Through the eyes of beginner game designers: An experience report on the pre-production of our first commercial game

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Abstract. *Digital games are one of the most prominent forms of entertainment in the contemporary world. For those that are inspired by such games, there's the possibility of a career path in the production of digital games. In this work, we aim to report on the pre-production stage of our first commercial game, which is "Meu jardinzinho" (Portuguese for "My little garden"). By briefly describing our ideation, design and prototyping process, we intend to discuss the results from what we learned from Scott Rogers' book, "Level Up! The guide to great video game design", through our lens as beginner game designers. Our results tell us that, even by following the steps proposed in the book, the execution is not straightforward, requiring more experience and rework than anticipated.*
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1. Introduction

Among the various forms digital entertainment can take, digital games are one of the most notable nowadays. They have the potential to evoke aesthetic experiences, and have become culturally pertinent, seeping into many aspects of everyday life [Hanussek 2021, Santos et al. 2023, Boldi et al. 2022]. Ever since video game consoles regained popularity way back in the 80s, these games have become a common sight in the life of young people [Lisboa et al. 2020, Leonhardt and Overå 2021]. Hence, games have become a landmark in the lives of many, and, as young adults embark on the journey to find an enjoyable career path, creating games may occur to them.

Whether people desire to follow a career as a concept artist, a game designer, a developer, a composer, a translator, or a producer, the possibilities in the game industry are nearly innumerable. Besides, with the advancements of game development technologies, there's now a plethora of online resources, e.g., tutorials in making games, well-written documentation, robust game engines, and a strong online community [Hussain et al. 2020]. With all of these resources available, creating a game by yourself or with a small team is no longer a distant dream. However, making games requires multidisciplinary skills, and publishing a commercial game is even more challenging.

Through a business perspective, the digital games industry is currently the most profitable entertainment industry sector [Politowski et al. 2021]. "In the 21st century, video games have become the largest form of interactive media in terms of revenue" [Park et al. 2022]. And, through an educational perspective, there are undergraduate courses specific for the area, which contemplate formation in the whole spectrum of the involved areas [Carvalho 2021]. Also, it is not unusual for Computer Science-related undergraduate courses to offer game development disciplines [Coutinho et al. 2020]. Yet, they tend to be focused on system development skills. Now, designing games is a very complex activity, so teaching game design is at least as challenging [Vitor et al. 2023].

Carvalho conducted a research on undergraduate level professional education for the Brazilian digital games industry, which is based on data obtained from e-MEC, the Brazilian Ministry of Education system. Through the data, the author reported that there were two types of higher education courses available in Brazil: Game Design and Digital Games. From the total, 165 courses are in-person while 3949 are in the remote teaching format [Carvalho 2021]. By observing the number of courses available, there's seeming interest in game design and game development education [Parreiras et al. 2023].

Still, even with plentiful sources of guidance within the community, it's not very clear what pitfalls should be avoided in order to make a successful release of an indie game. From pre-production to production and eventual release, there's a substantial leap. With all of this added, many creative and enjoyable game design ideas aren't made available in their intended finished form.

In our paper, we present an experience report on the pre-production stage of designing a game, which was initially carried out as an undergraduate thesis. We studied the methodology taught in the book "Level Up! The guide to great video game design" [Rogers 2014]. We also studied the literature on game design and game development, mainly from papers presented in the latest Brazilian Symposium on Games and Digital Entertainment (SBGames) editions. By doing so, we were able to design and prototype a small portion of our game, "Meu jardinzinho". We also present it throughout this paper.

Through an afterwards overview of what was accomplished, and by assessing the artifacts we produced with a game designer perspective a little more matured, we concluded that the execution is not as straightforward as following a recipe. This led us to more rework than anticipated to flesh out mechanics, story arcs and documentation. We also present a brief analysis more focused on the correlation between designing our game mechanics and world-building, where we report how we dealt with such aspects of our game and what other obstacles we met.

The next sections of this paper are structured as follows: in Section 2, we detail our theoretical background; in Section 3, we describe our methodology; in Section 4, we display our results and discuss our findings; and, lastly, in Section 5, we state our final thoughts and our perspective for future work.

2. Theoretical background

Digital games are advanced software products, but, at the same time, they are complex works of creativity and art [Chueca et al. 2023]. To make a commercial game, that is well structured and that feels like a completed project, it's of uttermost importance

that an appropriate game design methodology is followed [Vitor et al. 2023]. Besides, there's the importance and merit of an iterative design, proposed in the work of Hunicke et al., the Mechanics-Dynamics-Aesthetics (MDA) approach [Hunicke et al. 2004, Junior and Silva 2021, Ouriques et al. 2021]. As explained in a study by Pueyo-Ros et al., the designers focus on the mechanics and the players focus on the aesthetics, while the dynamics are the confluence of both. Once the designer gets the players' feedback, the mechanics can be modified to fulfill the aesthetics expectations [Pueyo-Ros et al. 2023].

Although the game design literature is vast and well established, providing enough elements to build nice games, there's still no consensus regarding which of these methodologies should be used in game design [Leitão et al. 2021]. It's, however, very likely that the appropriate approach will vary with the kind of game the designers have in mind. In a way or another, it becomes clear that the design can make or break a game.

Understanding what game design is means an important step to this whole process. And defining this concept is a long running research question within both academics and industry. Firstly, according to Schell, game design is the activity of deciding what a game should be [Schell 2008, Mangeli et al. 2021]. There are many methodologies regarding game design, but Schell's approach seems to be well perceived within the industry [Mangeli et al. 2021]. It splits design elements into four categories: mechanics, story, aesthetics, and technology. The design process is, then, guided by these elements.

However, more than just game design issues, management problems tend to arise due to the transition between pre-production and production [Callele et al. 2005, Politowski et al. 2021]. Attempting to release a commercial game has its many twists and turns, but indie game designers and developers have to start somewhere, even as "bedroom coders" [Prieto and Nesteriuk 2021]. Whether it's through game jams or through small demo projects, at some point, indie studios will have to release a commercial game so they can thrive and prove themselves as a team. So, for the reasons mentioned above, added to the little experience we had when starting this game project, we chose to follow Rogers' approach. According to the study by Vitor et al., Rogers' approach focuses more on industry standards [Vitor et al. 2023], which is what we're aiming for.

3. Methodology

In this section we describe the process we carried out for our research, detailing the steps we took in the pre-production stage of our game. To do so, we followed the instructions present in the book "Level Up! The guide to great video game design" [Rogers 2014]. These instructions guided us on writing our Game Design Document (GDD), which is a document where the game design, i.e., its project, is detailed. It is a concept used by game creators that includes story elements and planned mechanics, which will lead the way in the game's production, will keep it documented and which will be shared with the team [Carrijo et al. 2023, Vasconcellos and Carvalho 2023]. It is not an immutable document, being subject to some iterations. That said, the first iteration of the one-page GDD we made for our game is presented in Subsection 4.1.

The flowchart shown in Figure 1 displays a summary of the steps we took carrying out our research. More specifically, this flowchart covers every step since the game's initial proposal as an undergraduate thesis. Things like main character ideation, concepts and the initial design were decided before the undergraduate thesis was green-lit. The

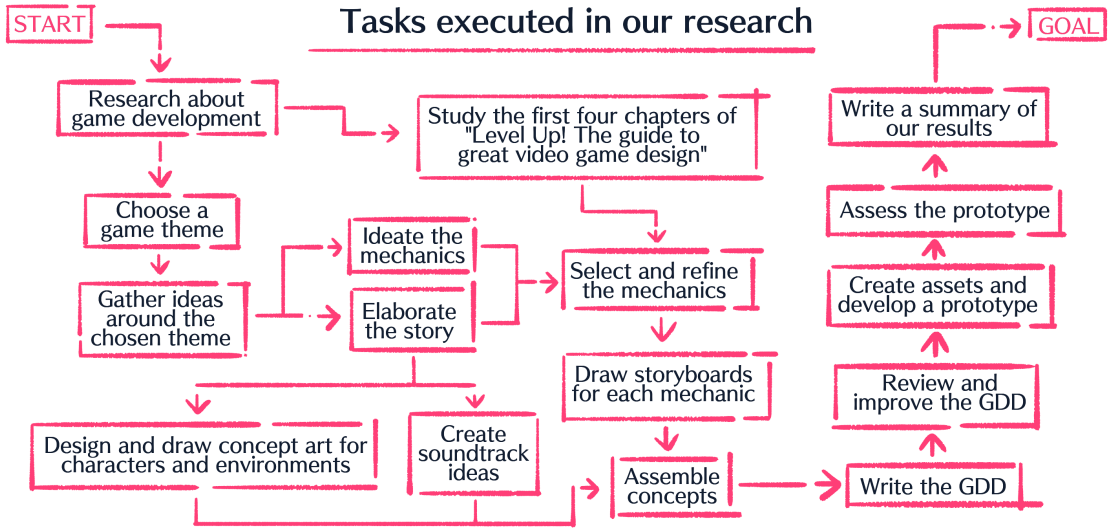

Figure 1. Flowchart of tasks that we executed in our research.

thought of making a game with gardening mechanics was already on our minds too. But the idea evolved only after the undergraduate thesis was green-lit. After reading the initial chapters of "Level Up!", we began to give more depth to our game's story and mechanics. One important tip provided by the book was to not get too attached to our early ideas.

When we decided the game would indeed be about gardening, we gathered ideas about gardening activities, taking notes of how they could be converted into game mechanics and visuals. After gathering enough ideas that could converge, we wrote more on our game's story and its initial setting, as it is ideal that mechanics and narrative correlate [Sousa and Junior 2021]. All of the mechanics we thought of were turned into simple sketches, so that we could better visualize them in our game's scenario. That was also a very important tip on the book: to draw mechanics and story bits like comic strips, so that the GDD does not end up being composed only of text. Some of our most relevant sketches are presented later in Section 4.

By drawing concept art and storyboards, we also got more motivated, since we were seeing our project take a clearer shape. That also made writing, reviewing and iterating the GDD more enjoyable. This flow also led us to start developing a small prototype for our game, where we implemented a few core mechanics and made some assets, which were also used in this early prototype. With all the steps we executed, we were able to experience the many roles available in a game development team. These roles include: game designer, character designer, concept artist, environment artist, composer, sound designer, writer, producer, software engineer, programmer and tester. To execute some of the activities linked to these roles, we also made use of the software listed below:

- **For prototype development:** Unity Engine, the game engine of our choice, given the experience we had previously, plus the amount of resources and tutorials available online, and its well written documentation. Visual Studio Code, a code editor. And Inky, the editor for "ink", a narrative scripting language for games.
- **For visual assets making:** FireAlpaca, used for making our early visual assets and for drawing sketches and early concepts. MediBang Paint, later used for

redrawing the assets for the newer version of our game's prototype. And Infinite Painter, which is currently being used for drawing newer concept art.
- **For audio assets making:** Audacity, the audio editor, which was used for editing our sound effects. MuseScore, the music notation program, in which we composed a few main soundtrack ideas. And FL Studio, the Digital Audio Workstation (DAW), in which we made the final versions of our prototype's tracks.
- **For management:** Notion, the note-taking web application, where we write our meetings' records, our to-do list, our ideas and plans.

The GDD is the main output of pre-production. Without it, the game might fall apart midway, losing its identity. To better understand what a GDD can be composed of, we list here a few of the things that are commonly included in the one-page version. The one-page GDD describes an overall view of the game, which includes the title, target platforms, target audience's age group, target entertainment software rating, synopsis, gameplay, selling points, and competitors. Additionally, a ten-page version can also be written. It gives us a more detailed view of the information provided in the one-page version, complementing what was absent from the one-page version [Rogers 2014].

As for the prototype, we read some of the engine's documentation and watched tutorials. We also tried observing the production process of other indie games, since indie games are made by relatively small teams, like our team. Namely, we looked into the process of the games "Bug Fables: The Everlasting Sapling" and "A Short Hike". This is done as an attempt to improve a game's development process [Ferreira and Junior 2023].

At its start, in February 2022, our game was being made by only one of us. Soon after the game's first presentation, a friend joined. From May 2022 onwards, our development team has been composed of two members, who share most of the roles we listed earlier. The exceptions are software engineer and programmer, roles which have been executed by only one member. Our team goes by the name "Atelier Benta Magia".

4. Results and discussion

We subdivided this section into three categories: in Subsection 4.1, we present the first GDD we made in our game design process, being very relevant to understanding what our game is about; in Subsection 4.2, we present some of the artifacts we made and discuss about them; and, in Subsection 4.3, we bring our main observations regarding one key aspect of game design, which is its strong correlation with world-building.

4.1. The first iteration of our one-page GDD

- **Game's title:** "Meu jardinzinho".
- **Target platforms:** for PC.
- **Target audience's age group:** from 12 to 30 years old.
- **Target entertainment software rating:** from 12 years old up.
- **Synopsis:** "Novelo is a young florist living a calm and enjoyable life in a quiet village at the middle of nowhere. Weirdly enough, her sales have never been low. Anyway... Follow Novelo's monotonous everyday life. Plant some sprouts and water them. Watch them grow as time goes on. Sell them. Get more sprouts? Rinse and repeat! Complete your plant log collection while you're at it. Novelo spends most of her time talking to her cat, Café, but Café never answers. To spend time like this must be tough. I can only wonder if Novelo is alright..."

- **Gameplay:** The player is able to plant sprouts in pots at the flower shop. The plants will go through different growth stages as time goes by on the player's PC. The player will have to water them, among other cares the plants may need, so that they grow faster and healthier. After each plant gets to its final stage, the player can put them on sale. Different plants can be acquired so the player can repeat the process. Try to complete Novelo's plant log collection and enjoy her monologues. This, which is the main flow in the game, is illustrated by Figure 5.
- **Selling points:**
  - Hand-drawn sprites and animations.
  - Enjoyable story with detailed world-building.
  - To be consumed in "small bites".
  - You can plant just like in real life!
- **Competitors:** "Viridi" and "Stardew Valley".

4.2. Overall results

As a way of better substantiating our discussion, we studied other papers within the area. This helped us learn what other contemporary works are researching and achieving, which also led us to ponder future possibilities for our current game project.

The activity we executed regarding our game that dates the earliest was the main character's design. Although unintentional, our game's main character, Novelo Cobalto, had her early concepts drawn way back in 2018, as part of the drawing challenge we intended to take part in, the "Adventure April". Characters tend to be the focus of most stories, otherwise we'd have a difficult time understanding actions in stories. In games, the player is an active part of the story. Still, characters are essential not only to the story, but to the gameplay too [Silva and Mota 2023].

When we decided to bring Novelo to be the main character of our game, her design had only a few nods to the gardening theme we were after. As we began to simplify her design so that we could more easily make the 2D assets, we also redesigned elements of her hair and eyes' shape. Later, we added glasses and red rain boots to better fit the idea we were aiming for. The colors of her design basically remained the same. Yet, what mainly stood out to us was how much her "cursed" overalls kept bringing us game design ideas. It's where she stores her items, so it has function; it gives her a distinct silhouette, so it's a noticeable design feature; it talks to her and adds mystery to the story, so it's intriguing. It influenced both story elements and gameplay. Novelo's main design iterations are displayed on Figure 2.

Figure 2. Novelo's character design iterations.

Figure 3. Some of the many characters of our story.

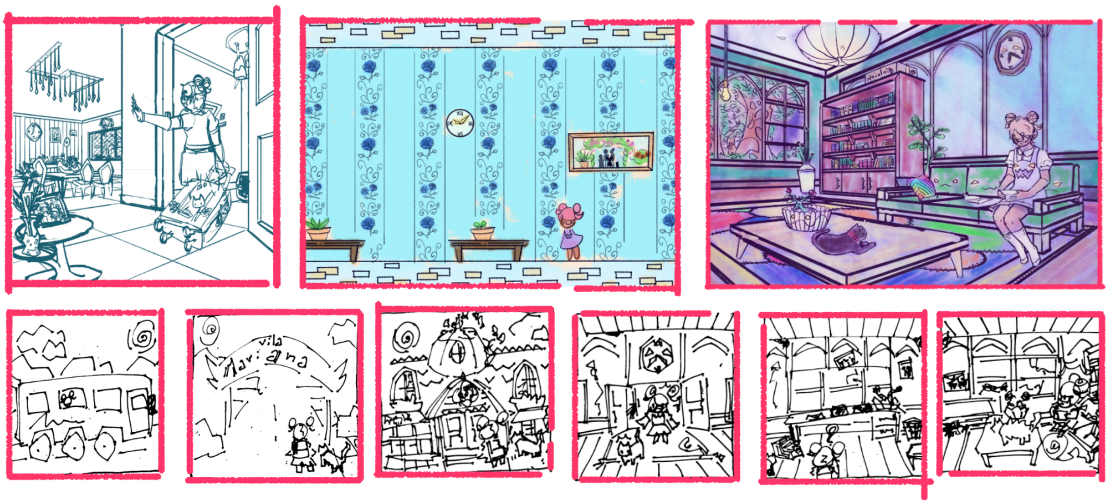

Figure 4. Environment concepts for areas in the first chapter of our game.

An essential aspect of our game's character designs is that, albeit almost unconsciously, we're writing and designing characters based on our acquaintances. We believe we're writing characters players can relate to, which can be really meaningful to players [Silva and Forte 2022]. The imaginary depth in character designs and world-building in games can encompass an enriching creative foundation [Cunha and Mota 2022]. Our game's current setting is within a country village with many neighbors, and there will be characters that address themes like gender equity, as well as elderly, LGBTQIA+ and neurodivergent representation [Reis et al. 2023, Passos 2023, Silva et al. 2023, Cabral and Pontes 2022, Lima 2022, Oliveira et al. 2023]. As it's too early to answer if we correctly addressed these, we will assess these after our demo's release. Some characters and environment ideas are displayed on Figure 3 and Figure 4 respectively.

Music is essential in video games, as it provides an embedding context for the players and complements the scenario [Amaral et al. 2022]. It even can be used to enrapture players and provide them with a way of sharing subjectivity with the characters [Summers 2019]. And it's ideal that sound design and art direction complement each

other from the start of the project, providing concepts for the project's sound identity [Silva and Meneguette 2023, Arnold 2023]. Accordingly, we composed a few tracks and melodies inspired by our game's gardening theme and its concept art, being references for our game's musical inclinations. These tracks include the main theme of the flower shop, a story introduction melody and a main menu melody, which has a leitmotif that will also be featured in other themes. Something to consider is how will audio adapt to different scenarios, i.e., how will some of our tracks reflect in-game change of events. Dynamic audio both in soundtrack and sound effects can greatly improve players' immersion, so the use of tools like the one presented in Rodrigues and Coutinho's work is being considered [Rodrigues and Coutinho 2021].

As our game will be heavily focused on story, we intend to make branching paths in its story, so that different points of view can be observed. It's also a strategy that may cause players to replay the game. But, whether these paths will converge at the end or not is still a point for discussion within our team. As some studies point, interactive storytelling plays a fundamental role in games, since it allows players to shape narratives with their own choice of actions, serving as a powerful tool to create immersive and engaging experiences. However, from the story writers' point of view, interactive narratives add a new layer of complexity to the development process [Lima et al. 2021, Lima et al. 2022]. Since it's our first commercial project, there has to be extra care so we do not doom our project due to unmet complexity standards.

Visual appeal and attention do detail are intended selling points of our game, which leads us to the subject of character emotional states, which is something generally neglected [Junior and Rodrigues 2022]. It's still up to debate whether idle, walk cycles and other animations will display emotional state cues. Since our game's characters are 2D hand-drawn sprites, adding more states can scale quickly. As different character skins are intended to be available as quest rewards, we have to carefully consider what will indeed be implemented, both due to development complexity and number of 2D assets.

A valid point we have to be aware of is: these features are currently adding more work to our to-do list than what is core to our game. A visually pleasing experience and branching story arcs can be invaluable to a game, but that will only be memorable if the game is played. And, for a game to be played, it has to deliver entertainment in some way [Peron et al. 2022], which leads us to postpone these ideas for now.

However, an important aspect that cannot be postponed was brought to our attention by the work of Cruz et al., where the authors assessed accessibility and usability in national digital games [Cruz et al. 2023]. Although our project is still in an early prototype stage, i.e., still in pre-production, designing it with accessibility and usability in mind early on cannot be underestimated. For players with disabilities, accessibility features are essential in a game [Monteiro et al. 2022, Andrade et al. 2021].

Overall, we affirm that we have gone overboard with the ideas present in the first iteration of our GDD, mainly the ten-page version, not presented in this work. That is not advised by any means in the game design methodologies we studied. But, since these ideas are what motivate our small team the most, for the sake of motivation, they will not be discarded this early. Some of our game's main mechanics are displayed on the storyboards presented in Figure 5, and screen captures of our game's first small prototype

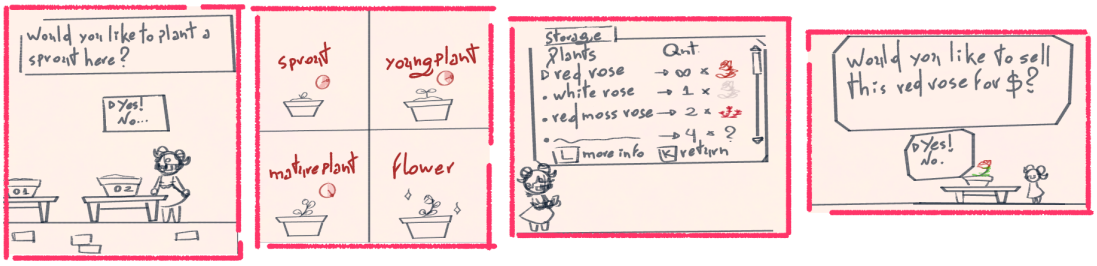

Figure 5. Some of the main mechanics of our game.

Figure 6. Screen captures of our game's initial prototype.

can be observed on Figure 6. It features the mechanic of changing flower states as time passes; the mechanic to sell flowers and the dialogue system; the flower storage; and the pause menu respectively. It also features the early 2D assets we made for our prototype.

4.3. Correlation analysis between game design and world-building

To our team, the most fascinating behavior we observed happened on the ideation stage of our project. We started designing game mechanics and creating our main characters and story, which we thought of as parallel tasks, as shown on Figure 1. As we carried out this activities concurrently, we found out they were closely related, at least for our scenario.

It's a game where you have to take care of something, as we intend for the player to care about their own actions. Taking care of plants by itself might not create a deep connection with the player. So, the player takes care of plants in order to strengthen friendship bonds with the neighbors Novelo once knew so well. Doing so also leads the player to uncover the many mysteries surrounding Mariana Village.

The planting mechanic is closely tied to the way we tell our story, but there's more to it. Taking care of plants takes time, as in, waiting time. Simply waiting for plants to grow and bloom would get tedious, so there must be other activities for the player to

engage with. As a story-focused game experience, telling too much only through dialogue text is bound to get repetitive. That's where some minigames and small animation sequences may come into play, as part of the "show, don't tell" narrative technique. For now, we have thought of ways Novelo can trigger events through interaction with in-game objects. We also intend for gardening-related actions to trigger different kinds of action command minigames, like pressing a given button at the right time, or quickly pressing a sequence of buttons correctly.

The story arch focused on the character Tessália will feature a minigame where the player arranges bouquets and garlands. This will have the player correctly matching flower colors and placing different flower types together in order to please specific neighbours. This is closely related to floriography, i.e., the language of flowers, an important concept sprinkled all throughout our world-building.

We present all of these examples to highlight that game mechanics and world-building are deeply connected. The connection between mechanics and narrative was also studied in Sousa and Junior's work, where the authors analysed the game "Papers, Please" [Sousa and Junior 2021]. So, at some points in our ideation process, we wonder if a given mechanic or story detail makes sense when put against with what we have established so far. The answer is not always positive, but, as we mentioned earlier, we cannot get too attached to our ideas. This leads to rethinking and GGD-rewriting, which can be intimidating at times.

5. Conclusions and future work

With our experience report, we aimed to pass on our findings regarding the pre-production stage of our intended first commercial game. As we followed the steps described in Section 3, mainly guided by the book "Level Up!", we were able to make GDDs that encapsulate what our game is about. However, as time passed and new ideas arose, we were uncertain on how to iterate our GDDs. There was also a slight feeling of self-doubt, since we don't want to see our project fail due to our little experience. "The design of games is not an easy feat" [Natucci and Borges 2020].

In summary, even though we followed the steps proposed by the first four chapters of the book and accomplished seemingly well written GDDs, the execution was not straightforward. It required more experience and more rework than we could anticipate. These GDD formats seemed overwhelming once completed, mainly for the ten-page version, which is not included in this work.

For future plans, we intend to use the Notion web application to better structure our GDD, as if it was a wiki. We propose assessing the viability, benefits and drawbacks of this form of GDD as future work. We expect this GDD format to be less overwhelming to maintain than a single view document. Also, at this stage, we plan to build an analog prototype made out of paper of our game, which is an approach that was already studied in a work by Silva et al. [Silva et al. 2022].

Although very early in development, we aim for "Meu jardinzinho" to be the first commercial game made by our team, Atelier Benta Magia. Our end goal is for it to be a captivating and indelible digital game experience.

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