of 20 to 24. Meanwhile, 15-19 year olds make up just 12% of the player base, making them the smallest group” (Corliss, 2021).

To understand what makes TTRPGs interesting for educational purposes and identify the context for which the digital app will be designed, it is necessary to first briefly examine the core elements that define a tabletop role-playing game.

1.1.1 What is a TTRPG

Gabe: ‘*Hmm, I think I’ll light my lantern. Ah, damn I forgot my character doesn’t have it anymore[.]*’

Ella: ‘*My character lights a match. What can we see now?*’

Steve: ‘*You can see properly now. Some of the bookcases have collapsed and their contents have spilled onto the floor. Are you going to go further in?*’

(Dragon Legion e.V., 2024d, p. 2)

In tabletop role-playing games, a group of players gets together at a table to tell a collaborative narrative. The game material usually provides the framework for the story with descriptions of the game world, rules to guide the gameplay, and inspiration for the atmosphere, as well as pre-made characters and visual aids such as maps or pictures (Daniau, 2016; Dragon Legion e.V., 2024c). In many TTRPGs such as *D&D* and *World of Discordia* (more about this in Chapter [1.2.3 World of Discordia](#)), the gameplay often includes rolling polyhedral dice to decide outcomes of tasks that the players might fail at, such as jumping a far distance or attacking a monster, introducing an element of chance (Dragon Legion e.V., 2024c; Wizards of the Coast, 2014).

One of the players assumes the role of the one often referred to as game master (GM), in *D&D* as dungeon master (DM), or in *World of Discordia* as game director (GD), who guides the story and plays the part of the world. The game master may use existing games, prepare their own scenarios, or even improvise spontaneously (Daniau, 2016; Dragon Legion e.V., 2024c; Wizards of the Coast, 2014). Daniau highlights this role and sorts the tasks of a game master into four different key dimensions:

- **Context:** Describes the world in which the characters move and provides an exciting story (Narrative).

- **Properties:** Ensures that the rules are followed and settles differences with or between players (Gaming).
- **Progress:** Interprets the characters in the game and promotes interaction between the characters (Simulation).
- **Functions:** Ensures the cohesion of the group's imagination and the fun of the game (Coherence).

The first three dimensions of play - narrative, gaming, and simulation, reflect the GNS theory, which describes how players interact and engage in role-playing games. The fourth dimension, coherence, emphasizes the collaborative process that leads to a shared fantasy world (Daniau, 2016).

At the beginning of the game, the game master describes the environment and the situation in which the characters find themselves. The players then create their characters with individual background stories and abilities. The game master can support the players in creating the characters. As soon as the characters come together, the actual game begins. The players mainly interact verbally, but can also use notes, drawings, or other aids. They search for information, solve problems, analyze situations, and make decisions to achieve their individual and common goals, such as finding a character's long-lost brother (individual) or defeating a monster to finish a quest given to the group (common). They alternate between speaking as their characters, discussing rules, and describing their actions. The game usually ends when the characters have achieved their goals (Daniau, 2016, Dragon Legion e.V., 2024c; Wizards of the Coast, 2014). Prager (2019) highlights the leveling aspect in role-playing games, where both the players as well as their player-created or predefined characters "develop their knowledge and skills which result in an increase of influence over the game world" (p. 1), which he compares to the mastery model.

1.1.2 The Benefits of TTRPGs for Youth

Gathered around an arcane collection of strangely shaped dice, a handful of fifth-graders debate how to best infiltrate the fortress at the center of a haunted forest; an hour later they are working together to solve a dragon's riddle; a week later they are putting those same problem-solving and debate skills to use in a Language Arts classroom. (Prager, 2019, p. 1)

When *Dungeons & Dragons* first became popular, some believed it was “an occult tool that opens up young people to influence or possession by demons” (BBC News, 2014). However, leaving aside the generally growing popularity of TTRPGs like *D&D* as mentioned previously, recent research has shown that playing TTRPGs can have several positive effects, especially on youth, including the development of communication and collaboration skills, enhancement of cognitive abilities, and the opportunity for personal growth (Cook, 2016; Daniau, 2016; Prager 2019).

Daniau (2016) emphasizes the transformative potential of TTRPGs and the four dimensions of reality that participants experience in a transformative role-playing game: character, player, person, and human being; which are associated with four dimensions of learning: knowing, doing, being, and relating. Cook, Gremo, and Morgan (2016), in their study, focus on the practical application of TTRPGs in the English Language Arts classroom and highlight how TTRPGs can lead to enhanced engagement and deeper thinking about texts. Prager's (2019) review of the literature supports the idea that TTRPGs can be used to develop collaboration and communication skills.

In summary, TTRPGs can foster:

- **Social skills:** TTRPGs provide opportunities for players to interact, negotiate, and collaborate with one another in a shared fictional world, which can help them practice communication, teamwork, and leadership (Cook, 2016; Daniau, 2016; Prager, 2019).

- **Problem-solving and critical thinking:** Players are often presented with complex challenges that require them to think creatively and strategically (Daniau, 2016).
- **Creativity and Imagination:** Character creation and the development of a shared narrative foster imagination and require creative storytelling (Daniau, 2016; Prager, 2019).
- **Personal Growth and Self-Awareness:** Players are allowed to explore different roles, develop confidence, and reflect on their experiences (Daniau, 2016).
- **Language Comprehension and Application of Knowledge:** Players are required to understand and use information from the story to make informed decisions (Cook, 2016).
- **Community:** The collaborative nature of the game enables a sense of community among players (Cook, 2016).

It is important to note that these researchers focused on the game being played together in person in an educational context. While it is possible to play TTRPGs online, for example in video calls assisted by digital tools, and achieve social and emotional benefits as shown in a paper by foundry10 (Pitt et al., 2023), this thesis primarily concentrates on offline gameplay. Digital tools and their usability at the table are discussed later in Chapter [2.3 Overview of Digital Tools](#).

1.2 *Dragon Legion*

Global Growth Insights (2024) states North America as the dominant TTRPG market and highlights that “[c]ommunity events, conventions, and digital tools also contribute to the region’s leadership”. The market for TTRPGs in Europe is growing, “with countries like Germany, France, and the UK driving demand” (*ibid.*). In Germany, conventions like Gamescom provide spaces for TTRPG communities to extend their reach. At Gamescom 2023, the German TTRPG community *Lurch und Lama*

operated a booth where they offered short one-hour-adventures, so-called one-shots, to fair visitors in various game systems such as *DSA*, *Vaesen*, *Cyberpunk Red* and *No Return*. One of the supporting communities at this booth was the *Dragon Legion*, which I partnered up with for this work.

1.2.1 What is the *Dragon Legion*

“We are a non-profit organization, a community of people from all over Europe, united by a shared passion: Bringing people together across borders with unique RPG adventures, events, and game design” (Dragon Legion e.V., 2024a). The *Dragon Legion* is an inclusive community of creatives, students, and professionals from 18 countries who share a passion for RPGs as tools for learning and cultural exchange. They are developing the European Role-play Approach (ERA), focusing on gamification and non-formal learning, as well as fostering creativity, critical thinking, and social skills. For over eight years, they have hosted RPG events across 10 European countries, building a participatory space to create, learn, and play together. They have also written multiple settings and adventures inspired by real-world history, as well as designed and produced other products, such as board games and workshops (Dragon Legion e.V., 2024a).

The projects of the *Dragon Legion* community are backed up by the European Union and are certified with the European Solidarity Corps Quality Label. As highlighted on the official European Youth Portal (2024), the organization integrates youth work with innovative activities like theater, improvisation, and role-playing games. As a non-profit, *Dragon Legion* hosts events in culturally rich European locations to immerse participants in local history and culture. These events promote intercultural learning by placing participants in diverse teams and encouraging ethical and cultural decision-making. Participants also develop skills in history, mythology, language, teamwork, and communication while building connections in an international network that underscores European unity. The organization additionally focuses on engaging disadvantaged youth and aims to provide a safe, inclusive environment where

role-playing fosters personal growth, confidence, and a sense of belonging (European Youth Portal, 2024).

1.2.2 *The RPG Initiative*

Role-playing is particularly well-suited as an activity for young people to develop a whole range of useful skills. So why not take advantage of this and make role-playing games available to a lot of young people in our schools?

(Dragon Legion e.V., 2024b)

I have discussed previously the benefits of playing TTRPGs in educational contexts for youth. However, there is a reluctance from educators to integrate TTRPGs into school curricula for several reasons, including a negative perception of gaming, practical challenges, and perceived complexity (Prager, 2016). For this reason, the *Dragon Legion* launched a project in 2024, called *The RPG Initiative*, which aims to bring TTRPGs to approximately 50 secondary schools across Germany, Austria, and Iceland to “make the positive learning effects visible” (Dragon Legion e.V., 2024b) and, “[i]n addition[, get] young people to discover how much fun role-playing is” (ibid.). It was supposed to launch in the summer of 2024, however, the process was delayed and only a select few schools had joined the program by January 2025. The program offers to “deal with the logistics and pay for [...] [a trained facilitator] for 2 years” (ibid.), thus removing financial and practical challenges, and consequently lowering the inhibition threshold from schools. Additionally, the games are run in English, which adds to the previously mentioned benefits practicing of student’s English learning skills (ibid.). The program is accompanied by the University of Paderborn, which conducts studies during the duration to measure the project’s success and provide reliable proof of it for future developments and projects.

I joined the program as a facilitator for the private boarding school *Privates Internat & Gymnasium Birklehof* in Hinterzarten. As such, I visited the school weekly for one and a half months to meet up with the recently founded, student-led, TTRPG

“Arbeitsgemeinschaft” (AG) (eng.: working group) of five students from ages 14 to 19, and facilitated game rounds in *World of Discordia* for them. The role and responsibilities of a facilitator are highlighted in detail in Chapter [2.1.3 Facilitators](#).

1.2.3 *World of Discordia*

“*World of Discordia* is an Erasmus+ funded tabletop roleplaying game designed for use by young people and youth workers” (Dragon Legion e.V., 2024d, p. 1). This is the system that the *Dragon Legion* is developing and that is used in *The RPG Initiative*. The game, as well as all its materials, are currently accessible for free on the web (Dragon Legion e.V., 2024d). In the following, the system is briefly summarized. It’s important to note, however, that the system is still in development and undergoing frequent revisions, and as such, the rules have likely changed throughout this thesis’ editing duration. For the development in Chapter [3 Concept](#), the most recent, unofficial versions have been taken into account from internal documents and personal communication.

In *World of Discordia*, players take on the roles of main characters, called Player Characters (PCs) or Heroes, and a Game Director (GD) is responsible for setting the scene and playing all the other characters, called Non-Player Characters (NPCs). Players create their PCs by choosing a Heritage, namely Human, Dwarf, Elf, or Kagari, in a dark fantasy setting. They also choose a Role, such as Agent, Priest, Warrior, etc... that defines their role in the world as well as their Skill points. The game uses polyhedral dice, with the ten-sided die (d10) being the most important, as skill checks, attack rolls, and saving throws are made by rolling 2d10 and adding the relevant Skill and Attribute modifiers. Advantages and Disadvantages can modify these rolls. Combat involves actions, reactions, and tactical maneuvers, to reduce an opponent’s health to zero. The game also includes rules for mental and environmental conflicts, including disease and poison. Magic is woven through manipulating strands of the Weave, and divided into Disciplines. Each spell can be cast using a different Circle of Magic. Heroes level up by gaining experience points

for participating in sessions and completing achievements (Dragon Legion e.V., 2024c).

1.3 Thesis Focus

As briefly mentioned before, digital tools play a big role in increasing the popularity of TTRPGs. Additionally, technological innovations like augmented reality (AR) are expected to drive the market forward in the following years (Global Growth Insights, 2024). However, as of now, *World of Discordia* is lacking a digital tool of its own. This is why, in cooperation with *The RPG Initiative*, this thesis aims to design a digital companion app for *World of Discordia* incorporating AR for educational applications in schools. The resulting concept will be presented to the *Dragon Legion* and subsequently developed by them for use in *The RPG Initiative* as well as in play by the common public.

1.3.1 Research Questions

The unique requirements of the app raise several interesting questions to consider regarding the target group's specific needs for functionalities, user interface (UI), and user experience (UX) designs, but also regarding the possibilities in the given frames as an application developed by a non-profit organization and the utilization in schools. In this work, the following research questions will be investigated:

- How can a digital tool assist student players and GDs in gameplay without interfering with the offline game experience?
- What functions does the tool need to provide while ensuring educational benefits?
- What specific UI/UX needs do student players and GDs have and how can they be reconciled with the educational use case?
- How can AR be integrated in a way that supports offline gameplay?

- What else, on a broader level, needs to be considered for the development and integration in schools and the common public?

1.3.2 Methodology

In summary, the goal of this thesis is to create a design that is, firstly, **usable** for the user, secondly, **developable** by a non-profit organization with limited resources, and thirdly, **implementable** at schools and thus ensures compliance with laws and standards. The framework that will be used needs to acknowledge that effective design is not just about meeting the needs of individual users but also addressing the systemic factors that enable or constrain the tool's adoption. For this reason, a dual-layered design approach combining User-Centered Design (UCD) and Participatory Design (PD) will be utilized.

UCD is described as “a philosophy based on the needs and interests of the user, with an emphasis on making products usable and understandable” (Norman, 2016, p. 188). This approach specifies that the needs and requirements of the target group drive much of the design process. The key aspects of UCD involve understanding the people for whom the design is intended and subsequently designing for them. In terms of UI and UX, this means considering visibility, feedback, mappings, constraints, and consideration of error (Norman, 2016).

PD, on the other hand, is a “collaborative approach to design, involving all stakeholders in the creative process” (Dust, 2008, p. 307). This approach is rooted in the belief that collaboration between producers, designers, and end-users leads to more appropriate and better results. The key aspect of PD is stakeholder involvement, actively involving individuals who are affected by design decisions and providing a framework for solutions that mainly come from the members of the organization or the users themselves (Dust, 2008).

In this work, these two approaches are combined into a dual-layered framework, which utilizes UCD principles to create a self-explanatory and engaging tool for direct users (students, student GMs), and PD principles to guarantee that the tool is

feasible, compliant, and aligned with the broader ecosystem, considering the perspectives of the non-profit, schools, and regulatory frameworks. This holistic approach ensures that the design is practical, impactful, and scalable. More precisely, the procedure will be as follows:

- 1. Stakeholder Analysis:** The needs of all involved parties will be analyzed in a stakeholder analysis. The goals of the criteria the tool needs to fulfill are derived from the resulting list of requirements.
- 2. Design Research:** Once the target group has been defined, best practices for user interface and user experience design are identified through literature research.
- 3. Benchmarking:** The current market will be examined for already existing digital tools in the TTRPG sector. In addition, other applications from relevant areas will be drawn upon to gain an overview of industry standards on design, functions, and innovation.
- 4. Concept:** A series of requirements for features and design as well as measures to consider general constraints are developed from the previous findings. These are conceptualized in an alpha prototype for user testing and presentation in collaborative meetings and consequently revised in an iterative process.
- 5. User Testing:** The alpha prototype is tested in several sessions at the school with five participants as part of *The RPG Initiative* and evaluated in subsequent semi-structured interviews.
- 6. Evaluation:** The test results, the process, and the achievement of the previously set goals are evaluated. The plans for the further course of development and design are outlined.

The expected outcome of this work is a deliverable design document (see [Appendix C - Design Document](#)) that will be presented to the Dragon Legion and serve as a basis for further development.

2 Research

2.1 Target Audience and Stakeholders

2.1.1 Stakeholder Analysis

A stakeholder analysis is a process of identifying [...] [stakeholders] before the project begins; grouping them according to their levels of participation, interest, and influence in the project; and determining how best to involve and communicate each of these stakeholder groups throughout. (ProductPlan, 2024)

The first step to understanding the needs of all involved parties is to identify who is involved and what their relationship is to the application. According to ProductPlan (2024), a stakeholder analysis looks at “all the internal people and teams who the project will involve or affect”, for the purpose of “enlist[ing] the help of key organizational players”, “gain[ing] early alignment among all stakeholders on goals and plans” and “help[ing] address conflicts or issues early on”. Due to the nature of this thesis which lacks an internal company structure, this framework of a stakeholder analysis is not exactly applicable to the design process of the application. However, instead of examining who the project will involve or affect, the analysis can be adapted to consider who the product will affect, who will influence its implementation, and who is entitled to hold an opinion on the design. In this way, following PD, stakeholders can be considered as those who are affected by design decisions, thus ensuring that the design is integrated into a holistic concept and can be implemented seamlessly.

Not all stakeholders hold the same amount of influence over the implementation and success of the design, therefore their opinions and requirements, or the extent to which they shape the design process, need to be weighed according to their position within a matrix. One way of positioning stakeholders is the power-interest grid, which categorizes them along two axes, power and interest, resulting in four distinct fields

(ProductPlan, 2024). Modifying this matrix to the context of the product, the interest-axis is replaced by involvement. The resulting fields can be described as follows:

1. **Players:** High-power, high-involvement individuals who have direct involvement with the product and directly shape its design.
2. **Context-Setters:** High-power, low-involvement individuals who can have a lot of influence over the implementation of the product, but are not directly involved with it.
3. **Subjects:** Low-power, high-involvement individuals who are directly involved with the product but who have less authority and need not always be satisfied.
4. **Crowd:** Low power, low involvement individuals who are neither directly involved with the product nor influence its success, but are otherwise entitled to an opinion.

Once the key stakeholders for the *WoD* digital tool were identified, they were sorted into the aforementioned categories (Figure 1). Their general motivations and requirements for the application were then investigated through a combination of literature research, such as the needs of children and educators as elaborated in Chapter [2.2 Designing for Children and Teens](#), direct communication with the relevant stakeholders, such as team meetings with the development team or personal communication with the *Dragon Legion* CEO, and educated estimations. They are subsequently summarized in Table 1.

Figure 1

Stakeholders in the modified power-involvement grid

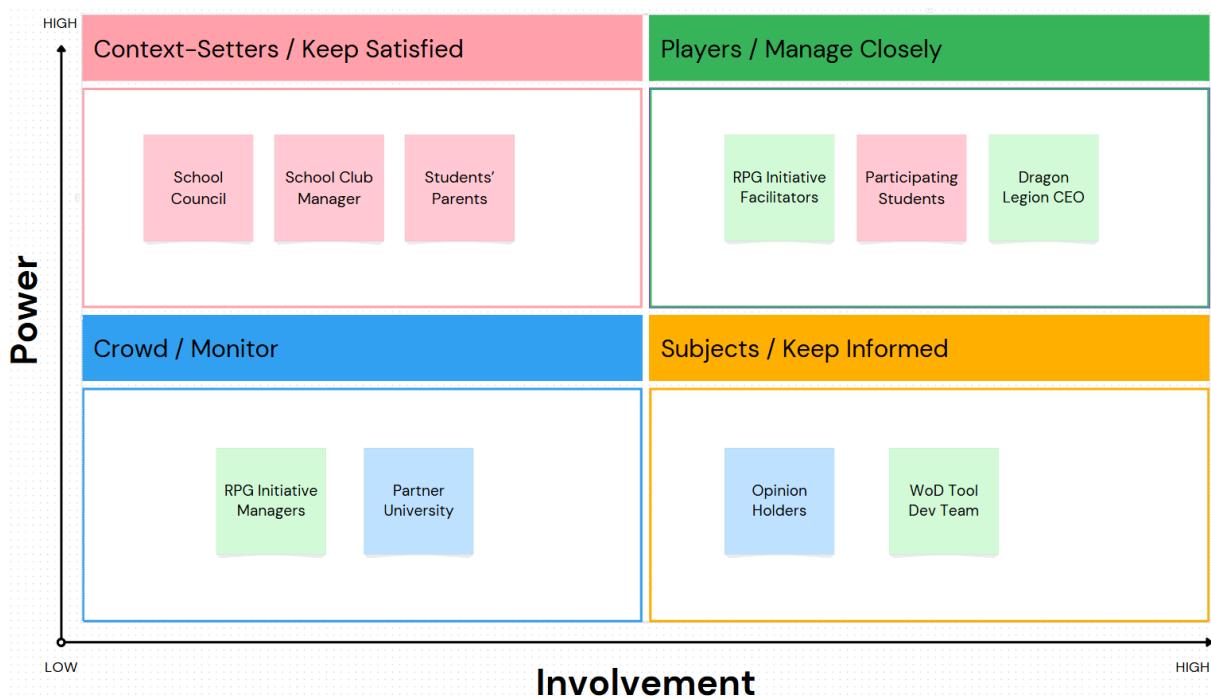


Table 1

Stakeholders, their motivations, and requirements

Stakeholder	Group	General Motivations	Requirements for the product
School Council	Context-Setter	Increasing the school's reputation and image, satisfying the parents	Adhering to laws and regulations, being serious and presentable
School Club Manager	Context-Setter	Satisfying the students and their parents	Being safe, fun, and educational for the students
Students' Parents	Context-Setter	Educating and entertaining their children	Providing educational value, being safe and trustworthy
Participating Students	Player	Having fun, following hobbies, spending time with friends	Being easy to use, being visually appealing, being helpful
Dragon Legion CEO	Player	Bringing TTRPGs into schools, growing the community	Aligning with their mission and brand identity, meeting their logistical and strategic goals

Stakeholder	Group	General Motivations	Requirements for the product
RPG Initiative Facilitators	Player	Playing TTRPGs, achieving facilitator goals	Being easy to use, beneficial for the gameplay, and time-efficient
Opinion Holders	Subject	Personal motivations	Variable
WoD Tool Development Team	Subject	Developing new functions, enriching the TTRPG gameplay	Being implementable and cost-efficient to develop
RPG Initiative Managers	Crowd	Implementing the RPG initiative in schools, managing schools' and facilitators needs	Amplifying the benefits and leaving a good impression on schools, not being a hindrance
University Partners	Crowd	Generating and collecting data for research	Bringing value to the field and being based on scientific research

2.1.2 Thematic Analysis

Based on the previous stakeholder analysis and the examination of the requirements of all stakeholders for the product, in the following stage, a structured list of requirements is created in a hierarchy of importance (Table 2). This checklist will serve as a guideline for the conceptual development of the *WoD* digital tool and sets goals for criteria the tool needs to fulfill, the success of which is evaluated at the end. Stakeholders and their respective requirements are categorized based on the impact of their opinions on the final product. Only stakeholders whose requirements have not already been defined by higher-priority stakeholders are explicitly included.

Table 2

List of requirements in a hierarchy of importance

Priority	Requirements - the app needs to be...	Stakeholders
1 - Players	- entertaining - easy to use - visually appealing - helpful/useful - not distracting	Participating Students, RPG Initiative Facilitators
	- true to the brand - beneficial to the Dragon Legion's mission - for free	Dragon Legion CEO
2 - Context-Setters	- providing educational value - safe to use by students - conforming to laws and regulations - presentable	Students' Parents, School Club Manager, School Council
3 - Subjects	- implementable - cost-efficient to develop	WoD Dev Team
4 - Crowd	- bringing value to the field - based on research	University Partners

2.1.3 Facilitators

The facilitators for *The RPG Initiative* are a stakeholder unique to this project. This chapter elaborates on the tasks and missions of facilitators to gain an understanding of their needs and justify the requirements set in the stakeholder analysis above. It also shows the principles I followed in my work with the students at the *Birklehof*.

The main issue that facilitators are concerned with is to make sure that the youth have fun playing TTRPGs. Their task is to introduce the students to the system that is *World of Discordia* and provide them with the experience and materials to eventually direct games on their own. At first, this involves running games, doing workshops on how to get into character, and employing feedback loops to improve play at the table. Facilitators are encouraged to make personal connections with the

students and be approachable. During the game, they should focus on the students and let them make decisions as their characters, rather than pushing their own agenda for the game.

Because they are working with minors, facilitators must adhere to rules for the content and implementation of the game. They are responsible for ensuring that topics and themes are kept age-appropriate and that the environment remains healthy and safe. They should implement a language that is suited for use in school settings.

Facilitators also need to moderate the way students deal with each other. A respectful interaction should be cultivated, meaning to let each other finish speaking and to remember that conflicts as characters are separate from personal conflicts between students. If problems with or between students arise, facilitators are expected to take them seriously, communicate with them, and try to find a solution together. If need be, they may set boundaries and, if conflicts cannot be resolved, refer to the school for help. Likewise, if there are problems with the school, the students must be kept out of it and issues need to be addressed with the *Dragon Legion*.

Due to the delayed launch of *The RPG Initiative*, it was not possible to gain personal insights and feedback from other facilitators except for myself at this stage of the project. However, as will be mentioned in Chapter [5.3 Future Directions](#), testing with facilitators on a larger level is a highly recommended step for beta testing before the launch of the application.

2.2 Designing for Children and Teens

[T]he lack of standards for kids' products, marketed as educational, is one of the biggest problems for this industry. It's right in this lack of regulation that I see the second opportunity. As designers we have the duty to solve people's problems with sensible solutions, even though we don't swear like doctors and

law enforcement officers, we should always remember that design should help humans and facilitate progress. (Cantuni, 2020, p. 4)

When it comes to satisfying the most important stakeholder, the main user group which the application is designed for, namely the students, there are multiple issues to consider. According to the CEO of Dragon Legion, *WoD* is suitable for youth from the age of ten (R. Pechuel, personal communication, November 12, 2024). This aligns with the common age of 5th graders, the first grade in German secondary schools and therefore the lower end of the application's target group. Since the focus of this thesis is the design of the application for *The RPG Initiative*, the upper end will be set at around 19, the age at which most students will have left secondary school. Considerations for older age groups outside of schools will be briefly outlined when relevant, but not elaborated on.

As previously identified, in order to meet the students' requirements, the app needs to be entertaining, easy to use, visually appealing, helpful/useful, and not distracting. The main aspect that fulfills the criteria of helpfulness is that the tool provides functions that support the game. However, the best functions become useless if the target group does not understand, find, or enjoy them. To gain insights into what makes students understand and enjoy something, this chapter covers the theoretical guidelines and best practices for designing for students in secondary schools. It also addresses strategies for satisfying parents and educators, which have previously been established as important context-setters for the *WoD* digital tool, as well as topics that must be considered for and by the dev team during development. The design decisions made in Chapter [3 Concept](#) for the *WoD* companion app are largely educated by and based on the findings from this chapter.

2.2.1 Understanding the Target Audience

By UCD, understanding the target audience represents an important step in designing. Designing digital products for students aged 10-19 presents unique

challenges because this user group includes both children and teenagers, who each have different needs and expectations (Cantuni, 2020; Joyce et al., 2019).

Children in this age range, roughly 10-12, are developing more complex cognitive abilities, moving from concrete to more abstract thinking, although they may still be primarily experience-oriented, which means they enjoy the journey of interacting with a product rather than focusing solely on a task. They have less experience with digital interfaces and need clear, simple designs that are easy to navigate (Cantuni, 2020). Teenagers, roughly 13-18, on the other hand, are more goal-oriented, seek efficiency, and are also more likely to use mobile devices. They have a greater need for autonomy and want to be treated as capable individuals. This is an aspect that creates a dilemma between designing for them and children because teenagers are sensitive to design that feels childish. However, teenagers have also proven to be less capable than they consider themselves to be (Joyce et al., 2019). To satisfy both of these audiences, their individual age-appropriate design recommendations must be combined to create a solution that works across age groups. The good thing about most basic design principles for children is that as long as they don't seem too childish for teenagers, they work and are even beneficial for teens and adults as well (Cantuni, 2020).

Both children and teens are also part of a threefold audience that includes parents and educators. Parents often look for educational value and may be concerned about screen time, and educators may be interested in how a product can make their jobs easier and enhance the learning experience in the classroom (Cantuni, 2020). Strategies to ease parents' and educators' concerns are outlined in Chapter [2.2.3 Safety Concerns](#).

2.2.2 Conceptual Considerations

Choice of Device

"During the early stages of our concept development, we need to decide: Which device(s) should our app run on?" (Cantuni, 2020, p. 49). Students will likely use a

variety of mobile devices, including smartphones and tablets, each with different screen sizes and interaction methods (Cantuni, 2020; Joyce et al., 2019). Therefore, the design should be responsive and adapt to different screen sizes (Nielsen, 2012). Mobile devices primarily use touch-based interfaces which means that designs should have large, easily tappable target areas to accommodate less precise touch interactions.

To have a successful mobile site or app, the obvious guideline is to design for the small screen. Unfortunately some designers don't, and we still see users struggle to tap tiny areas that are much smaller than their fingers. The 'fat finger' syndrome will be with us for years to come.

The second point is more conceptual—and more difficult for some people to accept: For a device with a small screen, you must limit the number of features to those that matter the most for the mobile-use case. (Nielsen, 2012, Wasted Mobile Space)

Reducing the amount of features and options on mobile also leads to a simpler design, which helps accommodate accessibility. In general, designs should be accessible and inclusive, considering diversity and different abilities (Cantuni, 2020). Another important factor to be recognized is that students often use mobile devices on the go, in various places, and with limited data. This also highlights the importance of lightweight content on online sites: Big images or data-heavy media slow the application down. Speed is a crucial element for this target group because slow-loading sites frustrate students. If the application needs loading time, for example, due to poor internet connection in schools or when downloading content, it should provide a simple and accurate loading-status indicator so students know how long they will have to wait, or even better yet, offer offline access (Joyce et al., 2019).

Choice of Technology

Another aspect to consider is the choice of technology. This choice significantly influences the product's accessibility, reach, and overall effectiveness. Cantuni (2020) compares the two most common options, mobile apps and web apps (Table 3), and introduces another third option, progressive web apps.

Table 3

Mobile apps vs. web apps

	Pros	Cons
Mobile apps	<p>Faster</p> <p>Can work offline</p> <p>More functionalities as they have better access to the device's hardware</p> <p>Safer. They require approval to appear in stores</p> <p>Easier to find, thanks to the app stores</p> <p>Not running in a browser (much safer for kids)</p> <p>Can send push notifications</p>	<p>More costly to build compared to web apps</p> <p>They usually require a specific build for each platform</p> <p>Expensive to maintain and update</p> <p>Updates need to be installed on the device</p> <p>Sometimes difficult and inconsistent app stores approval process</p>
Web apps	<p>They function in browsers, no need for installs</p> <p>Platform agnostic, they don't need a specific build for each device</p> <p>Self-updating without any local install or intervention from the user</p> <p>Quicker and easier to build than mobile apps</p> <p>They don't need approval as there are no official stores, they live on the Web</p>	<p>Do not work offline</p> <p>Slower than native apps and often lacking some features</p> <p>Less discoverable as there is no store</p> <p>The user experience is usually inferior compared to a native app</p>

Note: From *Designing digital products for kids*, by R. Cantuni, 2020, p 47. Copyright 2020 by Rubens Cantuni.

Progressive Web Apps (PWAs) are web apps that offer a more app-like experience, such as offline access and push notifications. They can be discovered and installed

as an application and feature faster loading after the initial loading. PWAs can be a good compromise for reaching a broad audience while maintaining an app-like feel, but they are not as powerful as native apps and are not as trusted because they do not appear in a store (Cantuni, 2020).

Educational Value and Gamification

The final conceptual consideration to be mentioned here is the educational value that the application provides and how it does so. However, since the WoD tool primarily only functions as a companion app to the physical gameplay, which itself provides both educational value and gamification, this has less relevance for this thesis. Understanding the basic principles can nevertheless be beneficial for the design to avoid distractions from the actual purpose of the tool, which is to support the educational value of playing the game.

Digital products for students can teach a wide range of subjects, and gamification can be a powerful tool to enhance engagement and motivation in these educational experiences (Cantuni, 2020). For this age group, it's important to recognize that they are not just playing games, they are often trying to accomplish a goal, and they want to be treated fairly for their age (Joyce et al., 2019). Educational apps should align with school curricula but also make learning fun and engaging. Gamification can be used to motivate students to learn by incorporating elements such as points, leaderboards, badges, upgrades, and quests. Despite this, it's essential to strike a balance between fun and learning so that the educational content remains the focus and also avoid making the game addictive (Cantuni, 2020).

2.2.3 Safety Concerns

It shouldn't surprise anyone that safety must be the number one priority when designing a digital product for children. Safety features for kids' products are not just the obvious ethical choice from designers (and developers and

(everyone involved) but also a requirement from app stores (both Apple and Google) and from the law (varying from country to country) (Cantuni, 2020, p. 89)

Safety has been identified as a core requirement of the application by context-setters such as parents and educators in the stakeholder analysis. Satisfying it is crucial to ensure the implementation and long-term success of the app. The main safety concern regards privacy. Applications for children and teens should comply with the Children's Online Privacy Protection Act (COPPA) in the United States and the General Data Protection Regulation (GDPR) in the EU to protect children's data. This includes having a GDPR-compliant privacy policy and ensuring data integrity and security (Cantuni, 2020). Beyond initial implementation, safety measures require ongoing maintenance. The app must adhere to all relevant regulations not only at launch but in all future updates. Compliance should be monitored regularly to ensure that evolving standards and best practices in children's online safety continue to be met (*ibid.*). Safety certifications also raise the credibility of an app, enhance trust, and appeal to educational institutions:

Another important thing to consider is that while parents can't be sued for letting their kids use an app that doesn't comply with COPPA or GDPR regulations, schools and educational institutions might be, so they are absolutely interested in knowing if a product is compliant and safe to use or not. If you plan to sell your product to schools, you can leverage on these certifications more effectively than you would with parents. (Cantuni, 2020, p. 226)

This thesis does not feature a detailed overview of GDPR, details of which can be found on the official GDPR website (GDPR.eu, 2019), but the following summarizes a collection of guidelines alongside the certifications:

- **Social interactions** are important to teenagers. However, they are educated to handle their private information carefully (Joyce et al., 2019). Meanwhile, Cantuni (2020) emphasizes inhibiting the sharing of personal information and avoiding links to external websites or social media platforms within the app, especially for young children. If the app includes communication features, it needs to be ensured that these function within a closed network (ibid.).
- **Parental gates** should restrict access to features like account management that may not be suitable for children. Parental gates can use various authentication methods, from simple math questions to biometric data. Purchasing opportunities, real or virtual, if present, should only appear behind a parental gate (Cantuni, 2020).
- **Content and activities** in the app should be age-appropriate (Joyce et al., 2019). Contents should be safe, meaning the app must be free of advertising, violence, and any content that could contribute to bullying or harmful interactions. Additionally, vanity metrics, such as like counts and follower numbers, should be minimized to avoid fostering unhealthy competition or social pressure among users. Instead, the app should prioritize a safe and encouraging environment (Cantuni, 2020).
- **Trusted sources** like teacher and parent forums enhance trust in the app. “Teens tend to trust sites that they learn about from teachers, parents, or friends” (Joyce et al., 2019, p. 240).
- **Transparency** is highly valued by teenagers. The application should be upfront with users about data collection and usage. If the app requires permissions, like notifications, location, or camera access, it should only ask for them when they are relevant, and it must be clear to users why these permissions are needed and how they will benefit from them (Joyce et al., 2019).

2.2.4 UI Design

The aspects mentioned in the previous sections mainly regarded conceptual decisions. While these are important measures to take that lay the groundwork for the function and success of the application, they are not what users see immediately. When presented with an application, it is through the user interface (UI) that the user interacts with it. Therefore, the UI needs to be designed in a way that is tailored to the age group and appeals to it, enabling the user to navigate and use it easily without problems or frustration. “There are some best practices when it comes to designing for children, but these never conflict with the general rules of good design, and this principle applies on everything” (Cantuni, 2020, p. 182).

Visual Design

On colors and color theory we have an entire history of books. Colors set the mood of your product more than any other visual element; for this reason, the choice of the color palette is one of the most important steps during the UI design process. (Cantuni, 2020, p. 151)

While children react more positively to bright colors, they can be overwhelmed by extreme color palettes (*ibid.*). In an interview, Chris Bishop claimed that “[k]ids can handle a beautiful, minimal color scheme” (Cantuni, 2020, p. 201). Figure 2 displays recommended color harmonies. Especially since the largest percentage of this app’s target group encompasses teenagers, the color scheme should avoid overly bright, rainbow-like colors as these are associated with content for younger children, and instead use a color palette that is visually attractive, modern, and neutral. The color scheme must provide sufficient contrast between text and background for readability and be gender-neutral. In general, the design should be visually attractive and engaging, with some graphical treatment. However, aesthetics should not be prioritized at the expense of usability (Joyce et al., 2019). The visual design should also be consistent with the brand and the app’s concept (Cantuni, 2020).

Figure 2
Suggested color harmonies



Note: From *Designing digital products for kids*, by R. Cantuni, 2020, p 160. Copyright 2020 by Rubens Cantuni.

When it comes to typography, simple sans-serif typefaces are recommended, which are easy to read and follow the rules of good typography such as kerning, spacing, and line height (Cantuni, 2020). Fonts that are too large may appear childish, but teenagers still struggle with reading, especially when it is written in small font sizes. Longer passages of text should be written in a larger font, but not too large. White spaces and simple formatting help with readability and concentration, while cluttered screens full of text should be avoided (Joyce et al., 2019).

The use of icons is highly suggested for mobile applications for this age group. Icons can minimize the space needed for long text links and free the small screen from clutter. However, they need to be self-explanatory and take advantage of commonly

known mental models. It's recommended to add labels to less established or more abstract icons (Cantuni, 2020; Nielsen, 2012).

Navigation

The navigation should be simple, consistent, and predictable to help students find information easily. Top or bottom navigation can work for older students, but younger users may prefer a central menu on the home screen. Users should always be able to keep track of where they are in the app. As such, information architecture should be as flat as possible, preferably at a maximum of three layers, to avoid confusion and cognitive overload. To ensure the comprehensibility of where a link will take the user, descriptive labels for navigation links and literal representations rather than abstract or metaphorical ones are recommended (Cantuni, 2020; Joyce et al., 2019).

Interactions

Students need interfaces that are self-explanatory and easy to use, and consistency is a key factor for easy-to-use interactions. Even if the initial interaction requires the user to think, once the user has learned how an interaction works, they should be able to apply this knowledge in all parts of the application. Changes in how an interaction works can confuse users, as seen by the behavior of the "back"-button in many applications. Clear goals and affordances for each activity are essential, as well as clear feedback after each step in an activity. Lastly, because students mainly use touch-enabled devices, it needs to be ensured that interactive elements have large target areas. A comfortable size for touch targets is about 1 cm (Cantuni, 2020; Nielsen, 2012).

Content

Clear, concise content is essential when designing for students. They can be especially impatient and easily distracted, so it's important to avoid overwhelming

them with too much text or cluttered layouts (Joyce et al., 2019). Additionally, reading on mobile is much harder than on big screens. Mobile designs should prioritize essential features and content to reduce complexity and fit the smaller screen. The word count should be cut down and secondary information deferred to secondary pages (Nielsen, 2012). To address student's readability needs, short paragraphs, bullet points, and visual aids increase scannability and comprehension. The most important information should be prominent through hierarchy and the use of relevant images can make the content more relatable and engaging for both children and teens. For teens, it's important to use simple language and avoid jargon, and complicated and verbose content (Cantuni, 2020; Joyce et al., 2019).

2.2.5 User Testing

Before the application goes into development, it's essential to involve the target group in the design and testing process, gathering feedback to guarantee the product meets their needs. User testing should be conducted early on in the design process, and throughout, to identify issues and ensure that the product is on the right path. Cantuni (2020) recommends low-fidelity prototypes such as paper prototypes at the very early stage of the concept, but he believes in "high-fidelity prototypes when it's time to really put your ideas to test" (p. 208). The closer the prototype design is to the final design, the easier it is for children to interact with it. While adults can perform the cognitive transfer from a wireframe prototype, younger children rely much more on colors and visceral reactions (Cantuni, 2020).

In addition, the objectives of each activity in the application should be clear and it should be obvious how they can be achieved. Animations, tutorials, and step-by-step instructions can contribute to clarity. It is also important to give children and teenagers more positive feedback and avoid pressure, as they may be afraid of making mistakes. When conducting user testing with children, a comfortable and welcoming environment should be created. The focus is on the product being tested, not the student, and the users should feel that they are the experts (Cantuni, 2020). When testing with teenagers, the interviewer should make them feel comfortable,

engage them in conversation, and encourage them to give feedback and think out loud (Joyce et al., 2019).

Another unique aspect when conducting user testing with minors is that parental or guardian consent must be obtained, especially if the test session is audio-recorded or video-recorded, which is recommended (Cantuni, 2020).

2.3 Overview of Digital Tools

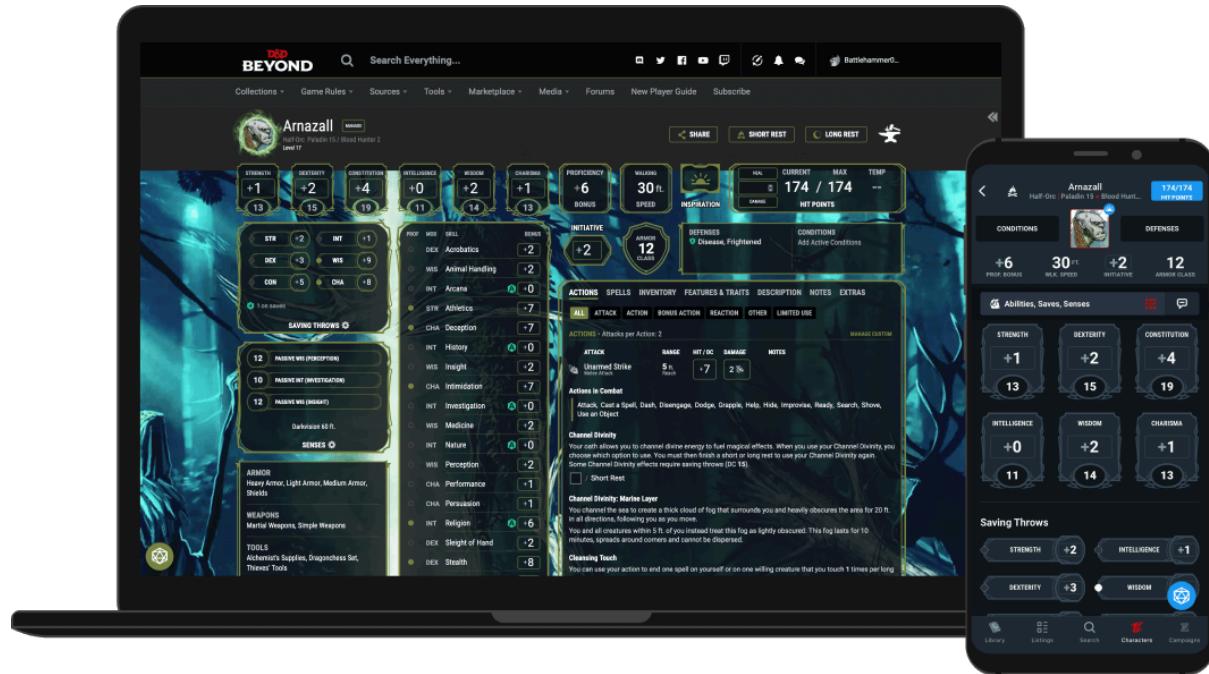
This chapter presents a comparison of a selection of digital tools of varying purposes. The current market of already existing digital tools in the TTRPG sector, as well as other applications from relevant areas, are drawn upon to gain an overview of industry standards on design, functions, and innovation. The results are summarized in Table 4 at the end of this chapter (the full comprehensive table is attached in [Appendix A - Digital Tools Overview](#)) and briefly evaluated in the following. The findings of this chapter contribute to the choices of tools and functions, design, and frames for the *WoD* digital companion.

2.3.1 TTRPG Digital Companions

TTRPG digital companions (Figure 3-1 & Figure 3-2) are designed, much like their title suggests, to accompany the game they are made for. *D&D Beyond* (Wizards of the Coast, 2025a; Wizards of the Coast, 2025b) is specifically designed for *Dungeons & Dragons*, offering features like a character builder, interactive character sheets, and campaign rooms. *D&D Beyond* sets a standard in this industry as the companion for the most popular TTRPG and provides several features that should be adopted by the *WoD* digital companion. However, this tool, while comprehensive for *D&D*, may be more suitable for the older end of the age range (14-18) due to its complexity. It offers a website application and a mobile version with reduced features. COMP/CON (Arena, n.d.) is another digital companion designed for *Lancer*, with a focus on functionality over aesthetics. Due to its harsh UI design, it is not well suited

for students. In terms of TTRPGs for children, there seem to be few established game systems with a digital companion tool in the current market. In a list by TTRPGkids (C, 2021) only *Avatar Legends* (Demiplane, 2025) has an official online tool that features similar but fewer functions as *D&D Beyond*, but with the iconic style and content of the franchise. Its theme and the simplicity of the system make it suitable for children and teenagers, however, the amount of text in the creator could be overwhelming and the mobile layout is cluttered.

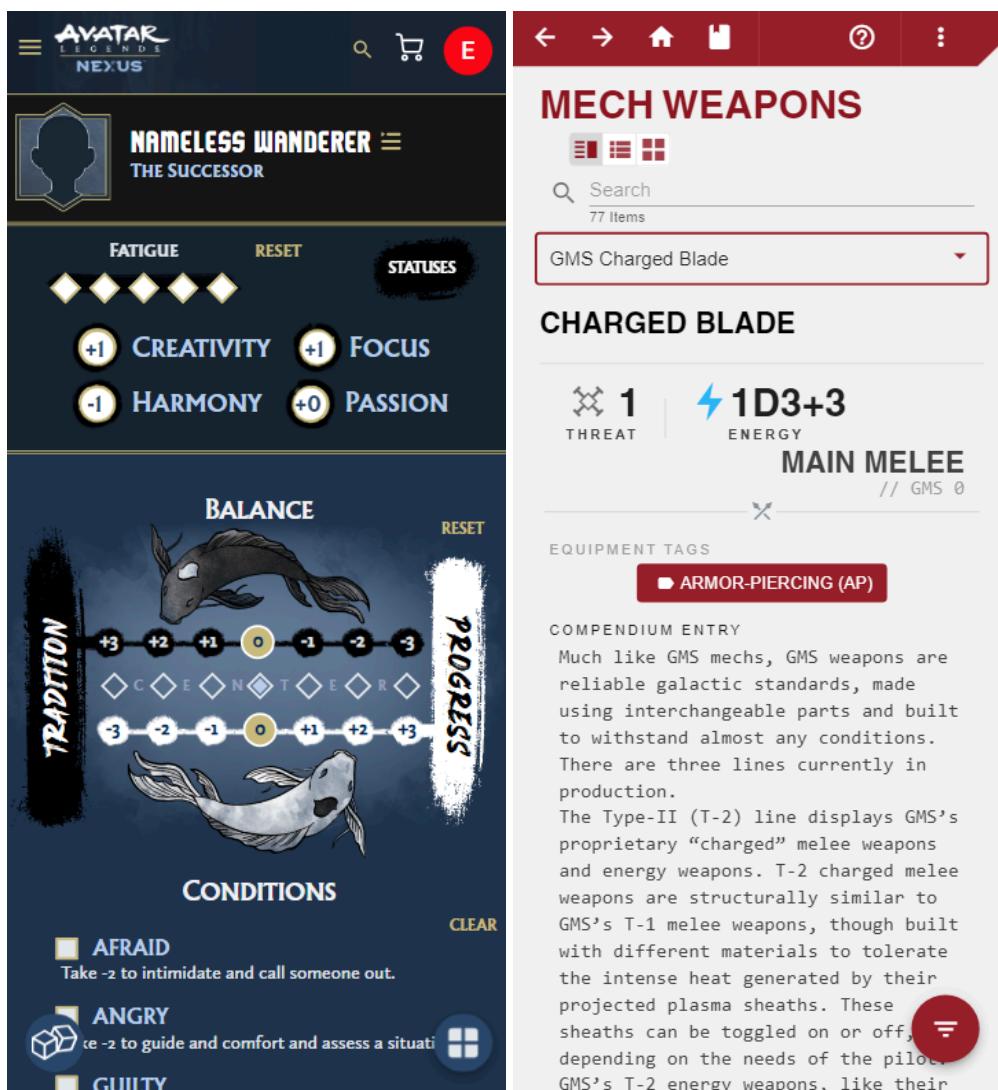
Figure 3-1
D&D Beyond Character Sheet Mockups



Note: From *Free D&D Character Creation Tool* (Wizards of the Coast LLC, 2025b),
<https://www.dndbeyond.com/characters>

Figure 3-2

Avatar Legends Nexus (left) and *COMP/CON* (right)



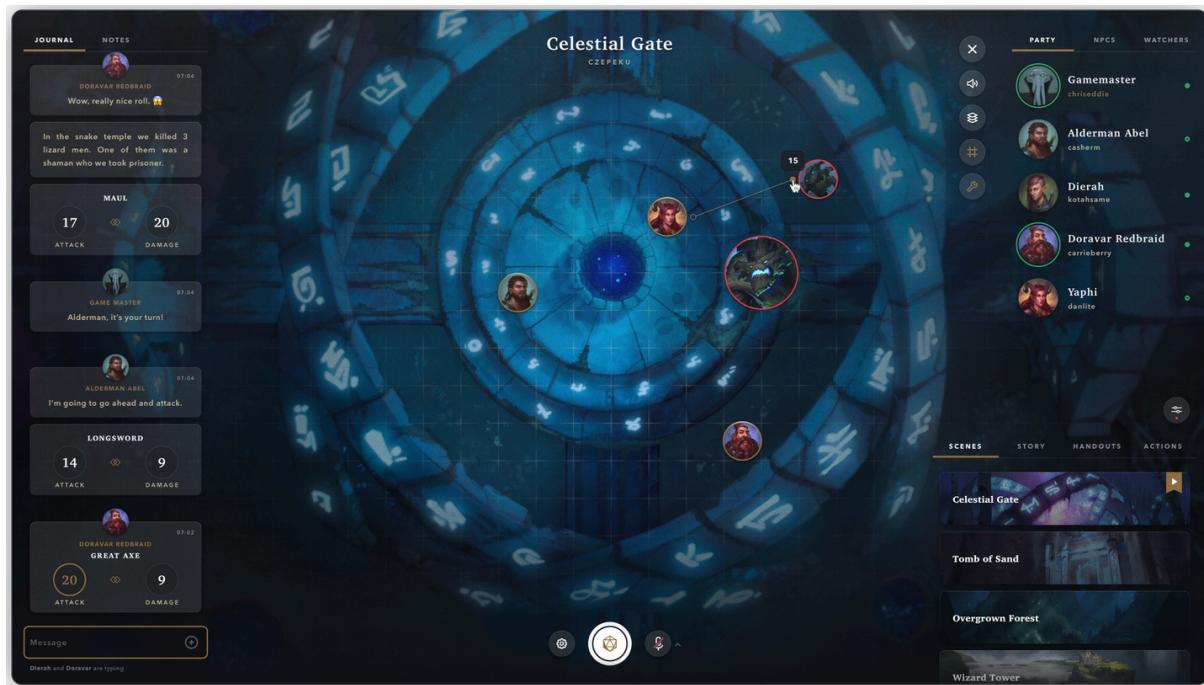
Note: From *Avatar Legends Nexus* (Demiplane, 2025; Private creation); *COMP/CON* (Arena, n.d.).

2.3.2 Virtual Tabletops

Virtual Tabletops are frameworks that simulate a tabletop for online play. While the focus of the *WoD* digital tool is supporting offline gameplay, the VTTs in this selection

provide unique usability and design concepts that should be considered. Tools for virtual play may also be implemented in the future. *Roll20* (Roll20 LLC, n.d.) is a popular, comprehensive Virtual Tabletop (VTT) that supports over 1,200 systems, offering real-time collaborative 2D maps, a dice roller, character sheets, and chat features. This platform's complexity and extensive feature set might be overwhelming for younger students (ages 10-12). However, it could be suitable for older teens (ages 13-18) who are already familiar with tabletop role-playing games. Because of its simplicity and mobile responsiveness, *Owlbear Rodeo* (Owlbear Rodeo, n.d.) presents a better option for the entire age range. It is a simpler, mobile-responsive VTT focusing on utility and usability. When it comes to aesthetics, *Alchemy* (Arboreal, 2025) stands out as a cinematic VTT in early access, offering a scene builder and integrated world builder. It focuses on a clean but immersive, fantasy-inspired UI with cinematic imagery (Figure 4).

Figure 4
Alchemy Tactical Mode



Note: From *Alchemy* (Arboreal, 2025).

2.3.3 AR Tools

Ardent Roleplay AR (Ardacious, n.d.; Ardaclous, 2023) is a system-agnostic TTRPG AR tool that uses animated overlays on marker cards to build and run encounters, while *Mirrorscape* (Mirrorscape Inc., 2022; Mirrorscape, 2024) simulates 3D maps in AR on the table both online and face-to-face play. Both tools could be engaging for students. *Pokémon Go* (Niantic Inc, 2025) is a popular game that allows users to use AR to catch pokémon and engage in battles and other social activities. It appears in this list because of its popularity in the AR market and serves as a guide when it comes to the integration of AR in games. Similarly, *GeoGebra 3D* (GeoGebra, 2025) provides insight into the use of AR in educational contexts as a math learning tool that allows users to place and manipulate 3D graphs, with AR visualization on mobile. The usability of AR in digital products for students is discussed in more detail in Chapter [2.4 AR](#).

Figure 5

Mirrorscape Mockup



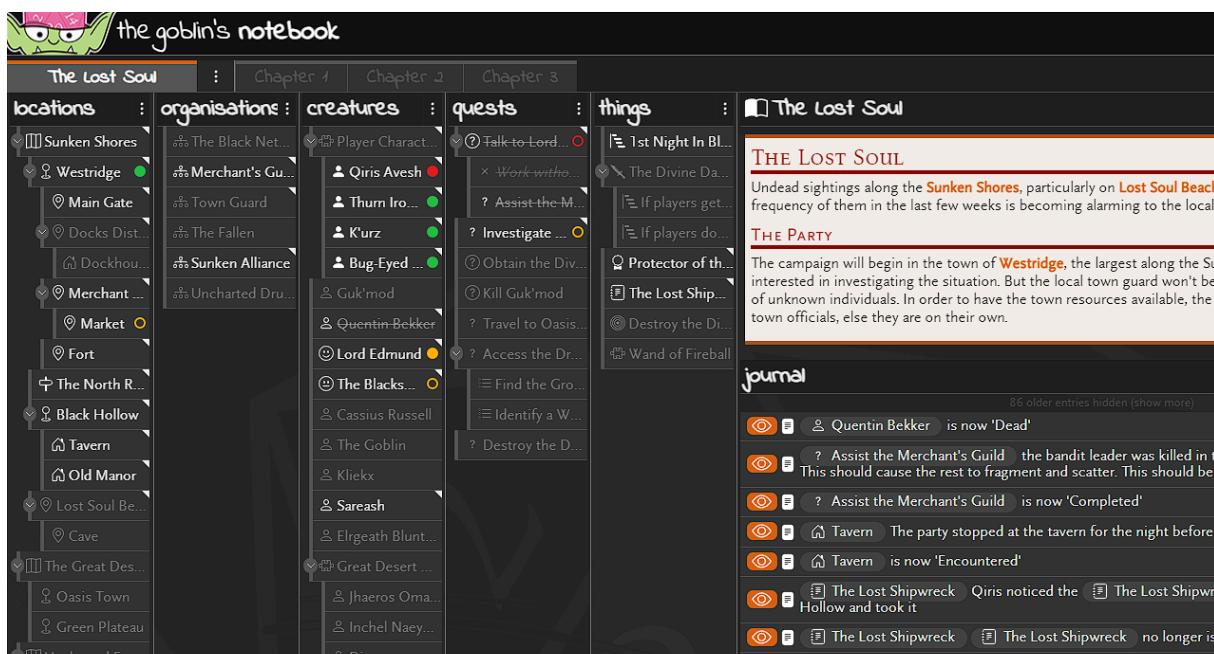
Note: From *Mirrorscape* (Mirrorscape Inc, 2022).

2.3.4 Other Tools

NPC Generator (EtiensPB, n.d.) is a free tool for generating NPC stats, appearance, and personality in one click, which makes it a helpful tool for GDs to improvise NPCs on the spot during the game. Similarly helpful at the table is *Pocket Bard* (Pocket Bard LLC, 2025), a TTRPG music tool to play interactive soundscapes, currently in open beta. *Pocket Bard* also provides a simple yet attractive fantasy-inspired UI. Before the game, GDs need to prepare their session or even world if they are not following a published adventure. To assist with this, *The Goblin's Notebook* (n.d.) provides a comprehensive, object-based notetaking framework for planning and running games in any system (Figure 6). The last tool in this list, *Duolingo* (Duolingo, 2025), is a language learning app. It stands out as an educational application that appeals to a wide age group and strikes in UI design. Cantuni (2020) emphasizes *Duolingo*'s success for young age groups through its well-designed gamification approach and mascot character design.

Figure 6

The Goblin's Notebook



Note: From *The Goblin's Notebook* (n.d.).

2.3.5 Pricing Models

The list of selected applications shows two main pricing models: Free and freemium, which are paired with subscriptions and in-app purchases. Free applications are often supported by other revenue streams such as advertisements (Cantuni, 2020), which creates a dilemma with designing for children because of the safety measures addressed earlier. The freemium model is the most popular model in this list, and very popular in general, especially for apps and digital tools. It allows users to try a limited version of the product for free and then offers a premium version, often through in-app purchases or a subscription. The "free" price tag is a powerful way to gain downloads, which is particularly useful for new developers (*ibid.*). The model for the premium version is usually either subscription-based or an in-app purchase. The subscription model offers a stable revenue stream for developers but usually requires constant updates with new content or features to justify the recurring cost (*ibid.*). *Roll20*, *D&D Beyond*, and most applications on this list use a freemium/tiered subscription model. Cantuni (2020) notes that the market has shifted from prepayments to subscriptions and claims that the subscription model is often used by high-value educational applications. In-app purchases are also often used alongside the freemium model, where users can purchase digital goods or unlock premium features. However, Cantuni (2020) also points out that app distribution platforms take a commission (usually 30%) of each IAP.

2.3.6 Accounts

Many digital products in this list require an account to use it or save progress or access personalized content. However, teenagers are cautious about sharing information and may be hesitant to create accounts (Joyce et al., 2019). It is important to clearly state the benefits of creating an account, for example offering personalized features, and best to let users explore some of the content before requiring them to create an account. When accounts are required, the sign-up process should ask for only the essential information and be clear about why certain

information is needed. Additionally, social logins can be an alternative to creating a local account that eases the sign-up process (*ibid.*).

Table 4

Comparison of selected digital tools, condensed overview (full version in [Appendix A - Digital Tools Overview](#))

Name	Category	AR	Mobile App	Pricing Model	Account	Core Functions	Specifically for kids
D&D Beyond	Digital Companion	No	Yes	Freemium / Tiered subscription Free core rules, One-time payment for rulebooks	Wizard or Social e.g. Google	Character builder, interactive character sheets, Campaign rooms, Encounter builder, Resource books, Game rules, Listings, Custom content creation	No
COMP/CON	Digital Companion	No	No	Free Free core rules, One-time payment for rulebooks	Optional	Character builder, NPC builder, Encounter builder, Mission Runner, Resource books	No
Avatar Legends Nexus	Digital Companion	No	No	Freemium Free core rules, One-time payment for rulebooks	Demiplane or Social e.g. Google	Character builder, Interactive character sheets, Digital library, Game rules	Yes
Goblin's Notebook	Digital Notebook	No	No	Freemium / Tiered subscription	Google	Notetaking, Campaign planning (markdown, object-based, connections) Shared view	No
NPC Generator	NPC Generator	No	No	Free	N/A	Generate NPC stats, appearance, and personality	No
Pocket Bard	TTRPG Music Tool	No	Yes	Freemium	Optional	Interactive music and sound effects	No
Roll20	VTT	No	No	Freemium / Tiered subscription	Roll20	VTT (Real-time 2D map, fog of war, Dice roller, Character sheets, music, text/voice/video chat, host or join campaigns) Compendium	No
Owlbear Rodeo	VTT	No	No	Freemium / Tiered subscription	Google or Apple	simpler VTT, mobile responsive, 24h rooms	No

<u>Alchemy</u>	VTT	No	No	Freemium Free and paid content	Alchemy	cinematic VTT, scene builder, integrated worldbuilder, streaming mode	No
<u>Ardent Roleplay AR</u>	AR Tool for TTRPG	Yes	Yes	Freemium Free and paid content	Social (e.g. Google)	animated AR overlay on marker cards, build and run encounters	No
<u>Mirrorscape</u>	AR Tabletop simulator	Yes	Yes	Free download	Google or Apple	3D/AR tabletop simulator (online or face2face)	No
<u>Pokémon Go</u>	Game	Yes	Yes	Free, In-App-Purchases	Nintendo	Catch Pokémons (3D/AR), fight, and social	Yes
<u>GeoGebra 3D</u>	Math Learning Tool	Yes	Yes	Free	N/A	Place, manipulate, and measure 3D graphs, AR visualization (mobile app only)	Yes

Note: Data compiled from Arboreal (2025), Ardaious (n.d.), Ardaious (2023), Arena (n.d.), Demiplane (2025), Duolingo (2025), EtiensPB (n.d.), GeoGebra (2025), Mirrorscape Inc. (2022), Mirrorscape (2024), Niantic Inc. (2025), Owlbear Rodeo (n.d.), Pocket Bard LLC (2025a), Pocket Bard LLC (2025b), Roll20 LLC (n.d.), *The Goblin's Notebook* (n.d.), Wizards of the Coast LLC (2025a) and Wizards of the Coast LLC (2025b).

2.4 AR

In the previous chapter, four of the selected digital applications had or were based on AR functions: *Ardent Roleplay AR*, *Mirrorscape*, *Pokémon Go*, and *GeoGebra 3D*. *Pokémon Go* is cited as “[t]he most successful implementation of this technology [...], which took the world by storm in 2016, becoming an instant pop culture phenomenon” (Cantuni, 2020, p. 240). However, apart from this success, as of 2020 AR is still struggling to find use on the larger market (*ibid.*).

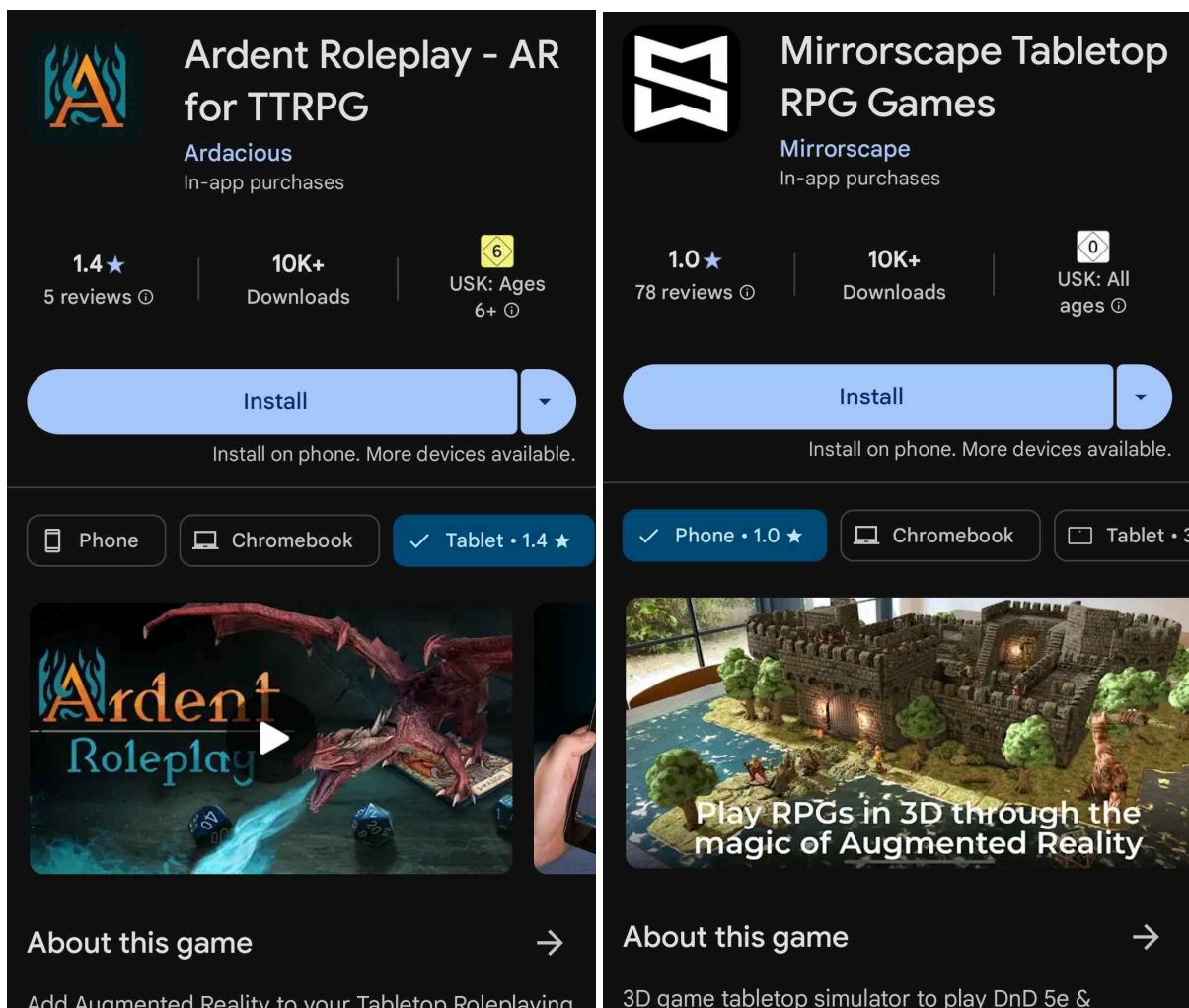
Ardent Roleplay AR and *Mirrorscape* both attempt to introduce AR technology to the offline TTRPG game table, with little success (Figure 6). *GeoGebra 3D*, a mathematical tool to visualize 3D objects, on the other hand, proves to be received quite well (Figure 7).

Cantuni (2020) attributes the absence of success of AR applications to the lack of a proper device, noting that smartphones are too small and tablets too heavy. Joyce et al. (2019) state that AR should only be implemented if it adds significant value to the experience. If the AR implementation does not serve a clear purpose or is seen as a gimmick, it may be received negatively by users. However, AR can be a valid component for digital products for children because it adds a “wow” factor that is appealing to them. AR can be effective when used in educational apps to reinforce learning, as seen in *GeoGebra 3D*, and can be particularly useful to supplement learning for students with different needs, such as visual or auditory learning styles (Cantuni, 2020). Additionally, AR games that have a real-world counterpart tend to be more positively received. When AR enhances or builds upon a familiar concept, users are more likely to see the added value (Joyce et al., 2019).

“So while resorting to AR in products for adults (task-driven) may often look gimmicky, doing so in products for children (experience-driven) could give our product an edge” (Cantuni, 2020, p. 240). In summary, AR can be a valuable addition to digital products for students if implemented thoughtfully with a clear purpose, context, and instructions. It should enhance the user experience and have real-world connections or educational value, rather than being a superfluous feature.

Figure 6

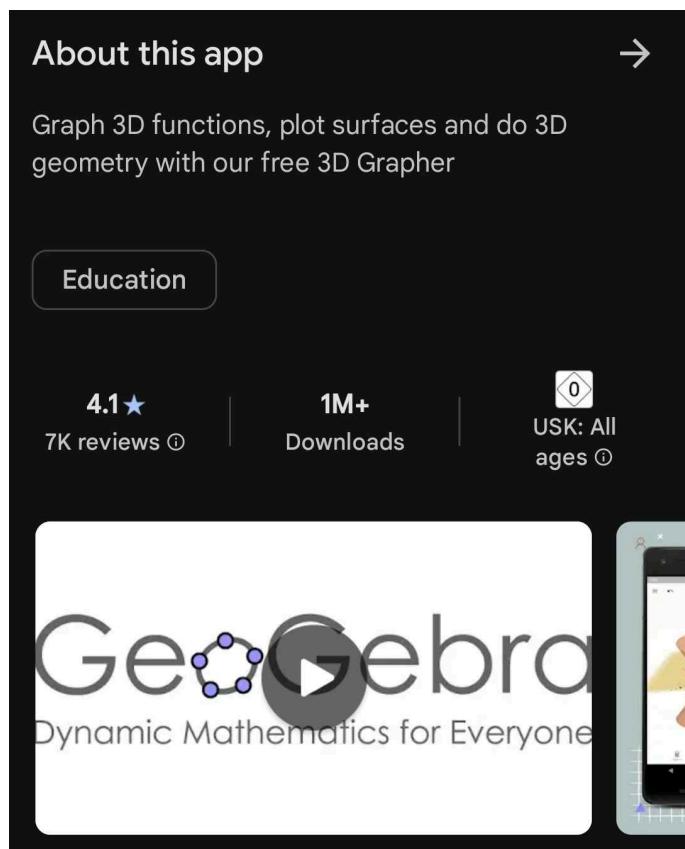
Ardent Roleplay AR and Mirrorscape have poor ratings in the Google Play Store.



Note: From *Ardent Roleplay - AR for TTRPG* (Ardacious, 2023); *Mirrorscape Tabletop RPG Games* (Mirrorscape, 2024).

Figure 7

GeoGebra 3D has a 4.1-star rating on the Google Play Store.



Note: From *GeoGebra 3D Calculator* (GeoGebra, 2025).

3 Concept

In this chapter, the knowledge acquired in the previous sections is combined with additional resources where necessary and applied to create the concept for the *WoD* digital companion application. Considerations from the user testing results in the next Chapter [4 User Testing and Evaluation](#), insights from team meetings with the development team, and changes through the iterative process have been integrated. Findings from this chapter detail the process and decisions made for the design document attached in [Appendix C - Design Document](#), which contains a non-explanatory version of the functions and requirements, a styleguide, and the link to the *Adobe XD* prototype web view for development.

3.1 Features

3.1.1 Platform

The application is developed for mobile use, with a design for smartphones first, as this is the device most commonly used by the target group. However, the user testing conducted with the mobile prototype has shown that some teenagers might prefer tablets instead, especially for writing, so therefore the responsiveness of the design for tablet use is an essential element to be considered. The application will be developed as a progressive web app. This fits into the previous experience of the development team and ensures a cost-efficient development and implementation, while still providing the best user experience for the students.

3.1.2 Tools and Functions

As explained before, children mostly value the experience over usability (not task-focused), however, this shifts as they grow older. The main experience that the students have in the scope of *The RPG Initiative* should come from the game at the table. The application should avoid keeping them glued to their phones, distracting

them from physical participation and social interaction with the other players. Therefore, the user experience of the companion app must excel by providing the smoothest, easiest possible information search and task completion to ensure that the users can stay focused on what is happening around them.

The *WoD* companion app needs to provide specific functions to support gameplay. As a minimum viable product, it should provide a function to create a hero and manage an interactive character sheet, as well as provide access to in-game information, much like the digital companions viewed in [2.3.1 TTRPG Digital Companions](#). However, to create a comprehensive application, functions observed from other tools have been integrated into the concept. The process of creating the structural composition for these functions as well as visuals from the prototype are presented in Chapter [3.2.1 Prototype](#).

Heroes

First and foremost, the application provides tools for creating, editing, and managing Heroes. This section takes a lot of inspiration from *D&D Beyond*. Creating heroes can be confusing for players, especially first-timers. Although the process in *WoD* is already simplified for a younger audience, students at the *Birklehof* voiced some struggles working with the (preliminary) paper rulebooks.

The Hero creation in the *WoD* companion offers a quick-build approach as well as a custom mode. Users are guided through the creation process step-by-step, accompanied by instructions that help first-time users but are not obtrusive to well-acquainted players, and limited by official game rules. Once created, Heroes are not meant to be edited directly through their creator again, in most cases. However, if a player decides to make changes in the base structure of their Hero, they can do so. For example, if a player gains a bonus that is ruled by the GD, they can edit their Hero even if it violates official game rules. In this case, they can use the editor. Changes done in the Hero creator/editor are logged in the Hero's changelog to enable players and their GDs to track them. This prevents players from secretly changing their Heroes and ensures fairness at the table.

A detailed digital character sheet that displays information about the Hero, such as their attributes, statistics, skills, and actions, replaces the paper version used at the table. This character sheet is interactive, allowing users to perform actions such as resting, taking damage/healing, repairing armor, managing equipment, casting spells and depleting Strands of Weave, rolling dice, and taking notes. Management functions include deleting or duplicating Heroes, as well as exporting the sheet to PDF for printing or sharing. Leveling-up also happens through the character sheet, however, due to the current state of the leveling-up game rules, this feature is not defined yet. The note-taking is designed to support What-you-see-is-what-you-get (WYSIWYG) editors, which allows users to structure their notes to their liking.

Games

An aspect that *D&D Beyond* is lacking in is the creation and tracking of games. Games in this context are frameworks for sessions, adventures, or campaigns, allowing GDs to plan, gather their players in one place, and share information with them. *D&D Beyond* enables the DM to create a campaign and invite players, whose characters they then gain access to but provides no tools for note-taking or adventure planning other than two, private and public, general note-taking sections in simple text field format.

Running a game is a daunting task, especially for young users, because GDs have a lot to consider and do at the same time, as seen previously in Chapter [1.1.1 What is a TTRPG](#). The *WoD* companion can use the concept of game rooms to group players, but functional inspirations from *The Goblin's Notebook* and visual inspirations from *Alchemy* are added to help student GDs with tracking and writing their games in a versatile and visual, but simplified, object-oriented framework. The game tool is dedicated to game management, enabling users to create, join, and manage game sessions. It offers different views for players and GDs.

The GD is the one creating the game and has access to all game objects like locations, NPCs, or quests, and tools to edit and manage game objects, their connections to other game objects, and players. Writing game objects' descriptions

and notes also supports WYSIWYG. Apart from creating their own games and objects, GDs should be able to use templates from their owned [Resources](#) and game objects from their [Library](#). Inviting a player requires the GD and player to know each other in person and have established other means of communication to prevent interactions with strangers. Players have a limited view of the same structure and can only access content that the GD marked as visible to them.

Resources

When opening the *D&D Beyond* app, the first page the user lands on is the marketplace to buy new resources. Currently, all preliminary game resources for *WoD* are available for free on the web. However, as the game system is published and gains traction, more additional paid content may be released. The pricing should not concern students, as will be discussed in Chapter [3.3.2 Pricing Model](#), but the function to work with new publications is included in the concept to support the *Dragon Legion*'s long-term goals and it matters for non-student users.

Because most users are going to be players, the *WoD* companion places the resources section at the back. Nonetheless, it should be designed to lower the reluctance and entice young players to pick up a game book and become a GD. Users can browse published resources related to the game, preview them, and download their readable book versions. The reader includes options to bookmark chapters and adjust display settings. It is important to keep in mind the target group and adjust content accordingly as described in Chapter 2.2.4 UI Design > [Content](#). Published resources should always be thoroughly reviewed and approved before appearing on the app. A function to publish user-created content is not included in this version of the application for reasons of privacy and development efforts but should be considered in future updates and has also been requested by students at the *Birklehof* during testing.

Resources consist not only of their human-readable book versions but carry data objects as seen in *Alchemy*, which are added to the user's library upon becoming the owner of a resource. Free core rules such as the basic rulebooks should always be

owned, non-removable, and part of the library. Free additional content needs to be added before it appears in the owned section and library.

Library

As mentioned, the library holds readable game-related content in the form of objects from official game materials such as spells, creatures, heritages, and lore, like the listings section in *D&D Beyond*, for users to read up on a specific topic. It always contains objects from the free basic rules and additionally any owned contents. The library provides a categorized structure for these entries and users can switch categories and search, view, and access entry content. The detailed content depends on the category of the object, or, in programming terms, class. Spells, creatures, locations, etc... all have their own attributes, and the values they can take differ. However, the specifics of these have not been decided yet, as they are based on the game rules which are still undergoing development. It is recommended to create class- or entity diagrams for the database structures once the rules are finalized. In general, though, they must also adhere to the rules of designing and writing content for youth on mobile devices as laid out previously.

Profile

Teenagers like to personalize their app experience and be social, as previously noted. This is why the *WoD* companion should provide an area for user account management, allowing users to manage their personal information such as their name and profile picture, account settings, and app preferences. This includes options to change account credentials, adjust display settings, and also access privacy information for transparency. This area should also contain any partnership labels or privacy certifications obtained by the application. As of now, account names and profile pictures are only shared with users in the same games. Signing up sports two different methods, one for personal use and one for school accounts. Further

considerations on account management and social interactions are elaborated in Chapter [3.3.1 Legal](#).

Other Functions

Apart from the main functions explained until now, the *WoD* companion offers various other functions to enhance gameplay, such as an encounter simulator, an AR map (more in the next Chapter [3.1.3 AR Integration](#)), and a dice calculator.

The encounter simulator allows the user, mostly GDs, to simulate battles between heroes and creatures chosen from presets, the library (creatures only), games (also NPCs), or custom temporary quick builds. Its purpose is to balance encounters for upcoming adventures. During user testing, students also asked for a function to save and run these encounters in their game. The dice roller can perform dice rolls per preset, custom selection, or with custom expressions. Whenever a user clicks an interactive field for dice rolls, for example on their character sheet, the dice roller opens and automatically rolls the tapped selection. An NPC creator is a planned tool, however, it is to be defined later.

3.1.3 AR Integration

Keeping in mind the principles of good design for youth and the requirements for this application, AR, although initially considered as a main feature, was reduced to a small feature as part of the whole. The affordances of AR speak against a prolonged duration of use, as this would be physically tiring and distract from the gameplay at the table. Additionally, while the use of aesthetic 3D maps and models, for example, animated monsters as used in *Ardent Roleplay AR*, may contribute to the previously mentioned “wow”-factor of AR, making use of such immersive functions undermines the concept of imagination and collaborative storytelling. It relieves the players of the task of communicating with each other about the appearance of elements and limits the imaginative freedom of GDs to the imagination of the creators. Instead,

GeoGebra 3D showcases that AR can be used well for spatial mathematical imagination. The use case, for which this could be of great benefit, has already been briefly mentioned at the beginning of this work but not yet explained in detail: maps.

In *WoD*, maps are based on a grid system of squares, where each square equals 1,5m (Dragon Legion e.V., 2024c). In combat situations, maps are used to determine walking distances, weapon and spell ranges, control zones, and areas of effect. As of the time of writing this, areas of effect for spells in *WoD* are usually circular radii. During user testing at the *Birklehof*, students displayed major problems when determining distances and areas described by rules on the map, often arguing about definitions. One student of the age of 15 claimed: “I really have to take my hands to see where it is. [...] It's [...] not easy to do because I can't see it in my mind”.

This is where the AR map tool comes in to help users visualize and estimate distances in the grid. It uses geometric overlays that adapt to the user's input to measure distances between two points and highlight squares that are affected by radii or cones of user input sizes. At this point in time, the version in the prototype (see Chapter [3.2.1 Prototype](#)) is only a linear, rough visualization of this concept. However, it has already been well received by students in user testing, with one student claiming that “the very best part [is] the radius thing because it's [...] the shape prepared fitting our battle map and showing us [...] who is affected”. Further considerations that have to be made before moving forward with this tool are determining the method of grid detection and frameworks that integrate AR into PWAs. On a game rule design level, the definition of squares, distance measurement, and areas of effect must be finalized to provide a consistent mathematical approach. A function to recognize Heroes on the map and access their unique abilities quickly could also provide another level of usability and has been asked for by students.

3.2 Design

The design process for the *World of Discordia* companion app is divided into two parts: The creation of the prototype (Chapter [3.2.1 Prototype](#)) and the styleguide

(Chapter [3.2.2 Styleguide](#)). The results of both, including the *Adobe XD* prototype web view link, as mentioned before, can be found in [Appendix C - Design Document](#).

3.2.1 Prototype

This chapter focuses on the process of creating the concept and alpha prototype (see [Wireframes](#) in Appendix C for the web view; Appendix D for all prototype files) for user testing and proof of concept. The prototype aims to gather feedback from the students and dev team before further development. It incorporates the initial implementation of key features but does not offer full functionality nor a final visual design, focusing on the utility of functions, site structure, and information hierarchy, rather than actual content. However, design principles like touch target sizes, typography, and iconography have been used to bring the visual look as close as possible to help testers bridge the cognitive gap between the wireframes and a finished visual design without feigning finality, to gain more accurate insights into their instinctive behavior. The degree of success of this is examined in Chapter [4 User Testing and Evaluation](#).

After establishing the list of requirements and overview of functions through the previous reviews (Chapter [2 Research](#)), the first step to visualize them was through UI scribbles on paper (Figure 8). Paper scribbles worked well in this context as they are not very detailed and quick to create, but inspire crucial structural questions, such as the number of main areas and logical allocation of functions, very early on. This was used for the first feedback loop with the development team to ensure that the basic concept met the overall objectives of the application. From this, a sitemap (Figure 9-1) was derived, which was iteratively adapted throughout the design process (Figure 9-2). The web version with better readability is available in the design document created for *Dragon Legion* (see [Appendix C - Design Document](#)).

Figure 8
UI Scribbles

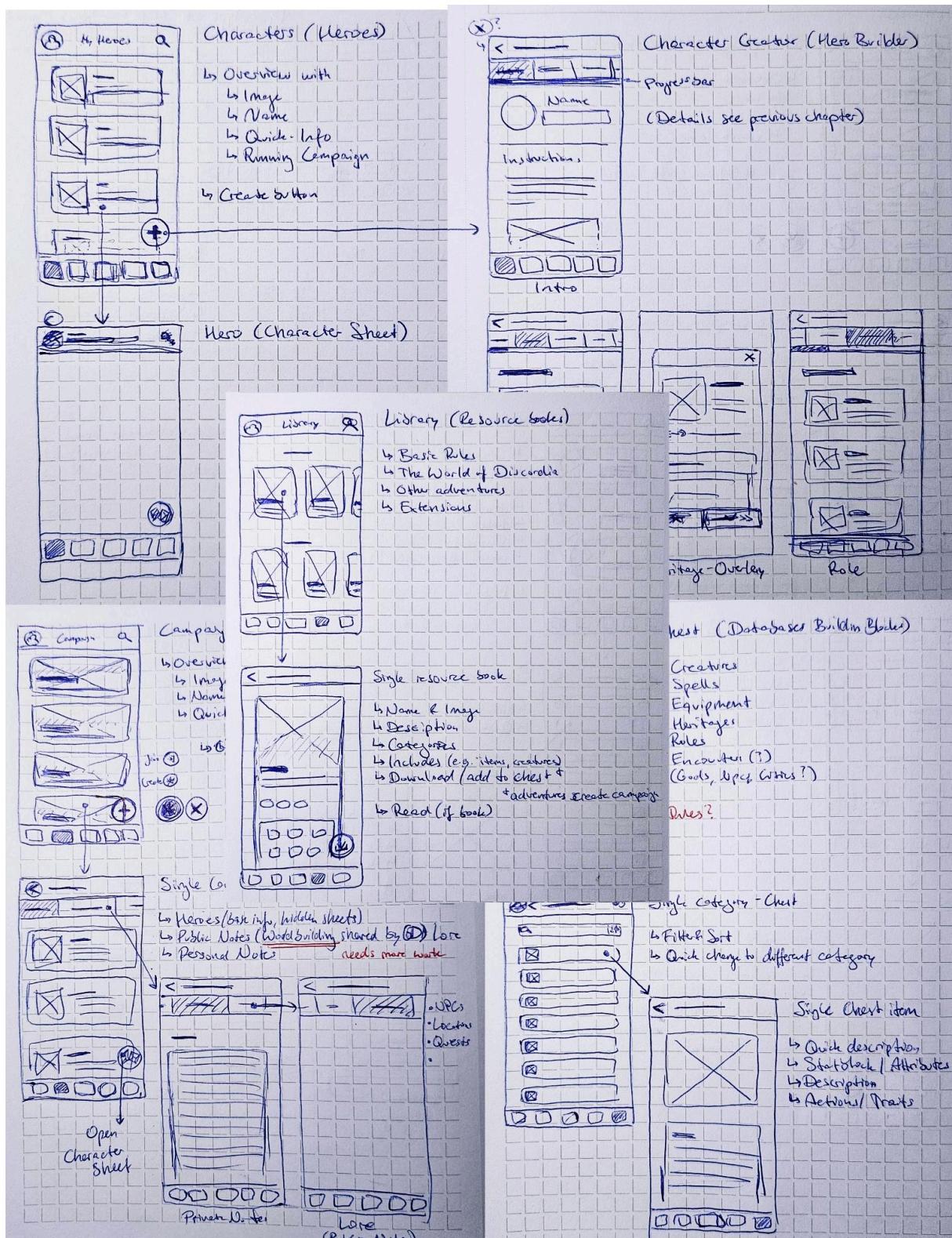


Figure 9-1

The first draft of the sitemap

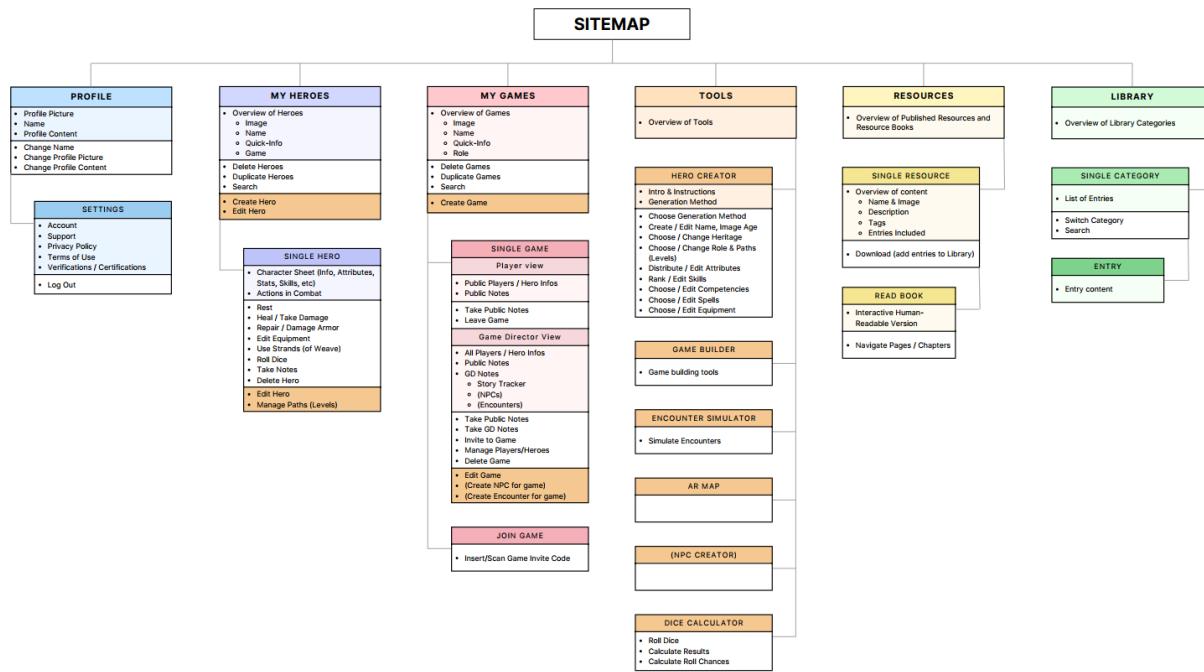
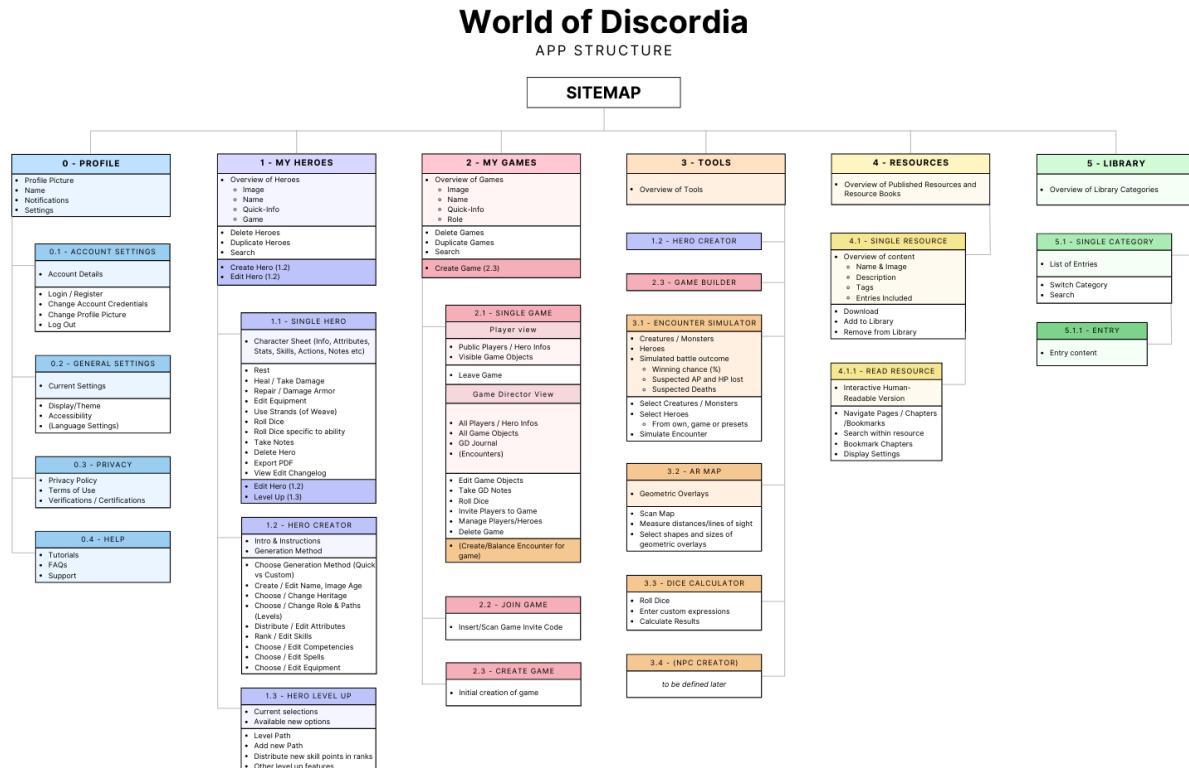


Figure 9-2

Final sitemap



For the second iteration, the concept was adapted into *Adobe XD* in a monochromatic wireframe style, meaning that hierarchies had to become clear through layout and visual weight. Positions of where images and icons would be were only outlined by a placeholder (Figure 10-1). However, it became clear during the first testing that icons played a crucial part in providing incentives and visual information for interactions. Placeholders were replaced by exemplary icons from *Font Awesome* and *Flaticon.com* when possible in all following iterations (Figure 10-2).

Figure 10-1

Placeholder symbols for icons and images in the second iteration did not provide enough visual information.

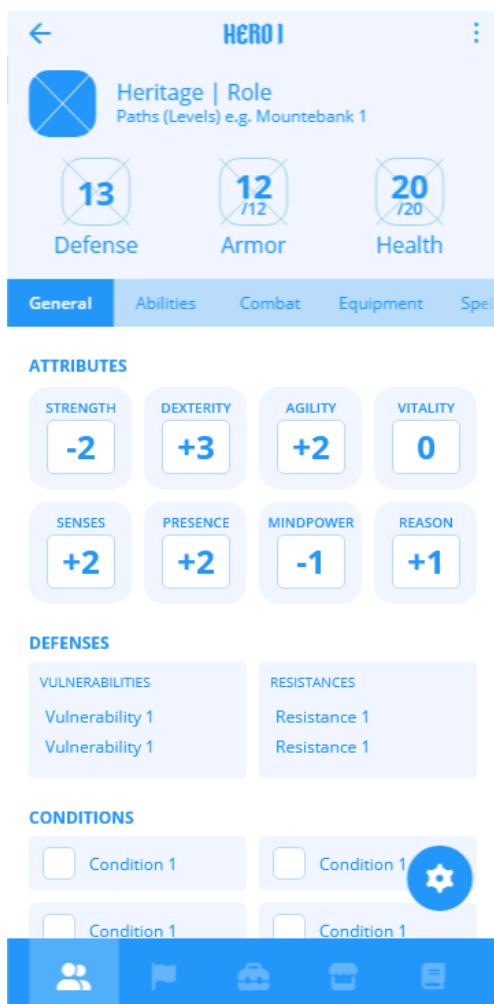
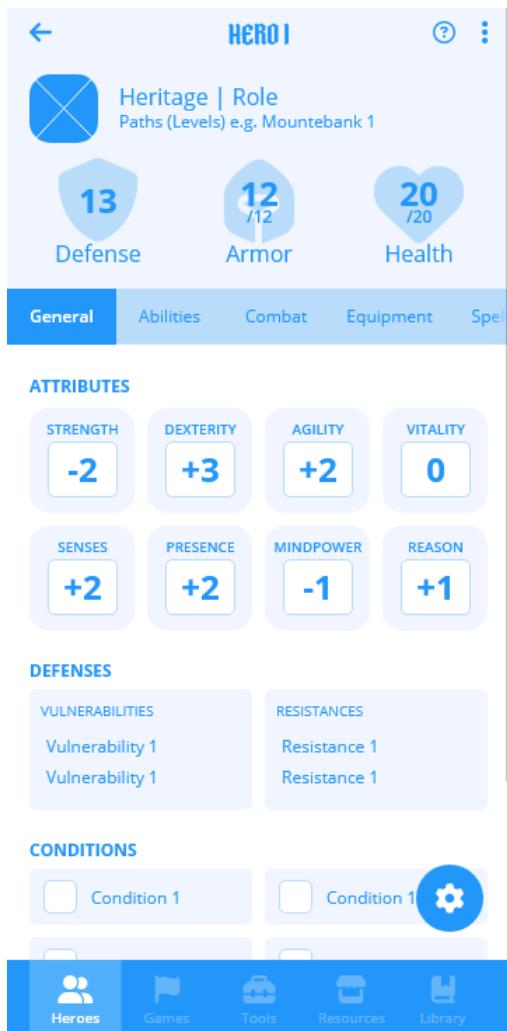


Figure 10-2

Exemplary icons and labels increased visual comprehensibility.



The second iteration consisted of rough representations of the five main areas in *Adobe XD*: Profile, Heroes, Games, Tools, Resources, and Library, as well as the key functions for hero creation and character sheets (Figure 11-1). Throughout the user testing, each section was then added, tested, and subsequently evaluated (Figure 11-2 – 11-8).

Figure 11-1

Segment of the second iteration prototype

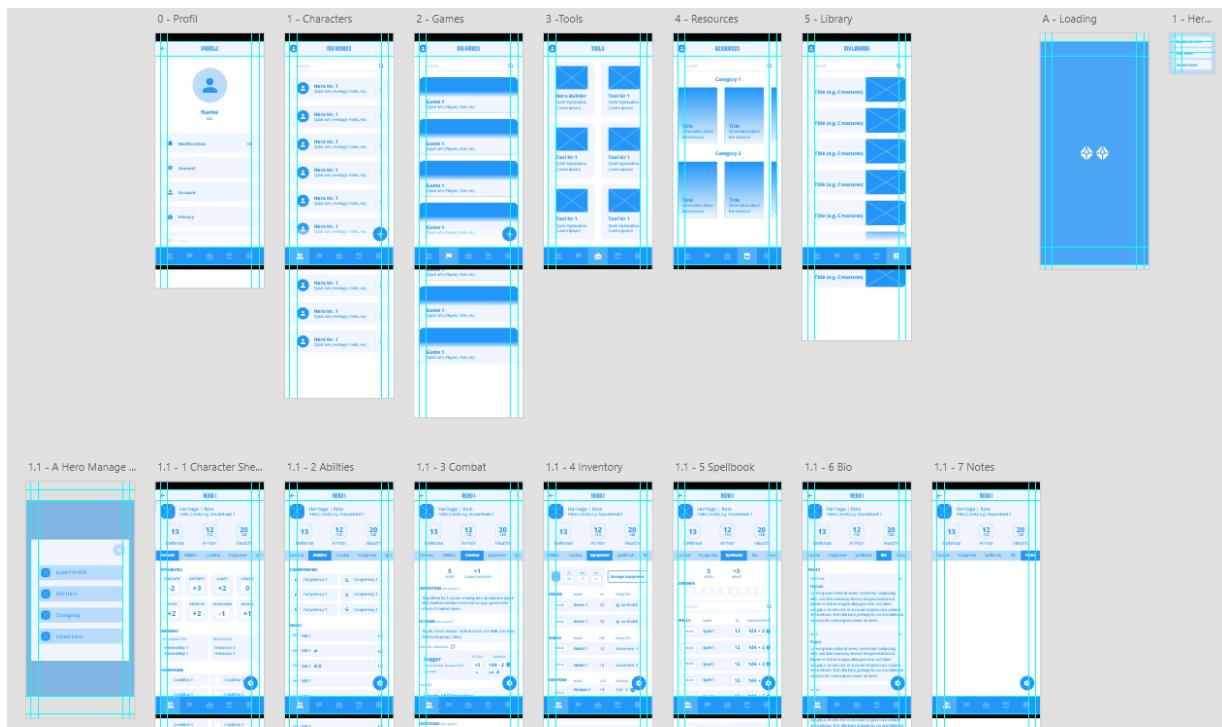


Figure 11-2

The main hierarchy section of the final iteration prototype

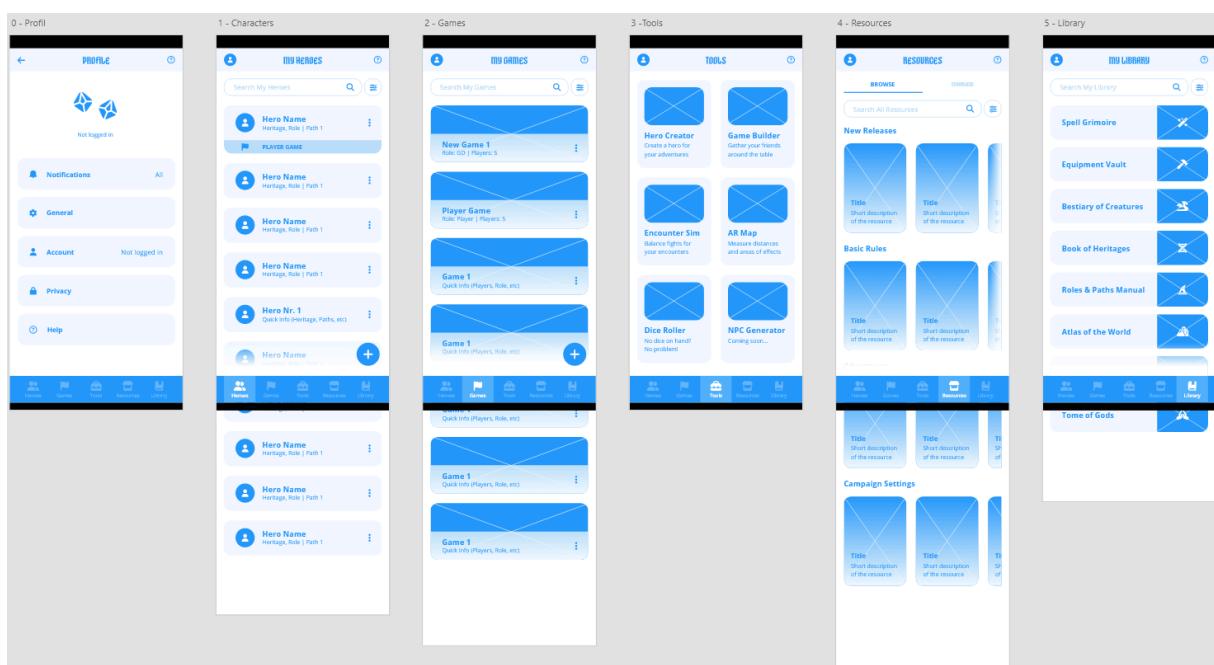


Figure 11-3
Segment from the Hero section of the final iteration prototype

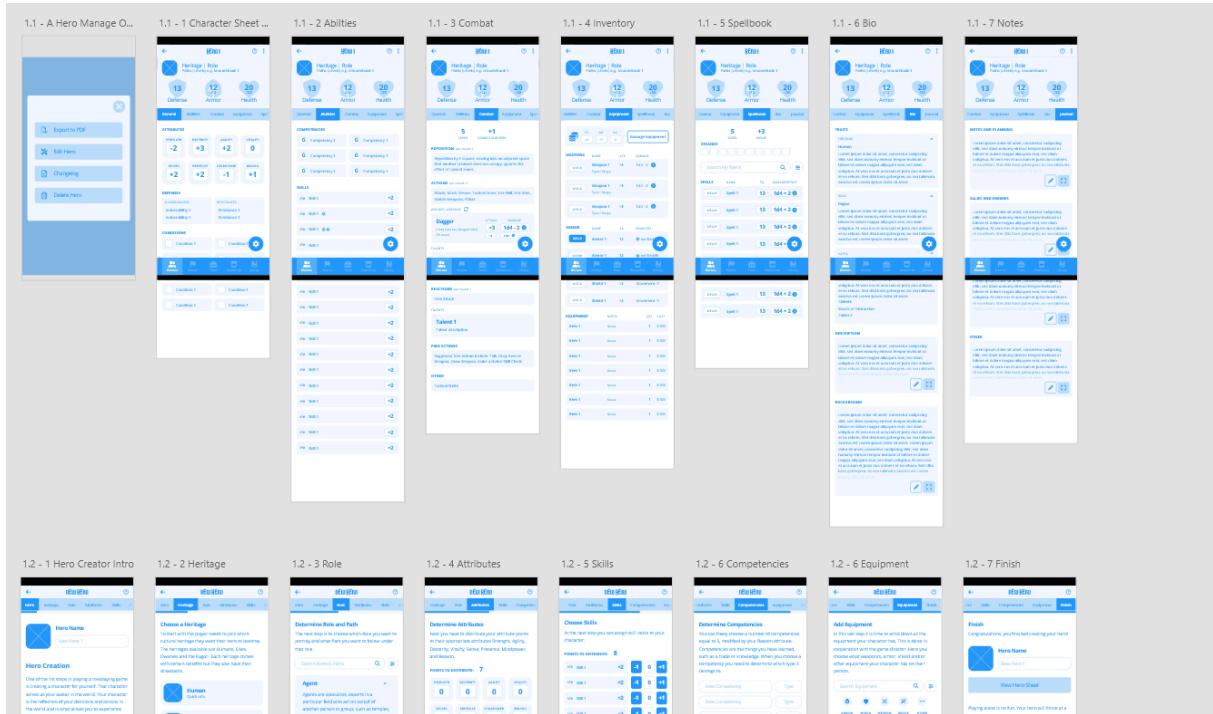


Figure 11-4
Segment from the Games section of the final iteration prototype

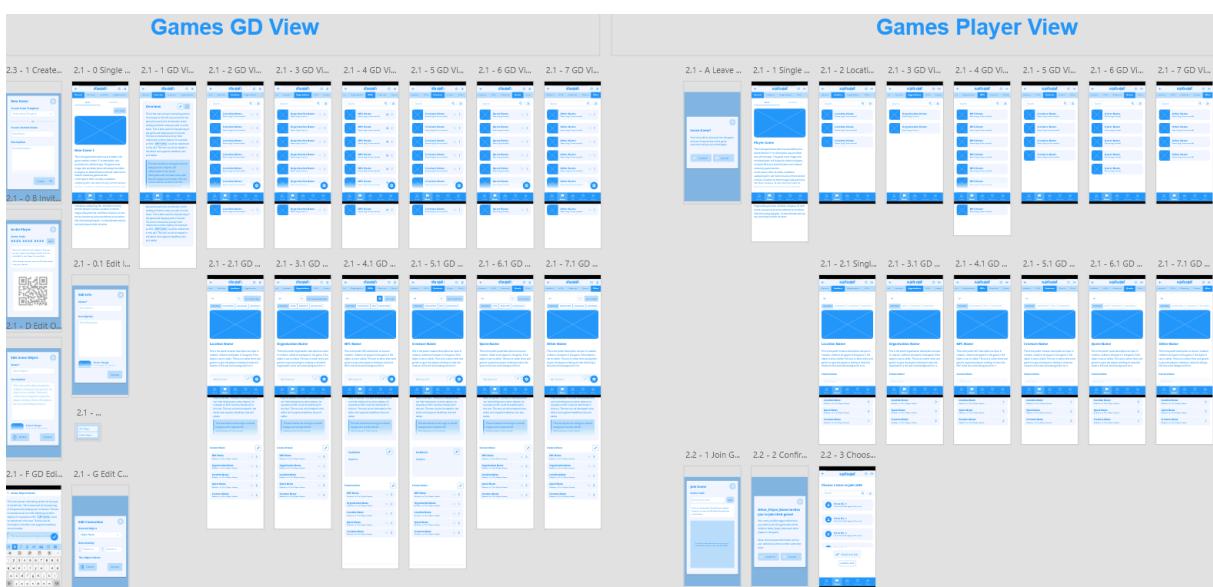


Figure 11-5
Segment from the Tools section of the final iteration prototype

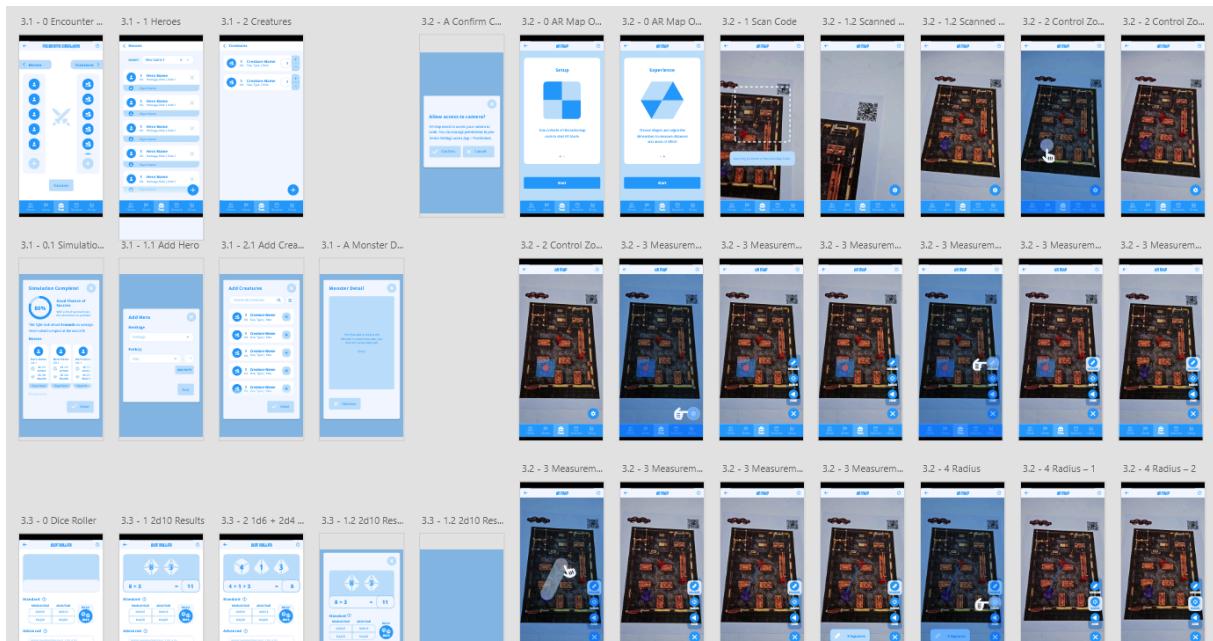


Figure 11-6
Segment from the Resources section of the final iteration prototype

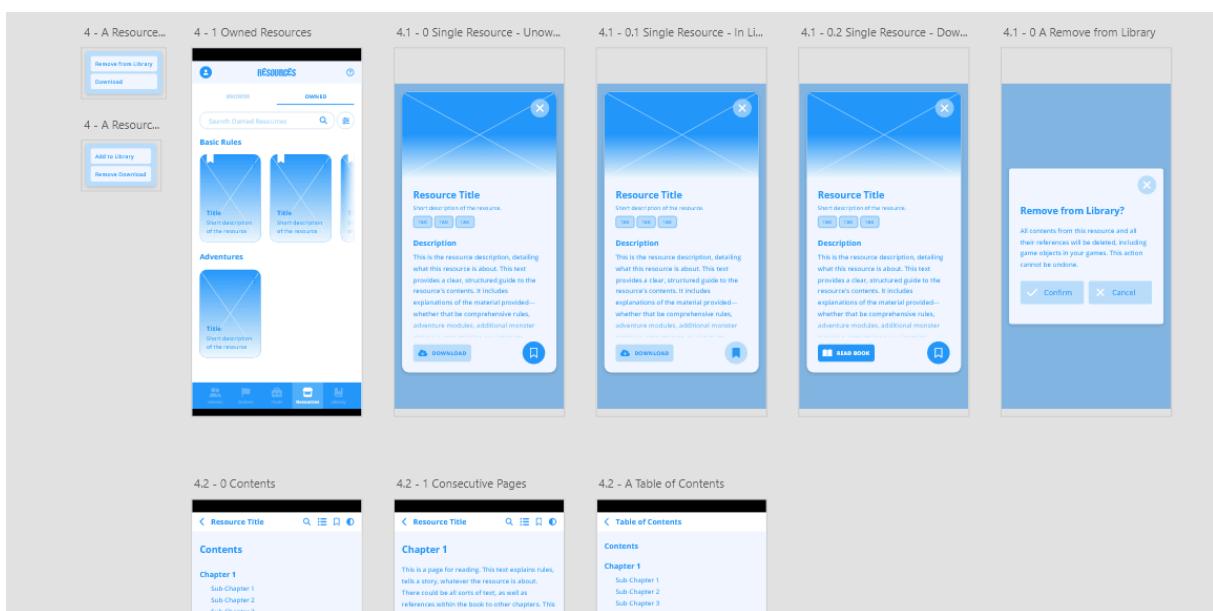


Figure 11-7

Segment from the Library section of the final iteration prototype

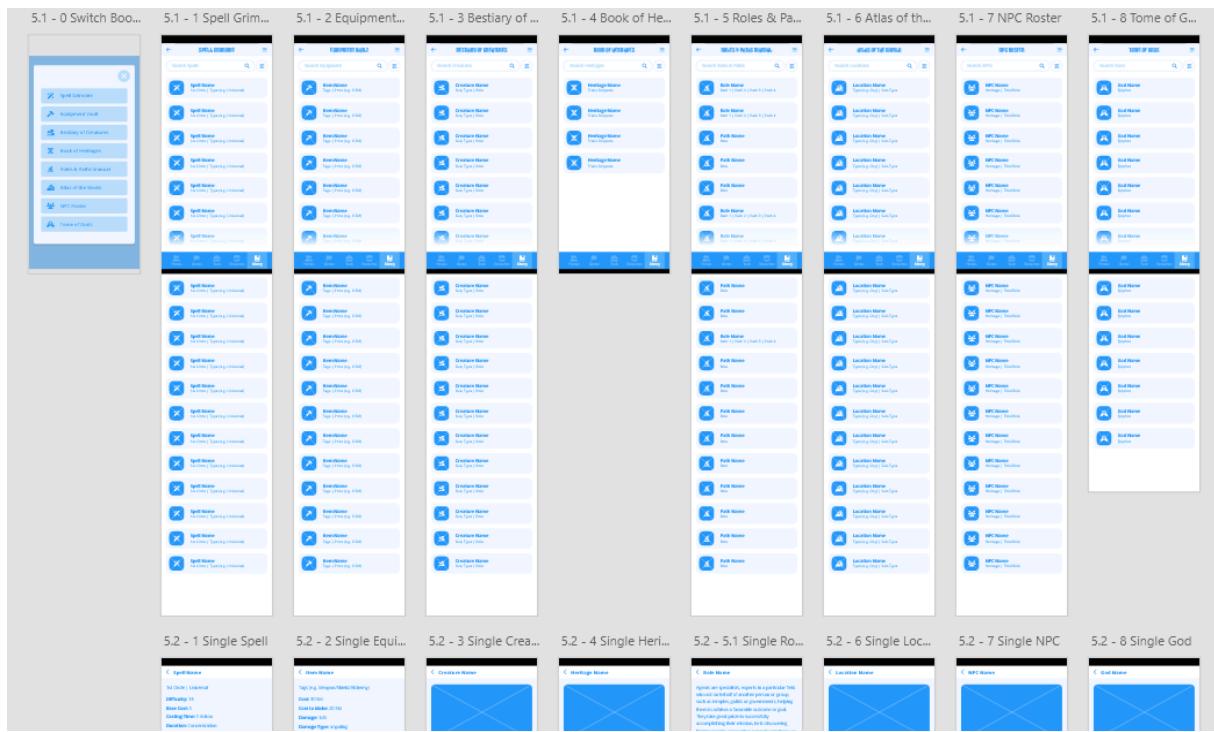
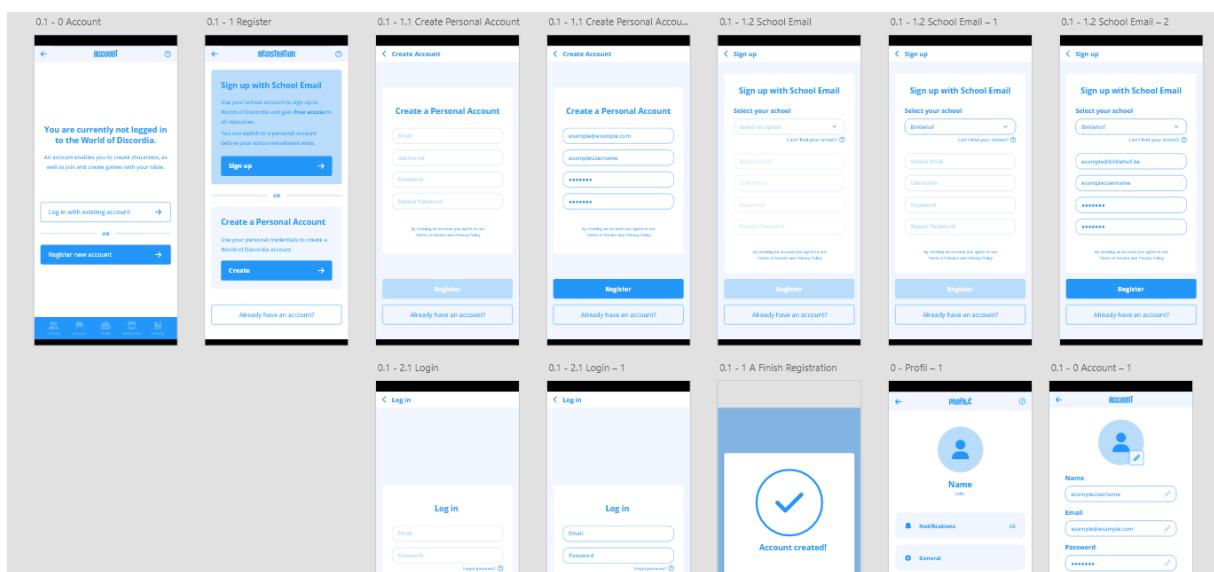


Figure 11-8

Segment from the Profile section of the final iteration prototype



The sections vary in the depth of functionality, and the focus for the prototype and testing slightly shifted depending on the section. Functions such as the Hero creation or the GD view of Games, which are heavy on interaction and custom user paths, were realized in the prototype with the highest level of interactivity possible while maintaining an efficient scope. Efficiency meant that specific pages, like the detail pages for Heritages in the Hero Creator or the GD journal in the Game section, which represent templates more than individual pages in the code later, were included with generic headlines and content (Figure 12-1; Figure 12-2). This proved to be a fine line between overstepping the focus of the prototype with an unnecessary amount of almost identical pages and overwhelming testers with inconsistencies and backend jargon. Testing these kinds of pages in a later stage of the prototype which allows for variables is considered the better approach at this time.

Figure 12-1

Clicking on “Elf” opens “Heritage Detail” instead of e.g. “Elf Detail”

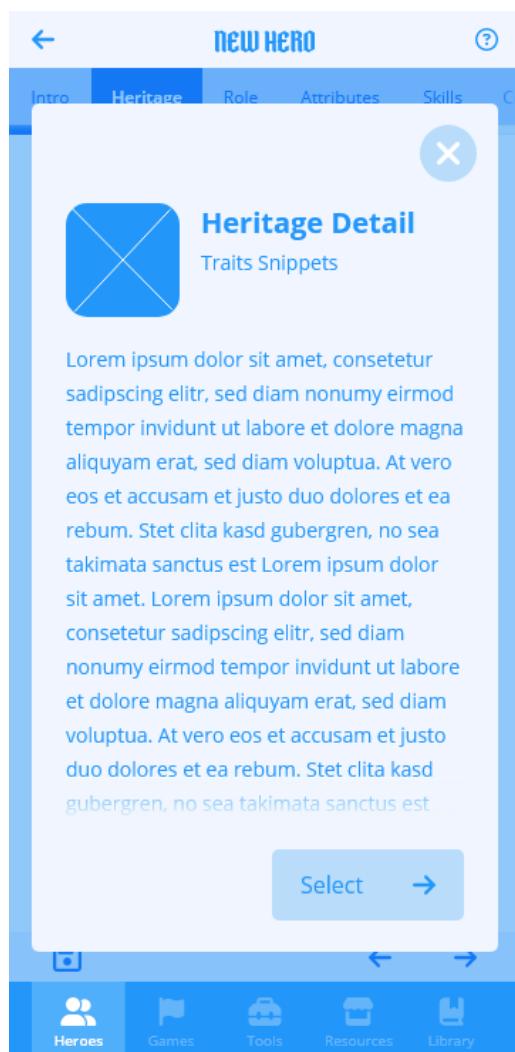
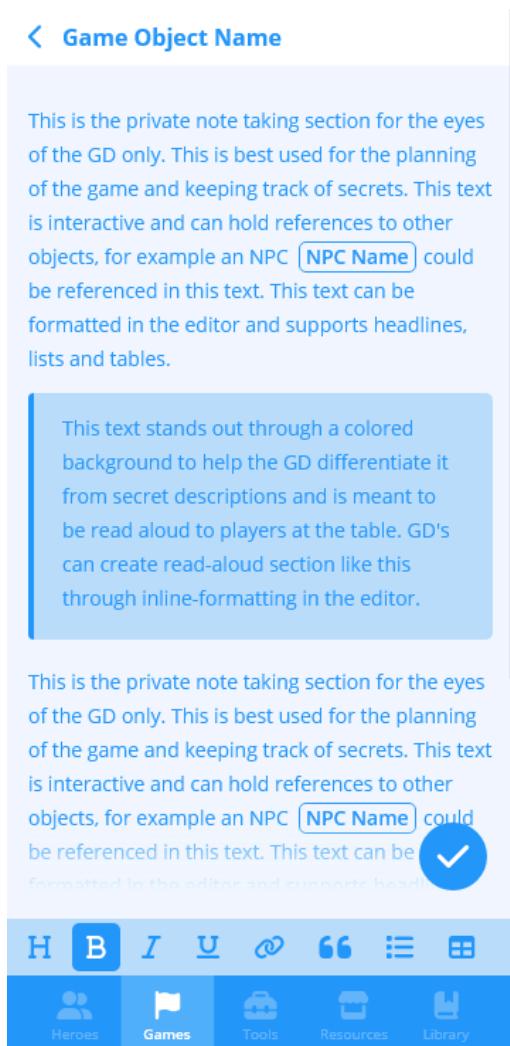


Figure 12-2

The “GD Journal” linked to the same “Game Object Name” page on each game object



Other sections of the prototype, for example the encounter simulator, dice roller, and AR map called for more limited user paths and interactive elements, due to the sheer amount of possibilities. The dice roller only accounted for one possible outcome, which meant it would only work when the tester followed the instructions given by an interviewer and otherwise left the user frustrated. In development, however, it should allow all interactions.

Since *Adobe XD* does not support AR applications, the AR map tool was created separately in *Adobe Aero* (Figure 13) and later implemented through a screen recording of the *Aero* prototype. The *Aero* prototype contained a sequence of predefined animations with 3D objects created in *Blender* that played on arbitrary interactions to simulate a specific user path. This sequence was recorded on a phone (Figure 14) and the recording was edited and cut into snippets. In *Adobe XD*, each snippet was then assigned to its section in the path and connected with overlays that guide the user to perform the required interaction (Figure 15). In this way, the prototype pretends to be interactive but forces the user to follow the predestined path.

Figure 13

Screenshot of the Adobe Aero prototype in the preview window

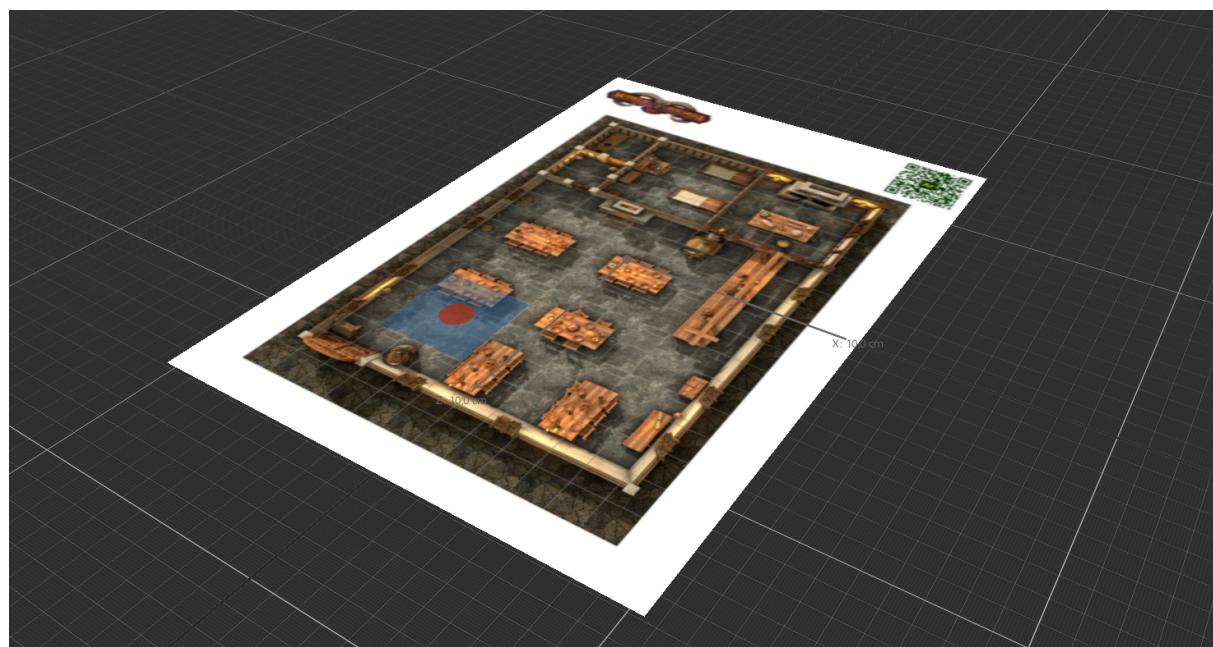


Figure 14

Screenshot of the screen recording of the running Adobe Aero prototype

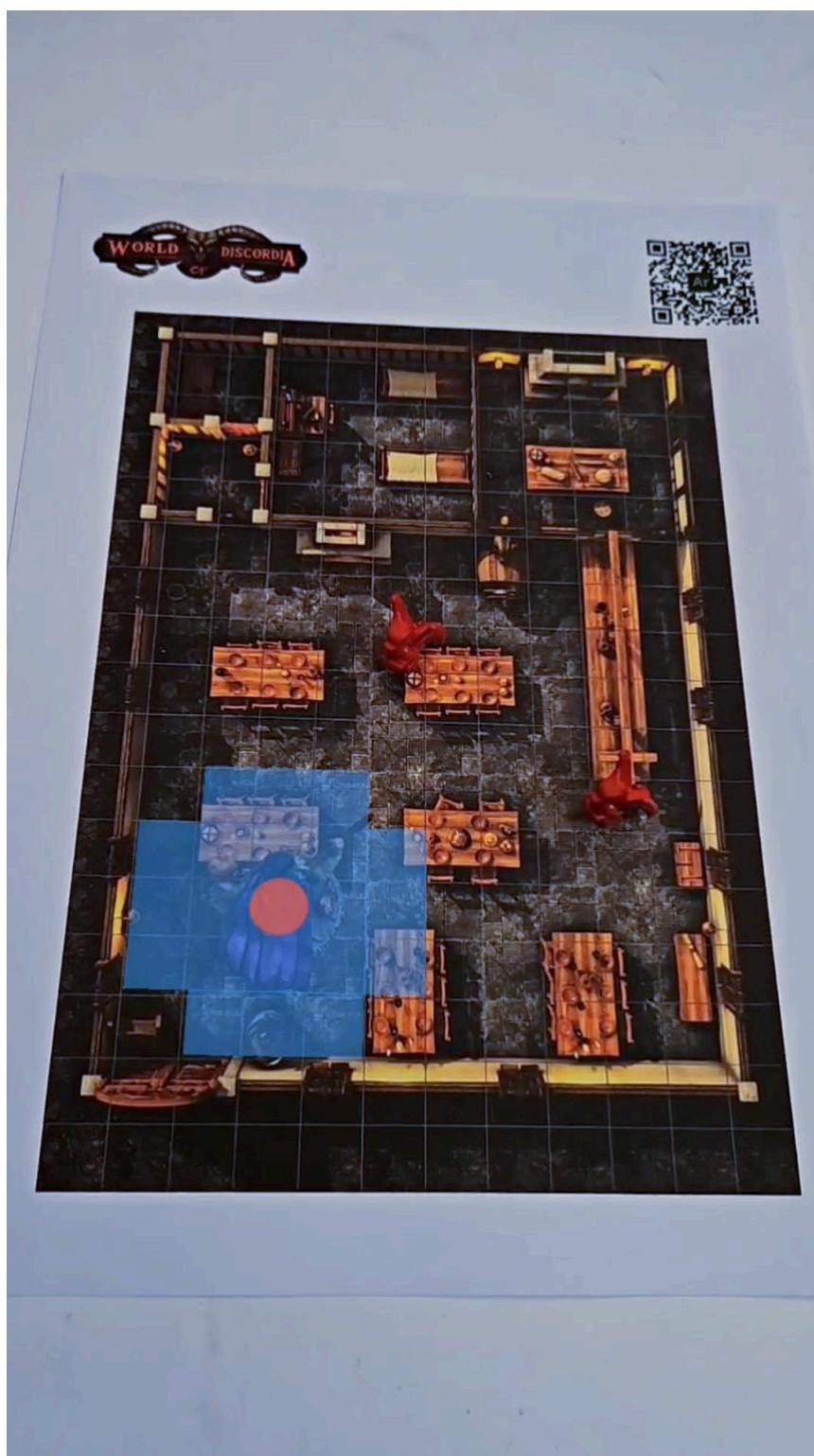
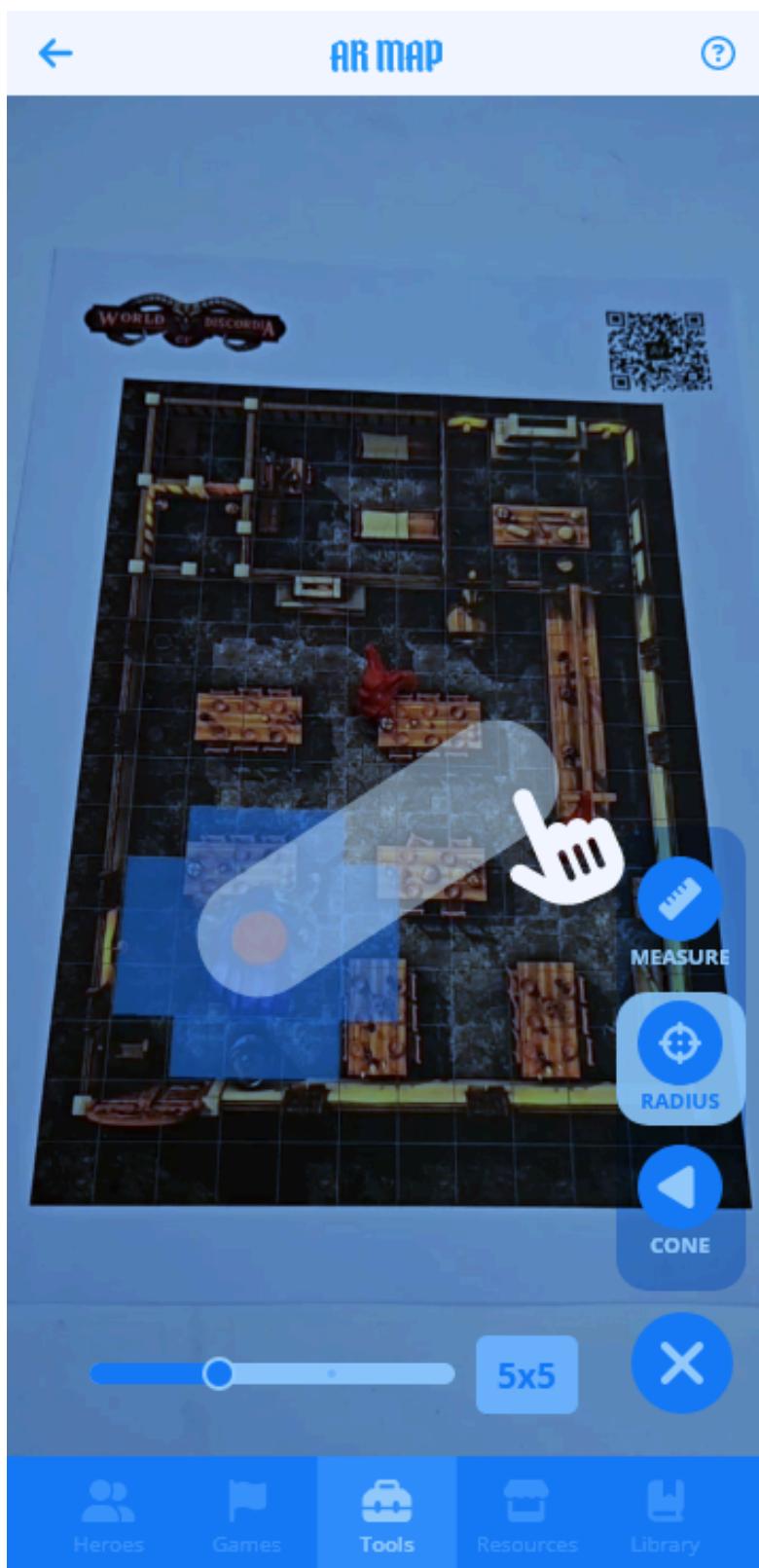


Figure 15

The same screen in Adobe XD with the tutorial overlay



3.2.2 Styleguide

As mentioned, some design principles have already been integrated into the alpha prototype. However, the actual visual design needs to be considered separately, as the prototype, while some elements can be transferred, is not meant to be a guideline for it. This chapter will elaborate on the design decisions made for the styleguide (see [Styleguide](#) in Appendix C), based on previous explanations in Chapter [2.2.4 UI Design](#), focusing on the colors, typography, and icon suggestions. Guidelines for interactions, content, and performance are directly derived from Chapter 2.2.4 and do not require further elaboration.

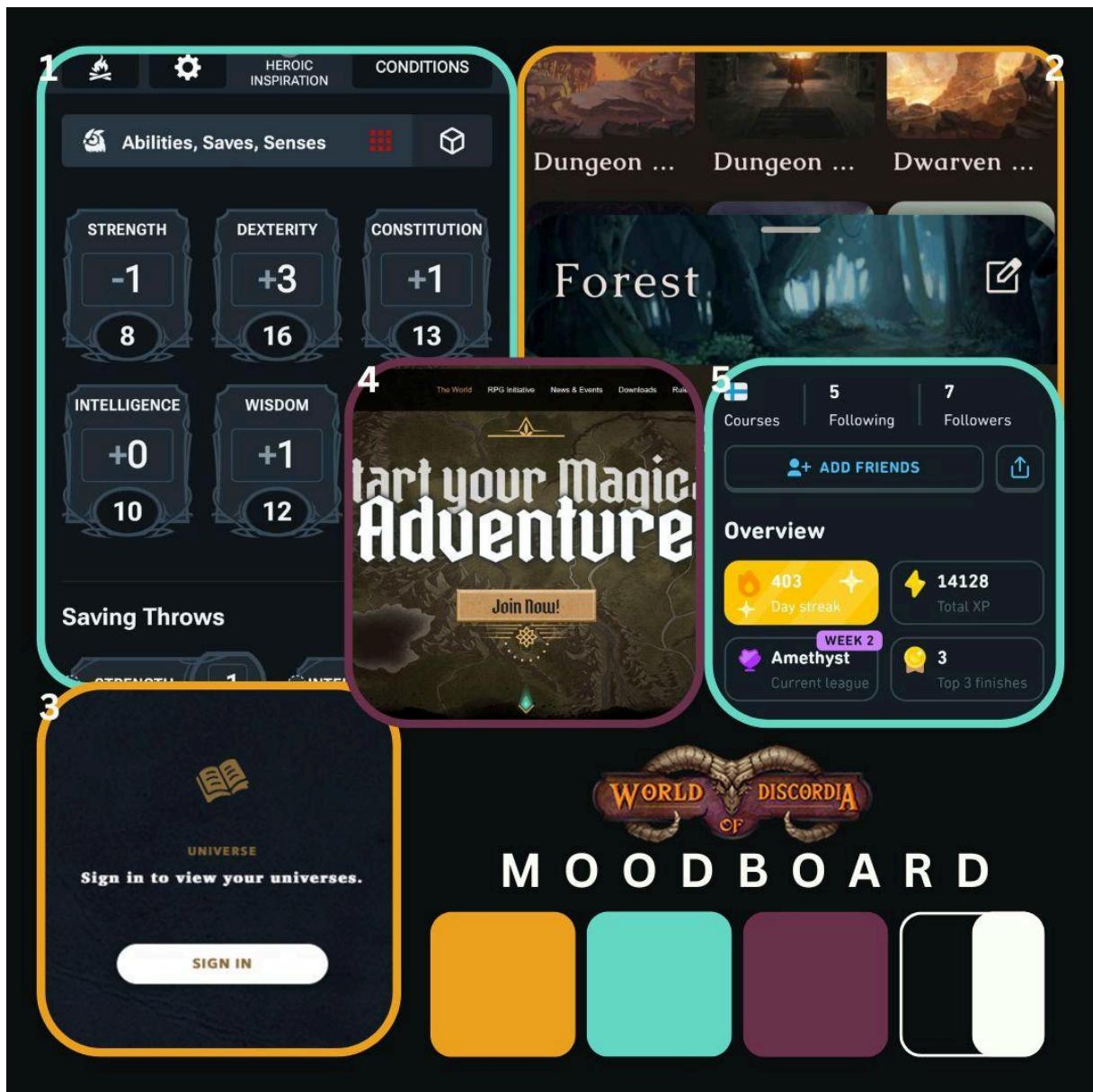
It has been previously established that simplicity in the design for mobile use is better, both for students (Cantuni, 2020; Joyce et al., 2019; Nielsen, 2012) as well as cost-efficient development. The *World of Discordia* currently has a website (Dragon Legion e.V., n.d.), the design of which is built upon with inspirations and suggestions for improvement. The visual design for the *World of Discordia* App draws inspiration from *Duolingo* for its usability for young age groups, *Pocket Bard* for its simplicity and use of appealing imagery, *Alchemy* for its aesthetics, and *D&D Beyond* for its fantasy-inspired utility and successful position in the TTRPG digital tool sector. Screenshots from these applications have been assembled in a mood board (Figure 16).

The resulting proposed style is applied to three pages from the alpha prototype as an example visualization for the UI design in Figure 17. It avoids overly elaborate ornaments and bright colors and is designed for dark mode. Dark mode is preferred by many users because of its aesthetic appeal. It can also improve accessibility for users with visual impairments and even save battery on OLED displays (Zhang & Kohler, 2024). Primarily, though, this is a cosmetic decision. An option to switch to light mode should be available through the display settings at a later point.

The visual design was not thoroughly tested. However, it elicited positive feedback from Birklehof students when briefly presented. “It looks very cool!”, said one student (personal communication, February 21, 2025).

Figure 16

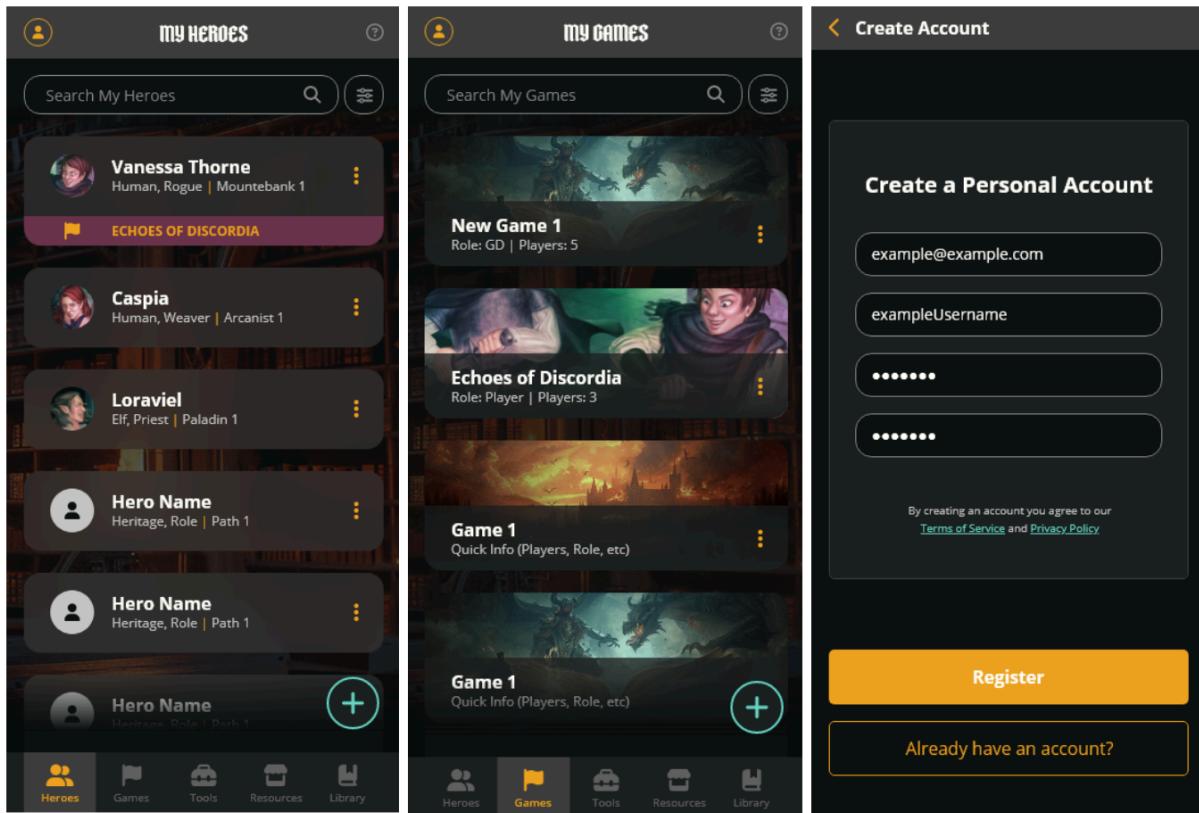
Moodboard for the World of Discordia Companion App



Note: From (in order) *D&D Beyond* (Wizards of the Coast LLC, 2025a), *Pocket Bard* (Pocket Bard LLC, 2025a), *Alchemy* (Arboreal, 2025), *The Discordia* (Dragon Legion e.V., n.d.), *Duolingo* (Duolingo, 2025).

Figure 17

The proposed style applied to the alpha prototype as an example



Note: Images used from *The Discordia* (Dragon Legion e.V., n.d.), retrieved on 18.02.2025, and personal documents. Icons used in the prototype by fontawesome.com and flaticon.com.

Color

As previously mentioned, the color scheme for the World of Discordia companion app should be colorful but avoid overly bright, rainbow-like colors and instead be visually attractive, modern, and neutral. The color scheme must provide sufficient contrast between text and background for readability and be gender-neutral. Suggested color harmonies are triadic, split-complementary, or squared/rectangular.

For the primary color, the muted gold from the Discordia website is amped up in saturation and brightness to create a more vibrant shade of Gamboge that suits a young audience better and resembles the Orange from the World of Discordia logo

more closely (see Figure 17). The accent color Turquoise is slightly adapted to fit the Gamboge. Together with Eggplant as a secondary color, which is also present in the logo, these colors form a harmony between triadic and split-complementary.

A dark, almost black color for the background and a bright, almost white color for the font, are added with gradations in between to create a palette of colors for background elements and text. Additional signal colors that stand out from the other colors are included for alerts. Figure 18 displays the choice of colors.

The contrast of these colors was tested through online tools and became apparent in grayscale (Figure 19). In the shown combinations, fonts are well-legible, and interactive elements are visible even in grayscale. The darker overlays on images provide dark and calm backgrounds for the text on top of them. However, the bright text on Gamboge displays bad contrast. Background colors used must be chosen with care. Zheng and Kohler (2024) emphasize the importance of visibility of structural elements such as dividers and visual section markers in dark mode. Figure 19 shows that the header and current footer items are clearly distinguishable from the content, which appears to be behind them. A thin outline was added to the card design behind the text inputs to accentuate it more clearly from the background (Figure 19).

Figure 18

Suggested color swatches for the World of Discordia companion app

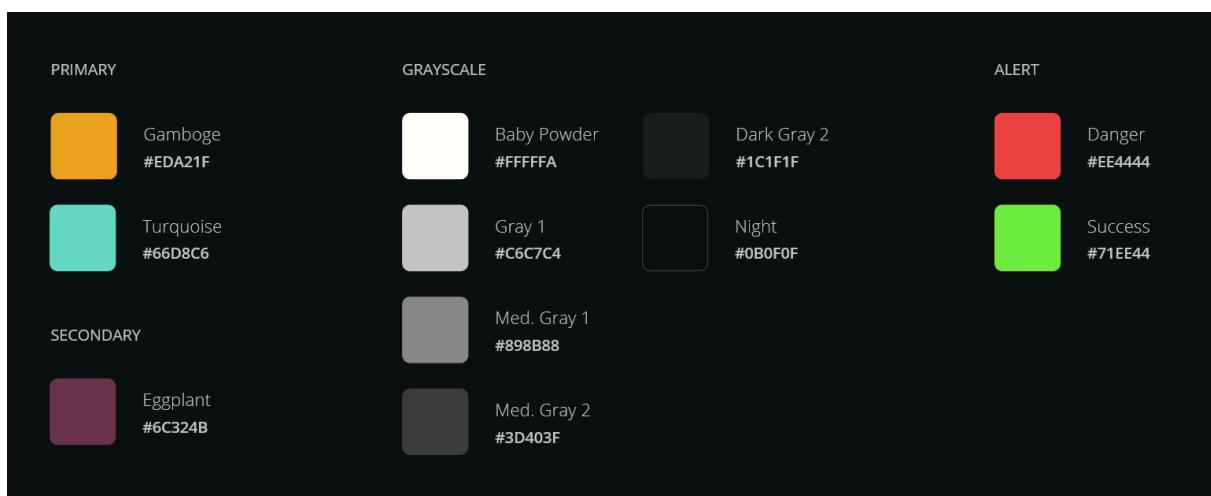
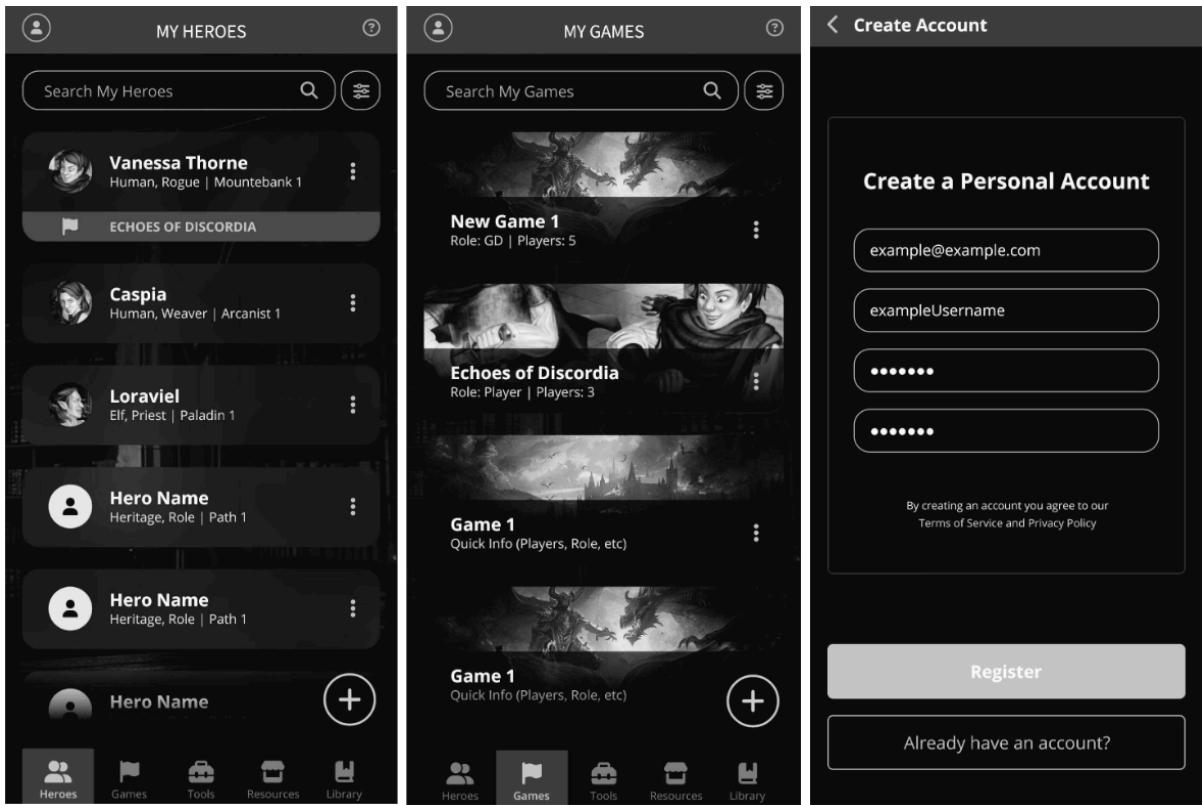


Figure 19

Proposed style example screens in grayscale



Typography

Simple sans-serif typefaces are recommended that must follow the rules of good typography, such as kerning, spacing, and line height. Longer passages of text should be written in a larger font, but not too large. A font size of 14pt was chosen for paragraphs with smaller fonts only used for secondary content or previews. The gothic font used on the *Discordia* website is used for headings, although sparingly as it is less legible at the size suitable for mobile devices. The sans-serif typeface “Open Sans” is used for most text. Regarding content pages, white spaces and simple formatting aid readability and concentration, and cluttered screens full of text should be avoided. Patterned backgrounds or images as backgrounds for text should always use overlays (as seen above in Figure 19) to provide better legibility. In general, accessibility standards for contrast ratios must be adhered to. Figure 20 shows the typography chosen for the *World of Discordia* app.

Figure 20

Suggested typography for the World of Discordia companion app

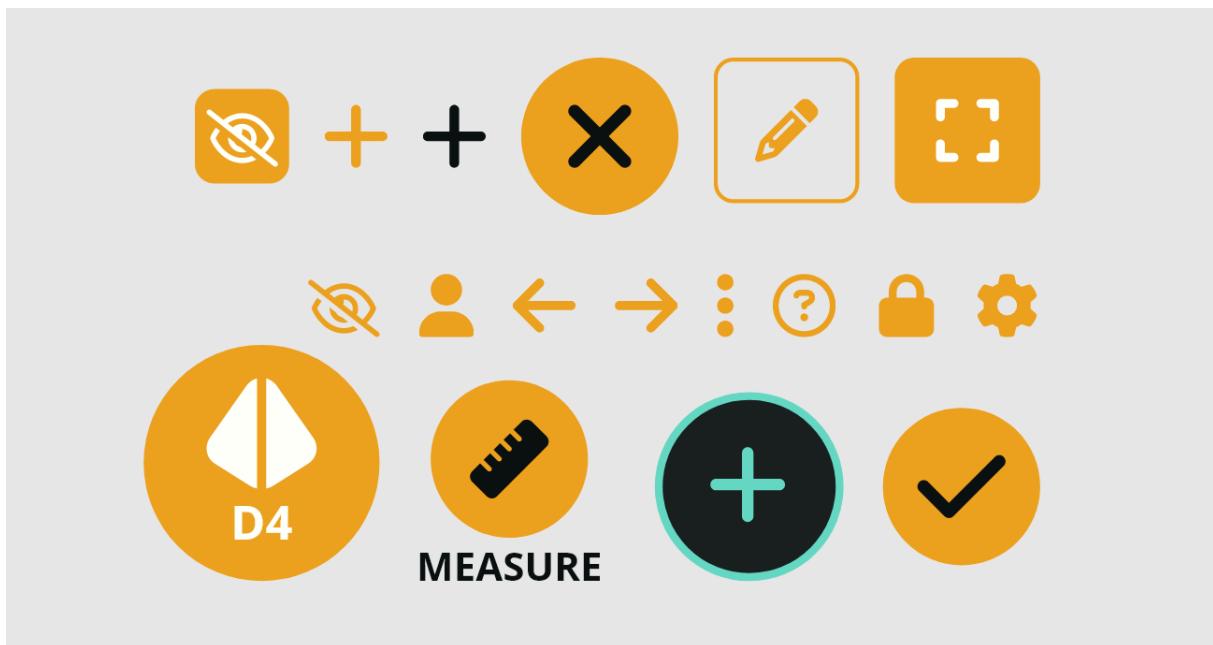
FONT STYLES		HEADINGS
AaBbCc	Raven Hell Gothic	HEADING 1 Raven Hell Gothic Condensed Medium 16
Open Sans		HEADING 2 Open Sans Bold 20
ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz 0123456789 ~%!@#\$%^&*_-=+ {}{}{} \\<>'''..::?	ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz 0123456789 ~%!@#\$%^&*-_=+ {}{}{} \\<>'''..::?	HEADING 3 Open Sans Bold 16 HEADING 4 Open Sans Bold 14 HEADING 5 OPEN SANS BOLD 12 HEADING 6 OPEN SANS SEMIBOLD 10

Icons

As established before, icons are a crucial part of the visual design for youth. They need to be self-explanatory and take advantage of commonly known mental models. It's recommended to add labels to less established or more abstract icons. For the prototype, fonts from free libraries were used (Figure 21). However, for more custom needs such as dice, defense, armor, health, or the icons in the footer menu, original designs should be considered. Custom icons should be adapted to fit the style of other icons used from libraries. Icons for interactions should be at least 16x16px.

Figure 21

Icons for the World of Discordia companion app



Note: Icons are not in the correct color. Icons used in the prototype by fontawesome.com and flaticon.com.

3.3 Frames

Aside from functions and design, the concept for the *WoD* companion app includes considerations and guidelines for legal and economical frames. This addresses the satisfaction of aforementioned context-setters and subjects, such as educators and the dev team.

3.3.1 Legal

Before delving into any conceptual concerns, the compliance of the code and content management with media and data privacy laws and the GDPR is indispensable. The

development team is responsible for ensuring security and accessibility standards in the code and preventing data leaks and vulnerabilities. The *Dragon Legion* must also adhere to media copyright laws regarding the content they create or may later distribute, such as adventures written by third parties. As discussed before, complying with standards and possibly obtaining certifications also has marketing benefits.

The main concern for this concept for school use regarding legal frames is account verification. Outlined in the prototype is a version that requires the student to select a school from a list of participating schools and then create an account using that email address. The address is to be manually checked and verified in the code. However, it is highly suggested to use verification for institutional logins instead, such as Shibboleth or OpenID (Shibboleth Consortium, 2022). These require more effort, contracts, and certifications, but in return, they offer safety and compliance, minimizing risks and ensuring trust in the application by educators and school officials, which is crucial when designing for children and educational institutions as mentioned before in Chapter 2.2. When creating a personal account, social logins should be added as an alternative way of signing in (Joyce et al., 2019).

Alternatively, there could also be two separate versions of the app, the normal version and an educational version, which only allows users to log in through the school or only enable the download after logging in online with the school. While presenting to be more effort at first, this would ensure that the educational version has all the needed certifications for use in schools and complies with regulations such as content filters and no socials or links that go outside to third parties, while the full version offers the full range of features. For future developments, this could also feature limited social functions compared to the full version, which could contain ads for revenue or links outside for marketing purposes. Inevitably, legal matters should be further discussed in detail with experts in the field.

In either case, as long as a user is logged in through an educational institution, content that is not suitable for students, e.g. possible official materials rated 18+, should be filtered out and unavailable to them. Legal notes and caution notices

should be visible whenever a user enters a potentially infringing area, such as reminders to not share sensitive data in text that is shared with other users.

For any kind of user, an account should not be needed to access the app. Browsing resources and the library, as well as downloading resources, can be done without an account, and users should be allowed to do so without being prompted to create one. Features such as creating and saving Heroes and Games, and purchasing or saving resources, which require an account, can be unlocked by logging in or signing up.

App permissions for notifications, the device's camera, or media should only be asked for when needed. Lastly, accessibility should be guaranteed by adding options for screen readers and display settings that accommodate visually impaired people.

3.3.2 Pricing Model

According to the Council of Foundations (2022), non-profit organizations are generally allowed to engage in economic activities, and additionally, if these activities are necessary to pursue the organization's statutory purpose and do not create undue competition with for-profit organizations, the profits are not taxed (which is another reason to keep the app educational).

The pricing model that is recommended for the *WoD* companion app upon first launch is free access to the application and core resources, with one-time in-app purchases for additional resources. However, should printed copies of said resources exist, users should be able to unlock the digital version as well to prevent them from having to pay twice for the same resource. Once *WoD* has reached a market big enough to support further development of the app, where additional features like the publishing of user-generated content are added, *Dragon Legion* should consider switching to a freemium subscription model, where the premium version can unlock special customization features, or if a limit on features is introduced in the free version, such as a reduced number of free hero creations, unlock unlimited slots for them. Users should be given the incentive to support the organization and their community work by paying for the premium version.

At all times, the application should stay free for students of educational institutions participating in *The RPG Initiative* and be free of ads in this version. Students of participating institutions should also gain free access to all resources. An educator's license could be introduced in the future, if the initiative is successful, in which case the school would finance the license and guarantee the gratuitousness for their students.

4 User Testing and Evaluation

4.1 Testing in School Setting

It has been previously established on multiple occasions that user testing is indispensable when creating digital products for children (Cantuni, 2020), especially when pursuing a UCD approach. The launch of *The RPG Initiative* provided a unique opportunity to join the program as a facilitator and interact with the target group directly. As part of the regular meetings with the AG, qualitative user tests following a semi-structured interview (SSI) approach were carried out with the five participating students (aged 14-19) at the *Birklehof*. An SSI approach can be especially useful for understanding children's and teens' attitudes and experiences (Adams, 2015; Joyce et al., 2019). "Conducted conversationally with one respondent at a time, the SSI employs a blend of closed- and open-ended questions, often accompanied by follow-up why or how questions" (Adams, 2015, p. 493). Due to the logistical testing situation, apart from the first general interview, testing sessions were split up into two groups instead of individual sessions. Each group tested the application and was asked semi-structured follow-up questions in sessions between 20 and 45 minutes long. The sessions were kept under an hour to address the target group's short attention span (Cantuni, 2020). Following Adams' (2015) guidelines for conducting SSIs, practical administration steps for data collection were prepared and interview guides and questions were drafted beforehand. Consent from the students' caretakers was received so that the testing sessions and interviews could be recorded and transcribed (see Appendix E). During the user testing, a casual, conversational approach was maintained to ensure professionalism while making the tester comfortable (*ibid.*). Cantuni emphasizes to "[m]ake it clear at the very beginning that the kids are there to teach you something, and not the other way around" (2020, p. 207). In between meetings, the prototype was further developed with new sections, incorporating the student's previous feedback.

Testing in this way provided the following special qualities:

- **Familiar environment:** The facility that the students met in was on their school's campus. This meant that they were familiar and comfortable with the

testing environment, leading to a more relaxed atmosphere and honest reactions.

- **Proximity to the intended scenario:** The testing was conducted in the same scenario the application is designed for, providing accuracy in the testing demographic. However, due to the low fidelity of the prototype, testing situations were simulated and students could not be observed using it in a real situation during the game.
- **Iterative process:** The students witnessed the process of the development throughout four testing sessions, which allowed the observation of their changes in reactions and behaviors between prototype versions.

As mentioned before, the prototype aimed to gather feedback from the students before further development and therefore included only the initial implementation of key features but did not provide full functionality or a final visual design, instead focusing on the utility of features, the structure of the site and the hierarchy of information rather than the actual content. The goal of the testing was to gain insights into the interface design, functionality, and potential improvements. The sessions focused on identifying areas of confusion, ease of use, and suggestions for enhancing the user experience for both student players and student game directors.

4.2 Evaluation

The aspect in which the success of the prototype is evaluated here is twofold: One, the satisfaction of students' requirements as defined in Chapter [2.1.2 Thematic Analysis](#), and two, the suitability of the prototype for user testing with young students. The extent of success in terms of satisfaction regarding the entire list of requirements is determined in Chapter [5.1 Summary of Findings](#).

A general summary of the user testing results is presented in Table 5, highlighting the most evident positive findings and points for optimization. [Appendix B - User Testing Interview Results](#) contains the entirety of the results, while Appendix E contains the original transcripts. As can be seen from Table 5, the application was generally well

received, particularly the information architecture and navigation, which were a key aspect of usability. Consistency in recurring element structures across the application proved to be very beneficial as the students quickly learned that e.g. non-administrative functions were located in the bottom right button and to use the top scroll bar to switch between different sections. One student pointed out that some things were “sort of easy to find because it's the same system that [the app] had with all the other parts of the game, like when making a hero and stuff”.

The AR tool, as mentioned earlier in Chapter [3.1.3 AR Integration](#), was well received as well. Participants found that it would give structure and “make things fair” and it was considered “helpful for beginners” to learn the rules of the game.

From this list of general findings, the satisfaction of students' requirements for the application has been derived and visualized in Table 6. It is concluded that most requirements have been successfully met, although further research and development is needed to wholly meet their needs.

Table 5

Overview of findings by positive findings and points for optimization

Positive Findings	Points for Optimization
Logical Structure App structure is generally well-received	Clarity Some functions and status changes need clearer communication
Easy Navigation Users found the app easy to navigate and remember	First-Time User Experience A guide or tutorial is suggested for new users
Helpful Icons Icons were generally liked and found useful	Design Consistency Some elements, like the invite player button's location, were not intuitive.
Valuable Tools Encounter simulator and AR map tool seen as useful	Text Size and Clarity Some text was too small or hard to understand

<p>Game Organization App seen as helpful for organizing and tracking games</p> <p>Character Creation Participants understood how to create a character</p> <p>Joining a Game Participants found the process of joining a game easy and natural.</p> <p>Resource Navigation Participants found it easy to navigate through resources</p>	<p>Amount of Information The amount of detail in some sections could be overwhelming</p> <p>Inconsistent Terminology Terms on the sheet differed from the rule document, and similar-looking terms caused confusion.</p> <p>Dice Roller Usability Removing dice from the dice roller needs improvement</p> <p>Library Navigation Participants felt there was a lot of scrolling in the library and struggled to switch categories.</p> <p>Visual Appeal Some participants found the design not very fantasy-welcoming and too much like a to-do list.</p>
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Table 6

Evaluation of user test results based on students' requirements

Requirement	Evaluation
Entertaining	Mixed
Easy to Use	Positive
Visually Appealing	Mixed
Helpful / Useful	Positive
Not Distracting	Mostly positive

Additionally, participants managed reading in a foreign language surprisingly well, even though they often overestimated their comprehension ability. Concerns regarding inconsistent terminology and the comprehensibility of texts must be addressed by authors of *WoD* material before being added to the application.

Cantuni (2020) devotes an entire chapter to character design and mascots for children's digital products, such as the *Duolingo* owl. In the concept for this application, a mascot was not included due to the risk of appearing too childish. However, the participants responded well to the proposal of a character, especially when combined with a tutorial guide. A proposed design concept for this character, created after and prompted by the interviews, can be seen in Figure 22. It represents a cartoonized version of the dragon skull which is in the logo of *WoD*. However, a detailed mascot creation should be issued in the next phases of development which addresses Cantuni's guidelines for characters in educational apps.

Figure 22

Sketches for a mascot that guides first-time users through on-screen tutorials



Regarding the second point of evaluation, it becomes evident in this overview (Table 6) that the visual design of the prototype, as expected, plays a big role in the reception of the application. Participants acknowledged the usefulness and logical structure, but they did not necessarily *enjoy* using it due to its low fidelity. Surprisingly, they still managed to navigate the alpha wireframe design better than anticipated, although many expected faults were proven to be true. Students stated that they needed more icons and that the blind text placeholders were too confusing for them. They relied heavily on the content to understand the structure. Some iterations of the prototype did not focus so much on changing features or structures of the app, but rather on improving the usability of the prototype for the testing audience. This process also showed that setting clear expectations for the interaction significantly improved the participants' ability to navigate and evaluate their experience. They performed much better when they were informed about the purpose of the tests and the unfinished state of the prototype. Instead of wondering why some interactions did not work as expected, they expressed their expectations and ideas about what could or should happen. This raises questions about creating separate prototypes for development and user testing.

The key takeaways from this evaluation can be summarized in the following:

- The app performs strongly in **usability and helpfulness** but needs improvement in **visual appeal**. The proposed UI design should be further refined and tested before launch.
- The design should be adapted and tested for **tablet use**.
- When finalizing game rules and inserting its content, **careful age-appropriate visual structure** and wording must be ensured to address the overwhelming amount of detail for some users.
- Game templates and **premade adventures** should be created
- A **tutorial** or guide for first-time users should be added.
- A **mascot** could further contribute to a welcoming feeling.

- AR implementation proved to be a **useful tool** that excites students.
- User testing with children and teens should be explored further to create **guidelines for prototyping**.

4.3 Limitations and Challenges

The quality of the prototype and its testing was impacted by a few challenges. Because of logistical issues, as mentioned previously, the launch of *The RPG Initiative* was delayed and started rather late in the process of this thesis, and the time for user testing at the school *Birklehof* was cut short. Ideally, other facilitators from more schools across Germany should have been involved in the tests to broaden the pool of testers and gain insights from a wider range of people. This is discussed further in Chapter [5.3 Future Directions](#).

The unfinished state of the game system and business plan by *Dragon Legion* had an impact on the concept and prototyping in several ways. On the one hand, it offered the opportunity to design the game mechanics and freely direct possibilities, on the other hand, it meant that a lot of loose information had to be juggled and some areas of the prototype could not be clearly defined. A lack of communication with the *Dragon Legion* further reinforced these issues.

On the technical side, the unfinished system proved the concept of measuring distances and radii in AR to be tricky. Currently, dimensions, squares, radii, and areas of effect are still a work in progress. This made it difficult to make decisions about how an AR tool should calculate them. Before the AR tool can be further developed, the mathematical consistency of the game system needs to be finalized.

The biggest obstacle in the development of the prototype was the limitations of the tool *Adobe XD*. Because the basic version of *Adobe XD* does not allow complex logical linkages, for example to the last page the user came from on the next higher level of the hierarchy, it was impossible to simulate complex behaviors such as a well-working “back”-button. Covering each possible user path in a complex, feature-rich, and hyperlinked prototype would require a prototype designed

specifically for that experience, which would render it confusing for development and scale it to a size beyond the scope of a prototype at this level of abstraction. Additionally, the prototype was limited by the inability to implement “on-scroll” behaviors, such as the fade-out of a menu, or sticky headers. These effects can be achieved, but not through the interactions that the testers would expect. This creates a dilemma between the design for interaction and actual user tests versus the design for the presentation of the user experience and the visual design. Furthermore, the function to display overlays on top of overlays was not supported, which in turn again means that the tester's freedom of interaction would have had to be restricted to make this effect visible. While these issues may seem arbitrary, visual cues like overlays or transitions reinforce the cognitive map that users create of the application. Depriving them of these crumbs of information made it significantly harder for them to navigate.

5 Conclusion

5.1 Summary of Findings

This thesis aimed to create the concept for a digital companion app incorporating AR for the *World of Discordia* TTRPG for educational use in schools. The design process followed a dual-layered approach combining User-Centered Design and Participatory Design. The key steps taken included a stakeholder analysis, design research, benchmarking, the development of the concept, and user testing. An alpha prototype was created and tested with students at the *Birklehof* to gather feedback and identify areas for improvement. The process focused on investigating how a digital tool could assist student players and GDs in gameplay, what functions it would need to provide, and how it must be designed to suit the students' specific UI and UX needs. Furthermore, the integration of a supportive AR function was examined and further contextual conditions regarding the implementation in schools were considered.

In summary, it can be said that the concept largely meets or at least accounts for the requirements set out in Chapter [2.1.2 Thematic Analysis](#) as seen in Table 7. The CEO of *Dragon Legion* commented: "Everything is really beautiful and excellent and very useful" (R. Pechuel, personal communication, February 20, 2025). Appropriate guidelines were provided to ensure the fulfillment of requirements that could only be addressed theoretically due to the prototyping stage.

Table 7

Conceptual satisfaction of the requirements defined by stakeholders

Requirements - the app needs to be...	Satisfaction	Justification
entertaining	- +	Some participants found the app enjoyable, while others felt it needed improvement in visual appeal.
easy to use	+ +	App structure was generally well-received, and users found it easy to navigate

visually appealing	- +	The low fidelity of the prototype impacted the enjoyment of using the application. Guidelines for better UI design are provided.
helpful/useful	++	The app was generally considered helpful.
not distracting	+	The app is task-focused and avoids unnecessary elements.
true to the brand*	++	Aimed at youth and the enhancement of offline play, includes only <i>WoD</i> content.
beneficial to the Dragon Legion's mission*	++	Supports accessibility of TTRPGs in schools. Potential extension of their reach due to the popularity of digital tools.
for free	++	The recommended pricing model upon launch is free.
providing educational value*	-+	Is designed to not interfere with gameplay. The impact could not be tested.
safe to use by students*	++	Prioritizes student safety through compliance and limited social interactions.
conforming to laws and regulations*	+	Provides clear suggestions for compliance with security standards, but is liable to faults occurring in development.
presentable*	+	Aims for a visual design consistent with the app's concept, inviting youth but maintaining an extent of educational seriousness.
implementable*	+	Designed for web and accounts for framework conditions. AR implementation is not discussed.
cost-efficient to develop*	-+	Simplicity and the PWA concept account for a low production budget. Extensive concept. But no cost analysis was conducted and AR is estimated to be costly.
bringing value to the field	+	Contributes to the development of Dragon Legion's digital tool. Suggests directions for future research and implementation. Incorporates innovative features like AR integration.
based on research	++	Based on literature reviews and the design process followed scientific approaches.

Note: Requirements marked with “*” are evaluated based on estimations and/or verbal statements.

5.2 Reflection

The dual-layered framework of combining UCD and PD proved to be well-chosen for the aim of this work. It ensured that the final product would be not only usable by the target audience but also aligned with the needs and expectations of involved stakeholders. UCD provided a structured methodology for iteratively refining the design based on user feedback, while PD enabled direct involvement from educators. The result was the successful application of a holistic approach that ensured that the overall shape fit before delving into individual areas.

Despite the benefits of these methods, several challenges arose throughout the process. One of the most pressing areas for future improvement is the need for thorough user testing with a functional beta version. While the prototype allowed for initial evaluations, a more comprehensive testing phase is recommended. The results from the testing show that the visual design and high fidelity of the prototype significantly impact user engagement. This second stage of testing should also be conducted with a wider range of participants and should also include facilitators to examine the use of the application to their and their mission's benefit.

Additionally, striking a balance between scope and depth in prototyping proved to be a challenge. Often, the prototyping was more concerned with the question of how to create a level of interactivity that made it usable for the tester rather than the finished application or programming logic. Clear communication and setting expectations turned out to be crucial for effective user testing. Given the iterative nature of the design, it may have been beneficial to develop multiple prototype versions: one optimized for usability testing and another intended for the development team for programming. This approach could have allowed for more targeted evaluations without introducing constraints related to feasibility.

Furthermore, the ongoing development of the game system required a high degree of adaptability from the design process. While directive suggestions and versatile solutions were integrated wherever possible, some areas may require re-designs as the game rules are finalized. The impact of the testers' confusion caused by inconsistencies in the game could not be distinguished from the confusion caused by

the application, which led to less reliable test results. The aforementioned second phase of user testing with a beta prototype should take place as soon as the system is finalized to avoid this problem.

In conclusion, the design of the *WoD* digital tool provided valuable insights into the challenges and opportunities of designing applications in real-world educational contexts. The application of the combined methodologies proved beneficial in addressing user needs and framework constraints, however further refinements, such as more user testing, implementation of the visual design, and regulatory compliance, will be essential to enhance the tool's usability and long-term viability.

5.3 Future Directions

Many recommendations for future steps have already been mentioned throughout this thesis. This chapter is intended to summarize these and point out some additions.

In the direct future, before the tool goes into final development, aside from implementing the visual design, there are a few more considerations to address. As previously explained, more thorough user testing in a beta version with actual functionality and design is essential, especially regarding visual cues such as transitions and navigational behavior such as the “back”-button. Second phase testing should involve a broader testing audience and feedback from facilitators, quantitative analyses of schools involved in *The RPG Initiative* (demographics, educational systems) should be used to validate the concept. The use of the app should be observed in actual use case scenarios at the table and the impact of the app on students’ learning outcomes and engagement in the game researched. This research could include a comparison with a control group playing without the app to gain insights into the impact of playing with the digital companion compared to playing without it on the stated benefits of TTRPGs.

To finalize the AR tool, the developers should closely collaborate with the game system creators to ensure accurate mathematical measurements and logic once the

definition of squares, distance measurement, and areas of effect are determined in the game rules. Further improvements in AR integration, such as recognizing heroes on the map and quickly accessing their abilities, as well as methods for grid detection and frameworks that integrate AR into PWAs, need to be investigated. On a larger level, the integration of AR compatibility with officially released *WoD* maps as its own format should be considered for published materials.

The content to be released in the app such as the texts for entries in the library or adventure books must be designed for the audience. For the most part, the structures used in the prototype are preliminary since the content is in large parts still unofficial and undergoing constant changes. To ensure better readability, text passages should be shortened and formatted following the rules of content creation and design for youth. To structure information better, class/entity diagrams should be created to determine the attributes of game objects, especially for content pages such as spells, creatures, heritages, locations, etc.... The aim of this is a framework that authors, designers, and programmers can consult for future development of the game system as well as the app.

Conceptually, the development team needs to prioritize accessibility, address the authentication and pricing for school accounts (no cost for students), and consider how an account could be transferred from a school account to a personal account. The mascot and tutorial guides should be designed and implemented as well.

After the launch of the app, further considerations for more functions can be tackled. A function to play music and the ability to share or publish user-generated content was requested by students. A shop generator (random assortments of items for sale), the back-end design for publishing content, and customization options should be on the list for additional implementations.

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With this document, I, Amélie Dell’Oro, declare that I have drafted and created the piece of work in hand myself. I declare that I have only used such aids as are permissible and used no other sources or aids than the ones declared. I furthermore assert that any passages used, be they verbatim or paraphrased, have been cited in accordance with current academic citation rules, and such passages have been marked accordingly. Additionally, I declare that I have laid open and stated all and any use of any aids such as AI-based chatbots (e.g. ChatGPT), translation (e.g. Deepl), paraphrasing (e.g. Quillbot) or programming (e.g. GitHub Copilot) devices and have marked any relevant passages accordingly.

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Appendices

- Appendix A** Digital Tools Overview
- Appendix B** User Testing Interview Results
- Appendix C** Design Document
- Appendix D** Prototype Files (Digital on [GitHub](#))
- Appendix E** Interview Transcripts (Digital on [GitHub](#))

Thesis GitHub repository: <https://github.com/Aam-Do/BachelorThesis-2025/tree/main>

Appendix A - Digital Tools Overview

Name	Category	AR	Web	Responsive Web	Desktop App	Mobile App	Pricing Model	Account	Core Functions	System Support	Specifically for kids	Aesthetic
<u>D&D Beyond</u>	Digital Companion	No	Yes	Yes	No	Yes	Freemium / Tiered subscription Free core rules, One-time payment for rulebooks	Wizard or Social e.g. Google	Character builder, Interactive character sheets, Campaign rooms, Encounter builder, Resource books, Game rules, Listings, Custom content creation	Dungeons and Dragons	No	Sleek, inspired by D&D print products
<u>COMP/CON</u>	Digital Companion	No	Yes	Yes	No	No	Free Free core rules, One-time payment for rulebooks	Optional	Character builder, NPC builder, Encounter builder, Mission Runner, Resource books	Lancer	No	Function over design, Lancer-inspired
<u>Avatar Legends Nexus</u>	Digital Companion	No	Yes	Yes	No	No	Freemium Free core rules, One-time payment for rulebooks	Demiplane or Social e.g. Google	Character builder, Interactive character sheets, Digital library, Game rules	Avatar Legends	Yes	Inspired by the Avatar franchise, South-East Asian traditional art
<u>Goblin's Notebook</u>	Digital Notebook	No	Yes	Yes	No	No	Freemium / Tiered subscription	Google	Notetaking, Campaign planning (markdown, object-based, connections) Shared view	System Agnostic	No	Utility-focused, D&D print inspired
<u>NPC Generator</u>	NPC Generator	No	Yes	Yes	No	No	Free	N/A	Generate NPC stats, appearance, and personality	System Agnostic	No	Function over design, fantasy
<u>Pocket Bard</u>	TTRPG Music Tool	No	No	N/A	Open Beta	Yes	Freemium	Optional	Interactive music and sound effects	N/A	No	Sleek, fantasy
<u>Roll20</u>	VTT	No	Yes	Yes	No	No	Freemium /	Roll20	VTT (Real-time 2D map,	1.200	No	Sleek, utility-f

						Tiered subscription		fog of war, Dice roller, Character sheets, music, text/voice/video chat, host or join campaigns) Compendium	Systems		ocused	
<u>Owlbear Rodeo</u>	VTT	No	Yes	Yes	No	No	Freemium / Tiered subscription	Google or Apple	simpler VTT, mobile responsive, 24h rooms	System Agnostic	No	Playful, utility-focused
<u>Alchemy</u>	VTT	No	Early Access	No	Early Access	No	Freemium Free and paid content	Alchemy	cinematic VTT, scene builder, integrated worldbuilder, streaming mode	12 Systems	No	Cinematic, immersive
<u>Ardent Roleplay AR</u>	AR Tool for TTRPG	Yes	No	N/A	No	Yes	Freemium Free and paid content	Social (e.g. Google)	animated AR overlay on marker cards, build and run encounters	System Agnostic	No	N/A
<u>Mirrorscape</u>	AR Tabletop simulator	Yes	No	N/A	No	Yes	Free download	Google or Apple	3D/AR tabletop simulator (online or face2face)	System Agnostic	No	N/A
<u>Pokémon Go</u>	Game	Yes	No	N/A	No	Yes	Free, In-App-Purchases	Nintendo	Catch Pokémons (3D/AR), fight, and social	N/A	Yes	Modern, playful
<u>GeoGebra 3D</u>	Math Learning Tool	Yes	Yes	Yes	Yes	Yes	Free	N/A	Place, manipulate, and measure 3D graphs, AR visualization (mobile app only)	N/A	Yes	Simple, utility-focused
<u>Duolingo</u>	Language Learning App	No	Yes	Yes	No	Yes	Freemium	Required for saving progress, Duolingo or Facebook	Learn and practice languages, leaderboards, quests, and friend challenges	N/A	Yes	Modern, gamified playful

Note: Data compiled from Arboreal (2025), Ardaious (n.d.), Ardaious (2023), Arena (n.d.), Demiplane (2025), Duolingo (2025), EtiensPB (n.d.), GeoGebra (2025), Mirrorscape Inc. (2022), Mirrorscape (2024), Niantic Inc. (2025), Owlbear Rodeo (n.d.), Pocket Bard LLC (2025a), Pocket Bard LLC (2025b), Roll20 LLC (n.d.), *The Goblin's Notebook* (n.d.), Wizards of the Coast LLC (2025a) and Wizards of the Coast LLC (2025b).

Appendix B - User Testing Interview Results

Testing sessions and interviews were recorded with the permission of caretakers. The audio files were transcribed and the results were converted into tables for overview using *NotebookLM*. The original transcriptions will be stored for as long as needed (max. 5 years) in Appendix E.

Testing Session 1

Type: Semi-structured interview

Duration (in total): 50:16 min

Summary of General Interview

Topic	Participant Feedback
Age	Participants' ages were 14, 15, 16, and 19.
Previous Tabletop RPG Experience	Some participants had experience with D&D 5th edition. One had developed a character before and had experience with improvisation and roleplay in general. Another participant had been part of a tabletop group but didn't finish a session. Some participants had also written characters, with one having written 3 or 4. One participant had no prior experience, while two others had experience in theater and writing stories.
Character Creation Time	Character creation times varied: some participants spent around 45 minutes to 1 hour. Others spent 2-3 hours. One participant spent an hour looking for a name before starting on the character sheet. Most participants spent less time than they would creating a character for D&D.
Satisfaction with Time Spent	One participant was not satisfied with their preparation time because they had forgotten some elements and had to reread the rules. Another enjoyed the compact time and felt they could have spent more time or made a simpler character.
Understanding of Rules	Some participants found the rules easy to understand for attributes and heritage, but the left side of the sheet was more difficult. One participant found it difficult to find information when working alone. Another felt the document lacked structure and made it difficult to find specific details. Using a dictionary helped some participants to understand the rules, however, some words were unknown even in German, like some weapons.
Calculations	Participants generally found the calculations easy, but understanding where to put the points was more difficult because some terms on the sheet were different from the document.
Language Issues	Some participants had issues with the names of paths and had to look them up. Some also had to look up weapon and shield names and use pictures to understand.
Use of Pictures	Some participants felt pictures would be helpful, especially for weapons. However, one participant felt that too many pictures would be irritating.

Descriptions	One participant thought that descriptions of attributes would be helpful. It was noted that there were descriptions but not provided during the character creation session.
Structure of Rules	The order of steps in character creation was generally considered logical. Some parts felt left out, but overall the structure was great. One participant noted that the introduction to rules and paths could be better written, as the talent for the Explorer path was confused for an introduction.
Ease of Filling Character Sheet	Filling in the character sheet was generally easy, but some participants had to take a moment to figure out where the information belonged. Some noted that the names in the document were different than on the sheet. One participant wondered where to write the reasons for competencies. Similar-looking terms like "presence" and "reason" sometimes led to confusion.
Order of Information	The order of information on the sheet generally made sense and followed the same structure as the document. One participant noted that the description of the path, the numbers on the sheet, and the calculations for the paths were in three different parts of the document. It was suggested that having text descriptions and numbered descriptions of the path closer together would be easier.

Summary of User Testing

Feature/Task	Group 1 (3 Participants)	Group 2 (2 Participants)
Initial Exploration	Participants explored the app, noting the Hero examples and the quick info on character sheets. They were able to navigate to Heroes, games, tools, resources and library. Tools was thought to be a place for character building or general game guidance. Resources was thought to be stories or short stories, and Library a lexicon or bestiary. One participant had the idea of having a list of encountered monsters in the library.	Participants started by clicking on the Heroes and thought they were the same as on the paper sheet. They identified that a new Hero could be created. They found the "lorem ipsum" text. They thought that the creatures section was for enemies. Participants were able to navigate the different sections of the app. They noted that it would be useful to be able to search the Heroes.
General Impression	One participant loved the roughness of the prototype and wanted it to stay that way. Another participant found the design not very fantasy-welcoming and too much like a to-do list. They would prefer some kind of design in some areas.	Participants thought the structure was good and easy to understand. They felt the icons in the footer were useful for fast navigation. They also said that the structure made sense.
Finding Equipment	Participants were able to find equipment by navigating to the inventory section.	Participants located the equipment within the inventory.
Skill Checks	Participants were able to find the skills section and identified the competencies as well.	Participants were able to find the skills section.
Dagger Attack	Participants were able to identify the weapons in the equipment section.	One participant thought that general equipment was for marketplace sales, and combat tab for in-game fighting.

Taking Damage	Participants tried to click on the health bar at the top of the screen, and then went to the general section.	One participant tried to find the health by looking at the general section and notes. Eventually the health bar at the top of the screen was found. The importance of using icons for health, armor and defense was highlighted.
Leveling Up/Editing	Participants identified the level up button.	Participants went to the settings button for leveling up, and the three-point menu for editing and deleting the character. They also identified the PDF export option.
Comparison to Paper Sheet	One participant thought the app was better structured than the paper version, but that the paper version had a certain vibe. Another participant agreed with the structure being very good, but they were used to seeing all the information at once on the paper sheet. One participant suggested a bigger version of the app for tablets that could display the entire character sheet on the screen.	Participants thought the mobile version was logical and better to have on the phone. One participant said that they would use the paper to make the character and then put the information into the app. Participants said that most information was where they expected, even the health points being in a different section. They said that if they saw the app for the first time, they would click through all of the icons.
Phone vs Tablet	Participants stated that they would rather use a tablet to check the app while playing. They thought that the tablet was more visible and had more space.	One participant said that they would prefer to use a phone, and the other said that they would use a phone during play.
Character Creation	Participants understood how to create a character by clicking the add sign. They saw the text descriptions, and how they would choose heritage and other attributes.... They noted that there was no "finish" button, but a save button. One participant noted that there should be a guide or information on the screen as you make the character. They noted the text was small and sometimes hard to understand. They thought that some guidance or a small description next to the titles would help, and that it should only be displayed for the first character creation, or if clicked.	Participants selected a dwarf as their character. They thought it was cool that the descriptions could be read when clicking the options. They noted that some of the buttons did not work yet, but were still trying them, and were excited to see how the app works. They found the app logical and easy to navigate and remember.
Touch Targets and Text Sizes	One participant noted that the touch targets were pretty visible, and that the text was a good size, even when viewed from far away. Some text was too small and needed to be made bigger, perhaps by clicking to expand.	Participants felt that the text sizes and the touch targets were big enough and that they could read and click without misclicking.
Likes and Dislikes	One participant thought the library should be part of the world, not for every game, and	Participants liked the icons and the description that appeared when clicked.

	that they didn't understand if the Heroes were the same across different games.	
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Testing Session 2

Type: Semi-structured interview

Duration (in total): 79:36 min

Category	Group 1 (2 Participants)	Group 2 (2 Participants)
Game Directing Experience	Both participants had no prior experience directing a game in any system. They had previously played a game where a friend was the director. One participant had begun working on their own world for a game, but had not run a game yet.	Both participants had no prior experience directing a game. One participant had directed a game of Werewolf but did not feel confident in their ability to create stories.
Desire to Direct	One participant found the concept interesting but felt it would be more work than playing and was concerned about making mistakes. The other participant was interested in directing, thought it sounded fun, and would like to try it out.	Both participants expressed interest in directing a game in the future. They would like to have more experience playing first.
Preferred Adventure Type	Both participants preferred to use a pre-made story as a base, to avoid making mistakes but also have the option to make changes as needed. One participant had tried to find a premade game, but then decided to create their own.	Both participants would like a premade world to use as a base, but would prefer to create their own stories. They would also like the option to follow a pre-made story.
Game Tracking Approach	One participant planned to use a digital note-taking app called GoodNotes with separate sections for sessions and for NPCs and characters, using different colors for planned and in-game notes. The other participant preferred paper for NPCs so they can see them all at once more easily.	Both participants planned to use the GoodNotes app on their iPads. One participant also considered using paper to lay out information and connect it, but was concerned it might become chaotic.
Perceived Difficulty	One participant felt directing a game would be too hard due to lack of experience and the potential for mistakes. The other participant thought it sounded cool and would like to try.	One participant felt it would be difficult due to the amount of work involved, but might be possible with more experience. The other thought it would be time-consuming at first, but could become quicker with practice.
Initial App Reactions	Both participants were able to easily navigate and understand the app. They quickly understood the	The participants found the app had a good structure, with a helpful overview. One participant was initially unsure what

	<p>difference between player characters and game characters. One participant suggested that the private note-taking feature was for game director mistakes or things not to tell players. The other thought it was to separate what to tell players from what not to tell players.</p>	<p>to include in the overview. They found the location connections feature helpful. One participant noted that keeping track of all the notes could be a lot of work. They also noted the use of recurring interaction elements (such as the scroll tab bar and the button in the corner) helped them to navigate faster.</p>
Joining a Game (Player)	<p>Both participants found the process of joining a game easy. They understood the function of the QR code. They also understood that the Heroes displayed were their own and not other players'. One participant noted that it made sense to be able to choose a Hero after joining the session.</p>	<p>Both participants found the process of joining a game easy and natural, with the same symbols and structure as other apps. One participant stated that the general information upon joining included a message to not share personal information with other players.</p>
Quests and NPCs (Player)	<p>Both participants were able to easily find quests, NPCs, and related information. One participant understood that NPCs related to a quest were shown within that quest, and all NPCs were shown in the NPC section. The other also noted that there were connections between the quests and NPCs.</p>	<p>Both participants were able to easily navigate to the quests and find an NPC related to a quest. One participant was confused by the back button, as it did not go to the previous screen they expected. They also expected the NPC to open in a smaller pop-up window. They felt the amount of information about NPCs shown in the game was sufficient.</p>
Hero Management (Player)	<p>Both participants were able to find their Hero in the game. One participant noted that the Hero shown was the Hero they had created.</p>	<p>Both participants were able to easily find their Hero.</p>
Leaving a Game (Player)	<p>Both participants were able to easily leave the game.</p>	<p>One participant initially cancelled leaving the game due to the wording of the button, but the wording was not considered to be sub-optimal. They were able to leave the game once they read the wording.</p>
Player Information Satisfaction	<p>One participant felt satisfied with the amount of information provided to players in the game, noting it was necessary for the game.</p>	<p>One participant felt that there was a good overview of information, and that it was not all in one place. They were unsure of how much text was appropriate for the game, and if there was a limit to how much text could be included. One participant felt there should be a short description of a character with an option to scroll down for more information.</p>
Editing Player Heroes (GD)	<p>Both participants expressed discomfort with the idea of a game director editing their Heroes. One participant suggested that the game director should be able to make notes or suggestions for the player,</p>	<p>One participant did not think there was a good reason for a game director to edit player Heroes, but thought it would be cool for surprises if it didn't annoy players. Both agreed that the game director should not change a player's Hero without telling</p>

	and the player could confirm the changes. The other thought it would be okay if they knew the game director well, but would not like it otherwise.	them. One participant felt that some things should be permanent, such as a character's name.
Creating a Game (GD)	One participant found the process easy and noted that they could add notes whenever they thought of something. They also noted that creating a game was the same as joining a game, but the game was empty.	Both participants were able to easily create a game. One found the interface the same as joining a game, except it was empty. The other mentioned that they could edit a lot of information.
Editing NPCs (GD)	Both participants were able to edit an existing NPC. One participant noted the function of the eye symbol for showing and hiding NPCs from players.	One participant was able to edit an NPC. The other was confused when trying to click the three dots but they did not work.
Private Notes (GD)	One participant was able to access and edit private notes on a quest.	One participant had difficulty finding the private notes, initially scrolling past the section. They stated that they thought the notes were not intended to be openly displayed. One participant also said they would use notes to quickly capture bullet points rather than long paragraphs. The other wanted to have separate sections for different players within the notes. It was noted that the text field is actually a rich text editor with formatting options.
Editing Locations (GD)	One participant was able to change the connections of a location.	One participant was able to change the connections of a location.
Creature Visibility (GD)	One participant was able to make a creature visible to players.	One participant found the creature visibility button, but wished they could click the symbol directly instead of the three dots. The other noted that editing forces more thought and prevents mistakes.
Organization Status (GD)	One participant was able to change an organization's status to disbanded.	One participant was able to change an organization's status to disbanded.
Adding a Quest (GD)	One participant noted that the final add button was not linked in the prototype.	One participant added a quest and thought the icon was not the right one, and should be a plus.
Inviting a Player (GD)	One participant was able to invite a player and noted the use of an invite code and QR code. The other suggested that the invite code could be copied and shared on WhatsApp.	One participant found the invite player button under the player's tab, but wouldn't have expected to find it under the general tab. They noted that once they were used to the placement of this function, it wouldn't be an issue.

Removing a Player (GD)	One participant was able to remove a player.	One participant was able to remove a player.
Deleting a Game (GD)	One participant was able to delete the game.	One participant was able to delete the game but did not think that the app confirmed if player Heroes also got deleted. Another participant was confused by the wording "player Heroes".
Game Creation Feelings (GD)	One participant found creating a game was easy, but filling everything out would require a title and some notes.	One participant felt that creating a game was easy, but filling it out would be time-consuming, and they would need some instructions or a template. They suggested that templates of existing adventures would be a good resource.
Control and Tracking (GD)	One participant felt that they would be in control of their game, and tracking it would be easy. The other participant noted that there was a risk of accidentally deleting something and that there should be a backup trash can for one day.	Both participants felt that they would have control over their game. One participant said it wouldn't be easy to make irreversible mistakes, because the app always required confirmation.
Status Changes (GD)	One participant found the status changes for game objects were easy, but they were not always easy to see at first. The other participant noted that they initially thought the status was a tab for more information rather than a clickable option.	One participant felt that the status changes made sense.
App Usefulness (GD)	Both participants stated that they would use the app to organize and track their game and that it would make it easier.	Both participants thought the app would be useful for game tracking, especially with the editing and writing options. One participant felt the app would be especially helpful if there were opening notes on what to put in each section.
Directing Confidence (GD)	Both participants felt that the app made the idea of directing a game more approachable. One participant stated that they would be less likely to make mistakes, and that they would have all information in one place.	One participant would want to play before directing. The other felt more comfortable with creating from scratch but that the app would be helpful if there were "opening notes" for what to put in each section. They also suggested a tutorial would help them understand where everything is.
Design Feedback	One participant mentioned that they would prefer to use the app on a larger screen.	Both participants preferred to use the app on a larger screen with a keyboard, such as an iPad. They were satisfied with the amount of icons and the text size.

Testing Session 3

Type: Semi-structured interview

Duration (in total): 64:08 min

Question Segment	Group 1	Group 2
Initial Understanding of Tools	Participants were initially unsure about the purpose of the encounter simulator, with one participant thinking it was mainly for balancing fights.	Participants explored the tools in general and thought they were for quick solutions during the game. They were able to identify the encounter simulator and its components.
Hero Selection	Participants explored the Hero and monster selection. One participant expected an overview of all Heroes rather than a single Hero opening up. They also expected to use a plus sign to add a new Hero.	Participants navigated the Hero selection, understanding how to add new Heroes. One participant expected a filter by heritage. They also discussed the difference between "add" and "create" icons, with "create" implying a new Hero from scratch. One participant suggested they should be able to choose an existing Hero, create a new one, or select an NPC.
Monster Selection	Participants understood the plus and minus signs for adding or subtracting creatures. They noticed the remove functionality was only available on the creatures page and not the Hero page.	Participants explored the monster selection, understanding how to add or remove creatures. They also identified a filter option.
Battle Simulation & Results	Participants identified the simulation results, recognizing the statistics and that the creatures had died. They thought the tool would be helpful for planning and assessing risk.	Participants simulated a battle and interpreted the results, noting the probability of success and discussing how the tool could help the game director (GD) adjust the difficulty of fights. One participant was confused by the dead signs on the creatures because no Heroes had died.
Presets and Saving	Participants found the preset function useful for making the process easier, one thought it would allow a quicker selection of Heroes and creatures. One participant thought a percentage of winning should be included.	Participants discussed the preset function, suggesting saving simulations to access later, with the Heroes being saved but not the calculation itself. One participant also suggested the ability to save estimations and plan different encounters.
Tool Purpose	Participants understood the tool as a simulation for the game director to balance encounters.	Participants generally understood that the tool was for preparing for a battle and balancing fights.
Help Function	Did not explicitly mention the help function in the encounter simulator [Source text].	Indicated that they would first try to use the app without help, and then access the help function if needed.
Additional Feedback		One participant suggested it would be useful if the tool was paired with a tracker for the game.

Distance & Area Calculation	Both groups had differing opinions on calculating distances, especially with diagonal movement. Both groups found calculating the area of effect confusing, particularly how the circle radius was calculated. Participants in both groups suggested that visual help would be beneficial for calculating distances and areas.	Both groups had differing opinions on calculating distances, especially with diagonal movement. Both groups found calculating the area of effect confusing, particularly how the circle radius was calculated. Participants in both groups suggested that visual help would be beneficial for calculating distances and areas.
AR Map Tool - Expectations	One participant thought it would be like a VR chemistry app. One participant expected a digital map that you could zoom in on.	Scanned the QR code in the video, chose a Hero, and saw their control zone. They discussed how it calculates distances and area of effect and how it could affect others in the fight.
AR Map Functionality	Participants clicked through the dummy AR map, noting the range and radius functions. They also discussed how a circle would be represented with squares.	Participants clicked through the dummy AR map and noted the distance and radius functions.
AR Map Tool Utility	Participants found that the tool would give structure and make things fair. One participant thought the tool would be helpful for beginners to get to know the game.	Agreed that the tool made it easier to calculate the range and area of effect and to avoid conflict.
AR Map - Additional Feedback		One participant suggested a spell bank with character selection, range, and strength. Another participant thought the tool should recognize the character and give a selection of what the character could do.
Dice Roller - Dice Selection & Rolling	One participant preferred to choose the dice from the overview and not the standard preset option. One participant thought the numbers in the standard section were random.	One participant initially looked at the area with the dice images rather than the top presets. One participant found the standard dice selection useful for quick rolls. Both groups used the advanced section to roll 1D6 and 2D4 for damage. Both groups correctly associated the roll function with the lower dice selection area.
Dice Roller - Tool Preference	Participants discussed how the dice roller made the math easier.	Participants discussed the use of the dice roller vs. physical dice, preferring the physical dice but recognizing the utility of the app. Both groups agreed that the dice roller should be included in the app.
Dice Roller - Standard and Advanced Areas		Distinguished between the standard and advanced areas of the dice roller, understanding the standard section as the most common dice. They agreed that the standard option was for the

		most used dice, and the advanced area was for extra weapons or options.
Dice Roller - Removing Dice	Participants discussed how to remove a die you accidentally selected, suggesting a plus and minus field to add or remove dice. In addition, they suggested holding the die to remove it.	One participant thought clicking "roll" would clear the dice. Participants in both groups tried to use the hold function to remove a die.
Dice Roller Accessibility	Both groups agreed that the dice roller should be accessible from the tool menu in the app.	Both groups agreed that the dice roller should be accessible from the tool menu in the app.
Dice Roller Additional Feedback	One participant did not understand what the "Enter expression" was for.	One participant felt it was not easy to click the wrong dice.

Testing Session 4

Type: Semi-structured interview

Duration (in total): 48:24 min

Area of Testing	Group 1	Group 2
Initial Navigation	Participants in Group 1 quickly navigated to the " resources " section when asked to find game content.	Group 2 initially guessed "resources or maybe the library" when looking for game content and then navigated to the resources section.
Resource Description	Group 1 noted that resources included a title, short description, long description, tags, and a download or bookmark option. They also observed a content list, but were unsure of the creator's name.	Group 2 found a short description under the title, a longer description when clicking on the resource, a download option, and a library bookmark option. They also saw content information and noted the ability to save for offline use.
Download/Library Buttons	Group 1 expected the bookmark button to add the resource to the library for later access, and the download button to add it to a separate section of the library for offline use. They also considered that a bookmarked item might disappear if the creator deletes it. The group did not initially read the notification after bookmarking an item	Group 2 thought the download button would allow them to play the resource offline and the library button would allow them to find it later. They understood that adding to the library meant the book/story could be found there.
Reading a Resource	Group 1 found it easy to navigate through the resource's chapters	Group 2 found it easy to navigate the chapters, using the arrows and table of contents.

	and subchapters using arrows and a table of contents.	
Searching Resources	Group 1 used a search icon to look for content within a resource.	Group 2 immediately looked for the search icon to find specific content. One participant noted they would have gone to the table of contents rather than the search function.
Bookmark Function	Group 1 expected the bookmark icon to add a bookmark to the current chapter, which could be seen when reopening the resource.	Group 2 expected the bookmark button to create a special mark to quickly jump to specific content.
Display Settings	Group 1 expected display settings to include options for light/dark mode, text colors, and possibly text size, both for the current book and the app in general.	Group 2 expected display settings to include font size, font type, colors (light/dark mode), and potentially a read aloud function for accessibility.
Finding a Spell	Group 1 navigated to the "resources" section, then to the "rules" to find a spell. Eventually, they were guided to the library and then to the spell grimoire to find a specific spell.	Group 2 initially thought the spells would be found under the "games" section, but was guided to the library, then to the spell grimoire to find a specific spell.
Library Organization	Group 1 found the library to be organized with a search function, filters, and icons with different titles such as "spell grimoire," "equipment vault," and "beastiary of creatures". They noted that content within the categories was organized similarly with search and filter options. They also discovered how to switch categories within a category.	Group 2 found the library to be divided into different types such as gods, creatures, and heritages. They found it easy to find information if they knew the categories but felt that there was a lot of scrolling. The participants struggled to find the way to switch categories, ultimately noticing it was in the top navigation. One participant did not understand the logic of this navigation element.
Spell/God Details	Group 1 found the spell details to include the spell name, basic information, a description, and an effects table. They found the god information to include a picture, symbol, spheres, description, core beliefs, organization, and places of worship. Participants found this content clear and understandable.	Group 2 found the god details included a picture and basic information with a description. They also noted that the spell details included spell name, information, effect, and a "basic rules" section. Participants noted a lack of structure in the spell details. They thought more images or tables could be included. One participant suggested that a table of contents could help when viewing God details.
Profile Creation	Group 1 successfully created a new account using their school email, finding the process to be straightforward with clear options. They expected to change their name under the general section.	Group 2 also created an account using a school email. They also found it easy to select the correct option, though one participant suggested a "+" icon to indicate creating an account. They also

		expected to change name and picture in the account section.
General Settings	Group 1 expected general settings to include language and app settings, also display settings for the whole app.	Group 2 expected general settings to include music, background music, voice options for reading text, and notifications.
Overall App Usability	Group 1 found the app easy to use with self-explanatory features. They compared the app to Unix/Linux systems due to its grouped information. One participant liked the blue color scheme.	Group 2 found the application easy to use once all the options were seen. They noted it was well thought out, though a guide for first-time users might be helpful. One participant found that there were many details which could be overwhelming to navigate. Another noted it could use a bit of more general selections, for example roles, spells
Suggestions	Group 1 suggested that it would be useful to see who created a resource, view their profile, and potentially send them a message. They also liked the implementation of game templates. They asked if the app would be available on the app store and learned that it would be a progressive web app.	Group 2 suggested a guide for first-time users. They also liked the idea of a mascot that would help users navigate the app the first time they opened a new section. One participant also suggested some short guidance arrows that they could follow to find where they need to click.

Appendix C - Design Document

Note: The following pages are the design document as submitted to the Dragon Legion on February 20th, 2025. It has its own page numbering and table of contents. The document is signed and stamped with my pen name “DodoCreates” for the presentation for and attribution by the Dragon Legion. “DodoCreates” belongs to me.

20th February, 2024



Design Document

World of Discordia Companion App

Proposed By:
DodoCreates

Proposed To:
Dragon Legion e.V.

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Introduction

1 Vision and goals

The digital companion app for *World of Discordia* should be developed to increase the popularity of TTRPGs among youth and specifically *World of Discordia*. Currently, *World of Discordia* lacks a digital tool of its own. The application should simplify the game process without restricting the educational and social benefits of TTRPGs. It should address the needs of student players and game directors (GDs). The tool should be usable for the user, developable by the non-profit organization *Dragon Legion* with limited resources, and implementable at schools. The resulting concept will be presented to the *Dragon Legion* and subsequently developed for use in The RPG Initiative as well as play by the common public.

The vision is to create a digital companion app for *World of Discordia* that enhances the educational and social benefits of TTRPGs for students while being easily developed and implemented, as well as to provide a tool that supports both student players and game directors, fostering engagement and simplifying gameplay without detracting from the offline experience.

1.1 Objectives:

O1: Enhance Gameplay: Assist student players and GDs in gameplay without interfering with the offline game experience.

O2: Ensure Educational Benefits: Provide features that support the educational benefits of TTRPGs and do not contain distractions or harmful features

O3: Support Development & Integration: Create a tool that is developable by a non-profit organization with limited resources and implementable in schools while adhering to regulations and standards.

2 General conditions

2.1 Areas of application

The application is developed for mobile use, primarily for smartphones, with consideration for tablet responsiveness. The app is designed to support offline TTRPG gameplay in educational contexts, specifically within school settings, but is suitable for all modes of play.

2.2 Target groups

Student Players: Youth aged 10-18 participating in *Word of Discordia* in a school setting, who need an engaging, easy-to-use tool to enhance their gaming experience and streamline lengthy processes. This group is the primary user base, and the app's design is centered around their needs for accessibility, entertainment, and educational support.

Game Directors (GDs): Student or adult GDs who guide the *World of Discordia* sessions, requiring tools to simplify game management, track player progress, and create engaging narratives. GDs play a crucial role in delivering the TTRPG experience, and the app aims to provide them with resources and functionalities to streamline their tasks and enhance the overall quality of the game.

3 System context and overview

The *WoD* digital tool will affect students and influence the implementation of TTRPGs. Stakeholders can be considered as those who are affected by design decisions. Key stakeholders include:

- Players: Students, *Dragon Legion*, RPG Initiative Facilitators
- Context-Setters: School Council, School Club Manager, Students' Parents
- Subjects: Opinion Holders, WoD Tool Development Team
- Crowd: RPG Initiative Managers, University Partners

First and foremost, the app needs to serve students' and facilitators' needs, as well as align with the mission, brand identity, and logistical and strategic goals of the *Dragon Legion*. The digital tool will work in conjunction with the *Dragon Legion's* TTRPG system, *World of Discordia*, and will be utilized in The RPG Initiative. The system must also be compatible with the school systems and legal frameworks in Germany and throughout Europe. It needs to be on a scale in which it is easily developable by the Development Team. Lastly, it needs to fulfill scientific approach standards and bring value to the field.

4 Functional requirements

The World of Discordia Companion App needs to provide specific functions to support gameplay.

FR1: Hero Creation: The app must provide a tool for users to create heroes with step-by-step guidance and limited by official game rules. Differentiation between Quick Build and Custom Build.

FR2: Hero Management: The app must allow users to edit and manage hero attributes, statistics, skills, and actions.

FR3: Interactive Character Sheet: The app must feature an interactive character sheet that allows users to perform in-game actions, manage equipment, cast spells, roll dice, and take notes.

FR4: Hero Level-Up: The app must allow users to level up their heroes according to the game rules.

FR5: Game Creation: The app must allow Game Directors to create and manage game sessions. Players must be able to join and leave games.

FR6: Game Object Management: The app must provide tools for GDs to create and manage game objects such as locations, NPCs, and quests, including descriptions and connections.

FR7: Resources: The app must allow users to browse, preview, read and bookmark published resources related to the game.

FR8: Library: The app must provide access to a library of official game materials such as spells, creatures, heritages, and items.

FR9: Profile Management: The app must allow users to manage their personal information, account settings, and app preferences. Users need to be able to sign up with a school account.

FR10: Encounter Simulation: The app must include an encounter simulator for users, mostly GDs, to simulate battles between heroes and creatures from the library and custom creations.

FR11: AR Map Integration: The app may integrate an AR map tool for users to visualize and estimate distances and areas of effect on the game map.

FR12: Dice Roller: The app must allow users to roll polyhedral dice, standalone, and from their hero sheets with automatic calculations.

FR13: PWA: The application must run and be installable as a progressive web app.

5 Quality requirements

The digital companion app must meet specific quality requirements to ensure its success and effectiveness in educational settings. These requirements address usability, safety, and compliance.

QR1: Usability for Children and Teens: The app must be easy to use and intuitive for students aged 10-18. The user interface (UI) and user experience (UX) should adhere to best practices for designing for children and teenagers, including simple navigation, clear instructions, and age-appropriate content.

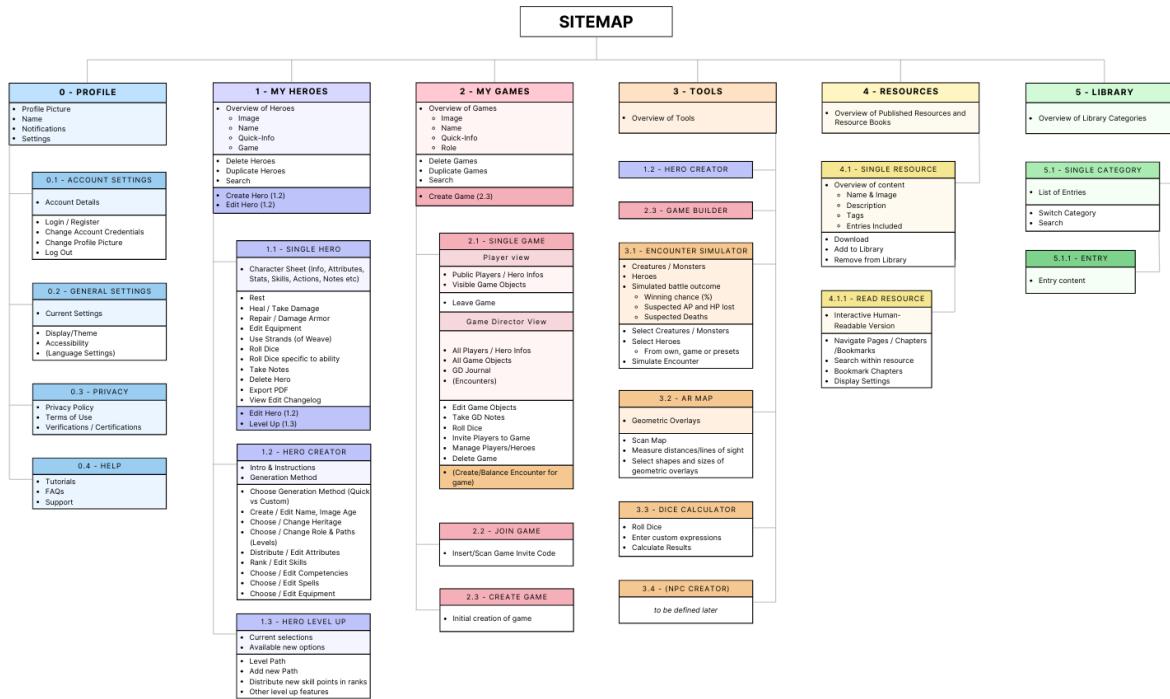
QR2: Privacy and Safety Compliance for Schools: The app must comply with privacy laws and regulations, such as the General Data Protection Regulation (GDPR), to protect students' data. It should include safety features such as content filters and secure communication channels to ensure a safe online environment for children.

QR3: Accessibility: The app must be accessible to students with diverse abilities and needs. It should include features such as screen reader compatibility, customizable display settings, and alternative input methods to ensure that all students can effectively use the app.

Sitemap

World of Discordia

APP STRUCTURE



https://www.canva.com/design/DAGbbDj19rk/Vyr81w3dsZSmC_YMr7Pe9A/view?utm_content=DAGbDj19rk&utm_campaign=designshare&utm_medium=link2&utm_source=uniquelinks&utllid=hb5581c996d

- * Entries marked with “*” are to be determined or require revision.
- > Entries starting with an arrow imply interactions and functions
- ★ Entries starting with a star are comments by the author

0 Profile

- Profile Picture
- Name
- > Manage Notifications
- > Settings

0.1 Account Settings

- > Log in or register.
 - > Sign up with a school account.*
 - > Create a new personal account.
 - > Log in with an existing account.
- > Change account credentials.

- Email
- Username
- Password
- Change profile picture.
- Log out.

0.2 General Settings

- Display / Theme Settings*
- Accessibility Settings*
- Language Settings*

0.3 Privacy

- Social Settings*
- Privacy Policy
- Terms of Use
- Verifications/Certifications

0.4 Help

- Tutorials
- FAQs
- Support

1 My Heroes

- List of Heroes
 - Image, Name, Heritage, Role(s), Path(s), Game.
- Delete Heroes
- Duplicate Heroes
- Search, Filter

1.1 Single Hero

- Header
 - Name, Image, Heritage, Role(s), Path(s)
 - Defense
 - Detail Page
 - Armor
 - Take damage
 - Repair
 - Detail Page
 - Health
 - Take damage
 - Heal
 - Detail Page
- Primary Menu

- Export PDF
- Edit Hero (Hero Editor)
- Changelog
- Delete Hero
- **Secondary Menu**
 - Level Up (1.3)
 - Rest
 - Dice Roller
- **General**
 - Attributes
 - Strength (STR)
 - Dexterity (DEX)
 - Agility (AGI)
 - Vitality (VIT)
 - Senses (SEN)
 - Presence (PRE)
 - Instinct (INS)
 - Reason (REA)
 - Roll Attribute Check (modifier automatically added)
 - Detail Page
 - Defenses
 - Vulnerabilities
 - Resistances
 - Detail Page
 - Conditions
 - Detail Page
- **Abilities**
 - Competencies
 - Type + Competency
 - Roll Competency Check
 - Skills
 - Skill + Skill Bonus + Attribute modifier + rank
 - Acrobatics (AGI)
 - Beguile (PRE)
 - Climb (STR)
 - Collect Information (PRE)
 - Disable Mechanism (REA)
 - Disguise (PRE)
 - First Aid (REA)
 - Forgery (REA)
 - Fortitude (VIT)
 - Legerdemain (DEX)
 - Lock Picking (DEX)
 - Notice (SEN)
 - Run & Jump (AGI)
 - Search (REA)
 - Stealth (AGI)

- Swim (AGI)
 - Willpower (REA)
 - Roll Skill Check (modifier automatically added)
 - Detail Page
- Talents (if related to skills)
 - Detail Page
- **Combat**
 - Speed, Combat Modifier
 - Detail Page
 - Reposition
 - Detail Page
 - Actions
 - Equipped Weapon(s)
 - weapon + attack + damage + attribute + type
 - Switch equipped weapon(s)
 - Roll Attack/Damage (modifiers automatically added)
 - Detail Page
 - Talents
 - Detail Page
 - Reactions
 - Free Attack
 - Detail Page
 - Talents
 - Detail Page
 - Free Actions
 - Detail Page
 - Other Actions
 - Detail Page
- **Equipment**
 - Manage Equipment*
 - Money
 - Copper Pennies
 - Silver Marks
 - Gold Crowns
 - Armor
 - armor + armor points + penalties
 - Wear
 - Detail Page
 - Shields
 - shield + modifier + penalties
 - Wield
 - Detail Page
 - Weapons
 - Detail Page
 - weapon + attack + damage + attribute + type
 - Wield
 - Equipment

- Detail Page
- **Spellbook**
 - Speed, Weave Modifier
 - Detail Page
 - Strands
 - Use
 - Recover
 - Spells
 - spell + name + range + attack + circle + effect
 - Roll spell cast/attack/damage (modifiers automatically added)
 - Detail Page
 - Search, Filter Spells
- **Bio**
 - Traits
 - Heritage
 - Detail Page
 - Role
 - Detail Page
 - Paths
 - Detail Page
 - Description
 - Edit Description
 - Backstory
 - Edit Backstory
- **Journal**
 - Notes/Planning, Allies/Enemies, Lore/Info, Other
 - Edit notes

1.2 Create/Edit Hero

- **Quick Build**
 - Instructions
 - Choose Heritage
 - Choose Role(s) & Path(s)
 - Generate*
 - Edit (Hero Editor)
- **Custom Build / Hero Editor**
 - Instructions
 - Input / Edit Name
 - Upload / Choose / Edit Image
 - Choose / Change Heritage
 - Choose / Change Role & Paths (Levels)
 - Distribute / Edit Attributes
 - Rank / Edit Skills
 - Input / Edit Competencies
 - Choose / Edit Spells
 - Choose / Edit Equipment

➤ Save*

1.3 Level Up

- Level up*
 - Current selections
 - Available new options
- Level up Path
- Add new Path
- Distribute new skill points
- Other

2 My Games

- List of games
 - Image, name, user's role, players.
- Delete Games
- Duplicate Games
- Search, Filter

2.1 Single Game

- **Game Director View:**
 - Delete game
 - Roll dice
 - Quick add new Game Object
 - **General**
 - Info
 - Edit Name
 - Change / Remove Image
 - Edit Description
 - Players
 - Invite Players
 - Manage Players
 - Players' Hero Sheets (Read-Only)
 - **Overview**
 - Edit
 - **Game Objects (Locations, NPCs, Creatures, etc...)**
 - Edit game objects
 - Name
 - Image
 - Statblock (if Creature / NPC)
 - Edit
 - Journal
 - Edit
 - Connections
 - Edit

- Quick add new Game Object (pre-input type according to current type)*
- **Player View:**
 - Leave Game
 - **General**
 - Info
 - Players
 - **Game Objects (Locations, NPCs, Creatures, etc...)**
 - Name, Image (if provided), Connections

2.2 Join Game

- Input Code
- Scan QR

2.3 Create Game

- Choose from Template
- Create own
 - Input Name (required)
 - Upload Image (optional, placeholder img will be inserted if omitted)
 - Input Description (optional)

3 Tools

- Overview of Tools
 - Name, Description, Image
- Hero Builder (1.2)
- Game Builder (2.3)

3.1 Encounter Simulator

- Selected Heroes and Creatures
- Choose Heroes
 - Search, Filter
 - From Game
 - Player Heroes
 - NPCs*
 - From Own
 - Create temporary NPC (quick build)*
- Choose Creatures
 - From Library
 - Search, Filter
 - Create temporary custom (quick build)*
- Simulate
 - Calculated winning chance (%)
 - Average rounds
 - Heroes

- Calculated suspected AP and HP lost
- Suspected Deaths
- Creatures
 - Calculated suspected AP and HP lost
 - Suspected Deaths

3.2 AR Map*

- Introduction
- AR Map
 - Scan Map code
 - View Control Zones
 - Measure distances
 - Visualize
 - Lines of sight
 - Radii
 - Cones (if applicable)

3.3 Dice Calculator

- Roll Results
- Quick Roll
 - 2d10s
 - Apply (Dis-)Advantages
- Custom expression (e.g. 2d6 + 4)
- Roll any die
 - Add dice
 - Remove dice (hold)
 - Roll
- Roll log (cached)

3.4 NPC Creator*

- (to be defined later)

4 Resources

- **Browse**
 - Published resources by category
 - Cover image, Title, Snippet
 - Search, Filter
- **Owned**
 - Downloaded, Added, Purchased* Resources
 - Cover image, Title, Snippet
 - Search, Filter

4.1 Single Resource

- Overview
 - Name, image, author/publisher, tags, description, and library entries included
- Purchase* (add to Owned)
- Download (readable resource)
- Read
- Add to Library (add entries to library)
- Remove from Library (remove entries from library)

4.1.1 Read Resource

- Read (like epub)
- Table of Contents
- Navigate pages, chapters, and bookmarks.
- Search within the resource.
- Bookmark chapters*
- Adjust display settings*

5 Library

- Overview of Library Categories
 - Spells
 - Creatures
 - Equipment
 - Heritages
 - Roles & Paths
 - Locations
 - NPCs
 - Gods
- Search, Filter Entries from All Categories (only added from resources)

5.1 Single Category

- All Entries from Category (only added from resources)
 - Image/Symbol, Name, Category-specific snippet
- Switch Category*
- Search, Filter

5.1.1 Single Entry

- Entry Content
 - Name
 - Image/Symbol (if applicable)
 - Snippet
 - Attributes
 - Description
 - Statblock (if applicable)
 - Sub-Entries (if applicable)
 - Source (Resource)

X Uncategorized

- Detail page
 - Title
 - Tags/Type
 - Content
 - Source (page number)
- ★ Detail pages for explanations of pretty much everything that is written in the rulebooks. Accessible mainly through the hero sheet and the library detail pages (other locations could be possible, in resource books or stat blocks). Detail pages include objects not listed in the library, such as Attributes, Skills, Conditions, Talents, Actions, and other rules. Objects that are listed in the library are almost identical to their library entries, but when accessed through a hero sheet or stat block, modifiers, and stats will always be calculated and provide a breakdown of how the resulting stat came to be.

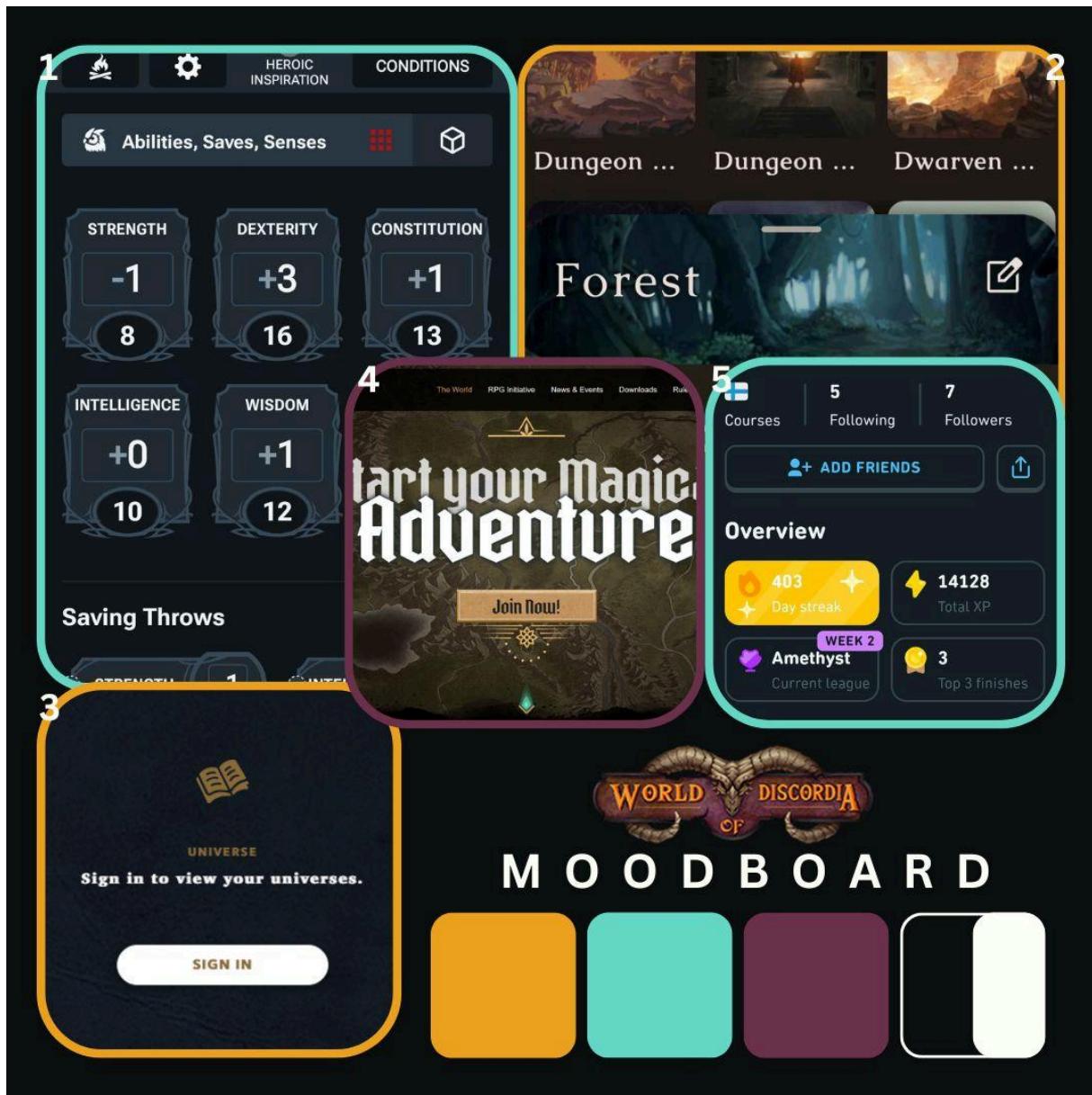
Wireframes

Link to Dev view for the Alpha Prototype:

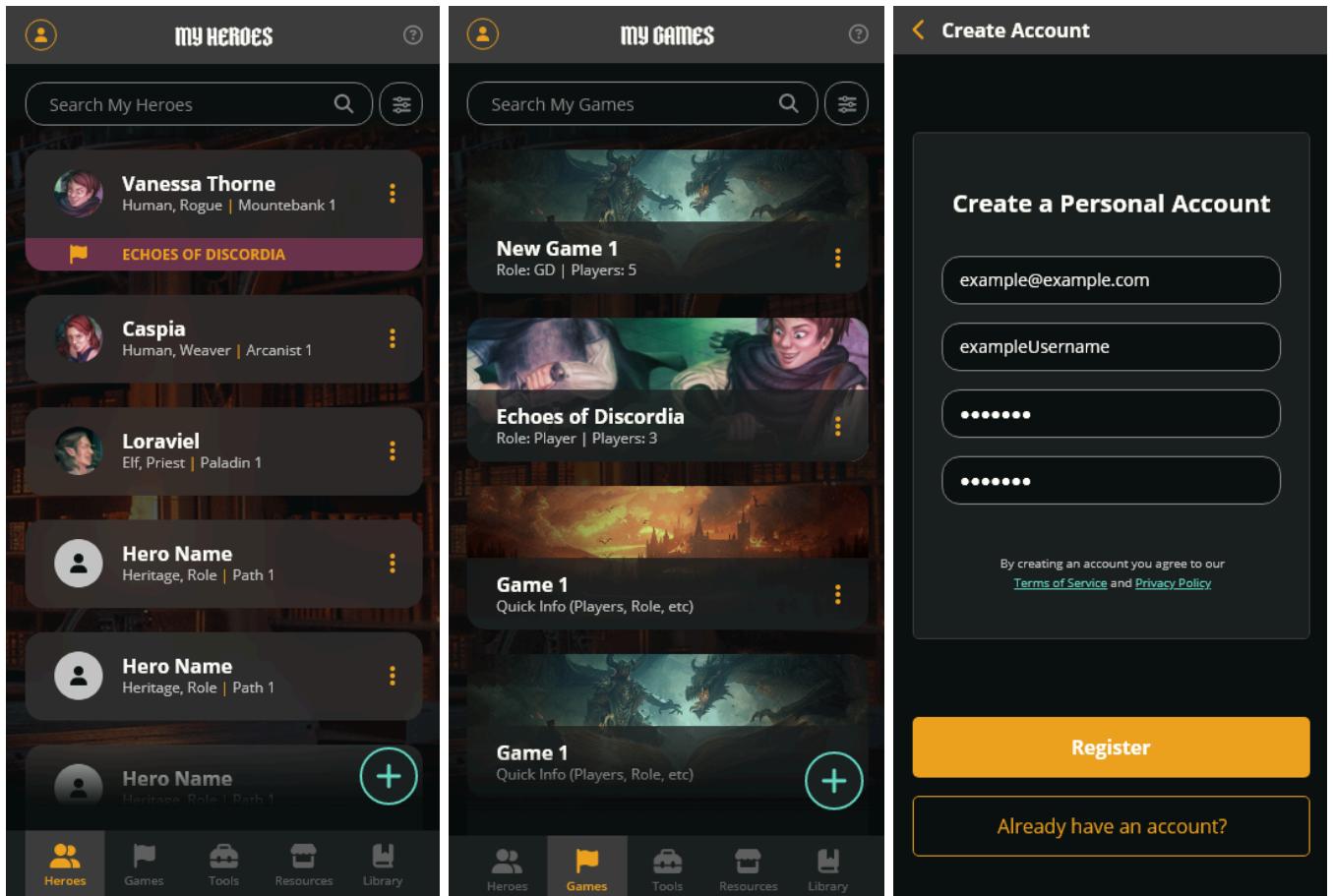
<https://xd.adobe.com/view/4a35c953-13cb-4887-8bca-c6cfdd3c0cfe-1f>

Styleguide

Moodboard



Note: From (in order) *D&D Beyond* (Wizards of the Coast LLC, 2025a), *Pocket Bard* (Pocket Bard LLC, 2025a), *Alchemy* (Arboreal, 2025), *The Discordia* (Dragon Legion e.V., n.d.), *Duolingo* (Duolingo, 2025).



Adobe XD Styleguide:

<https://xd.adobe.com/view/be2f24c3-ff7f-4585-89da-612564a73e93-eb7c/>

Guidelines

Color

The color scheme should avoid overly bright, rainbow-like colors and instead be visually attractive, modern, and neutral. The color scheme must provide sufficient contrast between text and background for readability and be gender-neutral. Suggested color harmonies are triadic, split-complementary, or squared/rectangular.

The design should be developed in dark mode, however, a light mode should be available for the user to switch to later (display settings). Suggested primary colors are Gamboge and Turquoise, which together with the secondary color Eggplant, form a harmony between triadic and split-complementary.

Primary: Gamboge #EDA21F

Primary / Accent: Turquoise #66D8C6

Secondary: Eggplant #6C324B

Background: Night #0B0F0F

Text: Baby Powder #FFFFFF

Alerts: Danger #EE4444



Typography

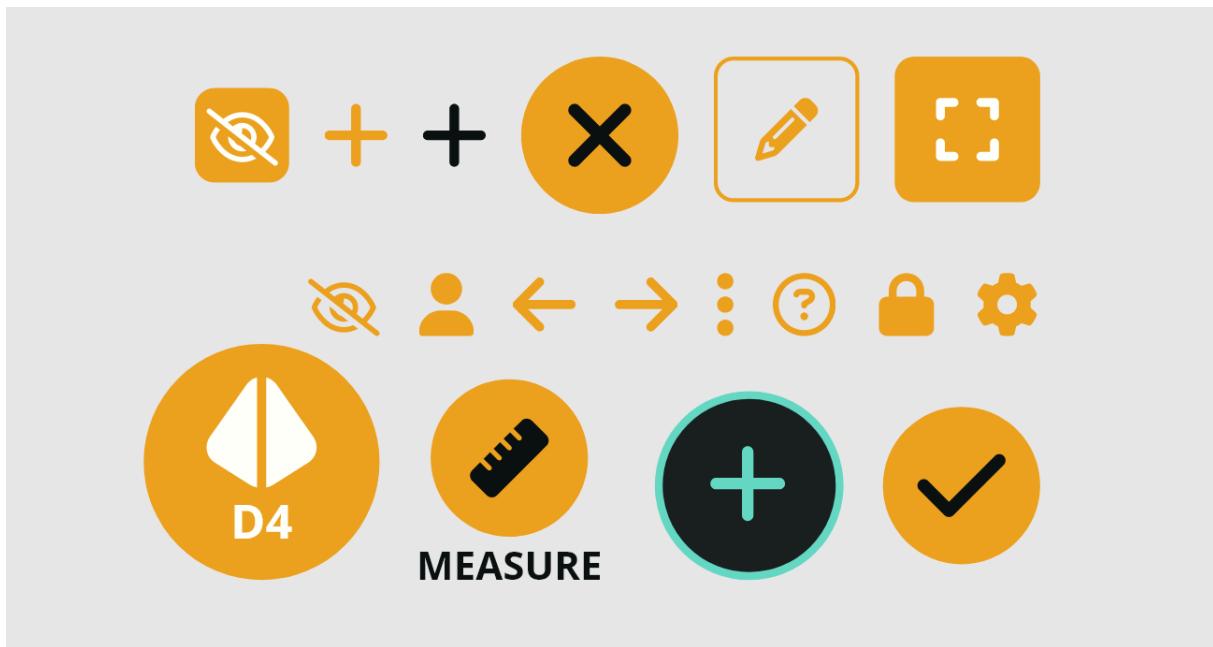
Simple sans-serif typefaces are recommended that must follow the rules of good typography, such as kerning, spacing, and line height. Longer passages of text should be written in a larger font, but not too large. White spaces and simple formatting aid readability and concentration, and cluttered screens full of text should be avoided.

- Use relatively large font sizes (at least 12pt) for text passages
- Use gothic font only for headlines, used sparingly
- Avoid patterned backgrounds or images as backgrounds for text, always use overlays
- Utility menu text, search field helper text, and some breadcrumb text on the website should meet accessibility standards for contrast ratios



Icons

Icons are a crucial part of visual design. They need to be self-explanatory and take advantage of commonly known mental models. It's recommended to add labels to less established or more abstract icons. Where applicable, free icon libraries can be used, custom made icons (e.g. dice, defense, armor, health) should be adapted to fit the style of other icons. Icons for interactions should be at least 16x16px.



Note: Icons not in the correct color

Icons used in the prototype by fontawesome.com and by flaticon.com (requires attribution).

Interactions

To make interactions usable and navigation intuitive, the following guidelines should be considered:

- **Touch targets:** Design clickable elements with large target areas, safe spaces, and rounded corners.
- **Micro-Animations:** Provide visual and possibly haptic feedback for interactions in small animations or effects.
- **Transitions:** Use transitions between pages, pop-ups, and overlays to enforce the mental map, such as moving into the frame from the side or popping up from below.
- **Instructions:** If instructions are required for complex interactions, consider using step-by-step instructions that guide teens through the process but offer them a way to skip instructions if they don't need them.
- **Alternative inputs:** Consider incorporating alternative input methods, adapt design for spelling errors, and limit required text input.

- **Auto-format:** Auto-format fields rather than asking users to type fields in a specific format.

Content

Clear, concise content is essential. It's important to avoid overwhelming users with too much text or cluttered layouts. Short paragraphs, bullet points, and visual aids increase scannability and comprehension. The most important information should be prominent through hierarchy, and the use of relevant images can make the content more relatable and engaging. For teens, it's important to use simple language, avoiding jargon and complicated and verbose content. Cut the amount of text and shorten the length of sentences and paragraphs.

Performance

Ensure fast performance by loading images only in the resolution needed and caching as much as possible for offline use. If the application requires loading time, provide a simple and accurate loading-status indicator and preview the page layout without content, if possible. Run tests to improve the speed and performance.

Suggestions for Further Development

The following lists some suggestions for the further development of the *World of Discordia* digital companion app, categorized by priority.

Priority One:

- **Conceptual Considerations:** Determine and improve sections marked “to be determined” or requiring revision.
- **Class Diagrams and Game Objects:** Create class diagrams and settle on which game objects have which attributes, especially content pages for spells, creatures, heritages, and locations. Finalize the rules and rulebooks before settling the design.
- **Finalize Design:** Determine the visual design.
- **Content Formatting:** Improve content usability by using less text and more icons, as well as nicely formatted information.
- **Account Verification:** Look into how to verify school accounts.
- **Account Transfers:** Consider enabling account transfers from school accounts to personal accounts.
- **Compliances:** Safety regulations for schools must be researched and thoroughly implemented. Requirements for possible certifications need to be considered.
- **Tutorials:** Add tutorials for first-time users.
- **Back-End Design:** Develop a back-end design to publish content.
- **Tablet Design:** Adapt the design for tablet use.
- **User Testing:** Conduct more thorough user testing in a beta version with actual functionality and design, especially focusing on complex navigational behaviors.
- **Facilitator Feedback:** Gain feedback from facilitators observing students interacting with the application.

Priority Two:

- **AR Map Improvements:** Collaborate with the system development team to ensure accurate mathematical measurements and logic for the AR map tool.
- **Mascot Creation:** Design a character to act as a mascot, possibly incorporating them into the tutorials.
- **Content:** Game templates and premade adventures should be created.
- **Pricing for Schools:** Consider pricing models for schools.

- **Content Sharing:** Enable sharing of user-generated content like encounters, adventures, items, and NPCs on the resource tab.
- **Images:** Provide a small library of official images to be selected or inserted if omitted by the user.
- **Accessibility:** Improve for students and schools.

Priority Three

- **Customization:** Offer customization options such as dice.
- **Music Integration:** Integrate music, such as playing music from within the campaign view.
- **Shop Generator:** Consider creating a shop generator.