Promotypes - Prototyping Games for a University Game Production Pipeline

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ABSTRACT

In this paper, we reflect upon the development process of three videogame 'promotypes', prototypes designed to promote the game production pipeline service in development at Aalto University. In the process of developing example games for potential internal clients of the university, we aimed to set out realistic project goals for given resources to better communicate the scope and potential level of the delivered outcomes. Our lessons in this project were, at large, general lessons in game development, including how motivation and proficiency with production tools, alongside the anticipated expectations of clients and players for polished games, affected the game development processes. In addition, we explore how the pursuit for academic accuracy and the model of a non-intensive process of academic game development posits additional challenges in the development of a realistically balanced production pipeline.

CCS CONCEPTS

• **Applied computing** → **Computer games**; **E-learning**.

KEYWORDS

academic game development, design decisions, educational games, game development process, game design post-mortem

1 INTRODUCTION

The challenges of making games within an academic setting are manifold. Typical production constraints relating to time and budget are further exacerbated by the additional requirements to balance the needs of educators with the competencies of available developers, whilst considerate of any expected scholarly output. The availability of professional game developers within academic game development is understandably scarce, owing to short contracts, comparatively less attractive project goals and budgets, as well as other issues common in hiring from highly competitive talent pools. Besides students, more common in this context is the utilisation of 'academic game designers', whose potential lack of industry experience can be weighed against a design value system that emphasises scholarly theory within design implementations.

In this paper, we reflect on a design process of three games in an effort to elucidate some of the design situations within the particular context of making games in an academic setting.

2 THE GAME PRODUCTION PIPELINE (GPP)

Aalto Online Learning—Online Hybrid Lab (the Lab) was founded in 2021 as a response to the complex and hybrid situation facing virtual education post-pandemic. The Lab was built on experiences and expertise gained in our previous mode of operation as a strategic educational development project (Aalto Online Learning, 2016-2020). In identifying the need for the design of engaging learning experiences, the Lab has worked to test, develop and support several production pipelines for technologies ranging from 360° learning environments [3], educational videos [9], MOOCs and virtual reality. The game production pipeline (GPP) [7] was established to provide support and expertise for users interested in the production of educational games within a university setting. The project specifically developed in response to growing inquiries about the use of games for education, specifically within the context of on-line learning, and inclusive of games for research. The GPP was structured as a research-oriented track to assist inquisitive educators, and connect them with developers.

The GPP developed from an internal wants-and-needs review leading to an initial proposition that provided an assessment inclusive of the setting, available tools, educators' interest and identified challenges. This outline has since been evaluated by industry professionals who have contributed essential feedback to further refine the GPP concept [7]. The academic underpinnings of the GPP are

in game production studies [16, 18] and game design praxiology [14]. Utilising the production perspective has enabled us to better consider the epistemic specifics of game making, while game design praxiology has been essential for our engagement with industry and contrasting the context, production and outputs that emerge from juxtaposed game-making settings. We have been particularly interested in how to construct a successful pipeline that takes in consideration the special context of the often lacking material resources (such as budget), as well as immaterial resources (such as the game education of the client) that typical academic game projects might face. The GPP relates to a frame of 'academic games', games designed for academic purposes (typically for research and education) [6]. As an academic game project, the GPP is formed to fit to the design practices framed by the academic context.

For the purpose of our project, we developed three games that would both evaluate the current design of the pipeline as well as promote the GPP to future clients. We have labelled these as 'promotypes' as they are *prototypes* designed to *promote* the potential outcomes which the university service team could produce internally. Their purpose was to show what could be achieved within a specific time-frame and restricted budget, whilst potentially also working as templates for future game projects. Our intentions were then to showcase some of the available genres and game mechanics that could still be utilised in the development of educational games. By bringing the production of these games in-house, we aimed to move away from demoing commercial games to educators and instead provide a more accurate representation of the potential GPP output that could be created within specific constraints.

3 THE PROMOTYPES

For this project, three unique 'promotype' games were developed: *How to Play a Videogame, Spooky Action at a Distance*, and *Cost Driver*. While each game was created to fit different design focuses, the themes and mechanics were left open to discovery during development. The games were hosted on the itch.io game platform[1] , to be presented on the Lab's website at Aalto University[2].

3.1 How to Play a Videogame

How to Play a Videogame (Working Title: Environment) is a rapid-fire showcase of different game genres presented in historical order, with the player transitioning from text adventure to 2D platformer and 3D adventure game. The focus of the design process was: spatial navigation and external game assets.

3.2 Spooky Action at a Distance

Spooky Action at a Distance (Working Title: Puzzle) is a 3D escape-room style game with the player stuck in a university building, required to learn the basics of quantum physics in order to find their way out. The focus of the design process was: problem-Solving and application of knowledge.

3.3 Cost Driver

Cost Driver (Working Title: Narrative) is a hybrid visual novel and a driving game, in which the player learns about basic accounting

[1]https://itch.io/profile/aalto-online-learning
[2]https://www.aalto.fi/en/aalto-online-learning-online-hybrid-lab/

Figure 1: Screenshots of the three Promotype games. From top: *How to Play a Videogame, Spooky Action at a Distance,* and *Cost Driver.*

concepts in an effort to keep their delivery business afloat. The focus of the design process was instructional, storytelling, and branching Narratives.

4 METHODOLOGY

From the start of the GPP project, we have been interested in connecting the pipeline to our understanding of the practice of game development. To provide us with additional research data, the development process was recorded through design diary entries, with additional information captured through GitHub update commits, meeting notes, alongside the regular screenshots and videos shared with the team. We are contextualising our study as practice-led research [2], wherein the design knowledge gathered is in the process rather than embodied in any completed artifact. Within this

category of research through art and design, Frayling [5] identifies a method of action research wherein a diary is first utilised to record the experimentation before notes are later adapted into a more suitable text. The use of design diaries to record and reflect on game design has been previously utilised with success in academic game design [12]. This method was based on the diary keeping guidelines of Pedgley [17], who has discussed how design diaries can be utilised to record the reflection, analysis and theorising essential for practice-led research. A more contemporary form of recording design reflection has been presented in the MDM method [11] which incorporates the recording of design thinking alongside source control commits, a practice partially adopted in this project.

5 THE DESIGN PROCESS

In this section we will open up how the development of the prototypes proceeded, in the format of a first-person narrative (game design post-mortem) retelling from the designer-developer of the games. This perspective allows the author to discuss the work transparently, while providing particular emphasis to the design decisions that shaped the project. We argue that the lessons learnt from this process provide relevant insights for other academic game design and design research projects. As academic designers, we are uniquely placed to best articulate the tension between the envisioned and realised, in this instance being the theoretical understanding of how educational games should support learning goals, and the applied implementation of game design within a constrained production process. While we acknowledge the limitations of any design reflection detached from the game industry, it is this interesting reality of academic game development that our project seeks to interrogate.

The game development work was undertaken by the first author of this paper, an academic game designer and doctoral candidate researching experimental and theoretical game design for their dissertation. While lacking in specific games industry experience, they had been developing games as a hobbyist for over a decade with a varied portfolio of work from small, independent projects. The development work of the three prototypes were undertaken initially while working on a 50% working hours contract for a period of three months from April 2022, later extended until December. The intention was to rapidly develop three prototype games alongside interested educators, that would be playable in a web browser with an expected playtime of approximately five minutes. This setup was deemed to be typical and realistic for our context, providing us with both a suitable test for the assumptions in the current formalisation of the pipeline and evidence necessary to further develop it.

5.1 Designer's Reflection

From my first meeting with the project manager (third author), it was emphasised that this project should exemplify an ideal academic work process that was not to involve working beyond the compensated hours, which in turn would provide a more accurate estimation of the production hours required for future projects. While grateful to be employed under such accommodating conditions, I still expected a certain amount of work would be necessary beyond this agreement. I was aware of certain limitations in my

toolset that needed learning or revision, but this was work I perceived as being just as beneficial to myself as the needs of the project. My personal artistic goals have always aligned with that of the solo developer, just as capable with art as with code and able to fill in any production gaps through the utilisation of found digital assets. Yet, while projecting myself as a self-contained production powerhouse, in truth I was more untested, with personal projects more often left languishing with development skills quick to erode over time. However, I was excited to be approached to work as the developer on this project and presumed I was capable enough to produce prototypes that were timely and fitting to the brief. It was not the personal inexperience I was aware of, but rather the inexperience I was unconscious of, that would lead to delays and problems with the project.

A few of the themes already suggested by the project manager as suitable for further exploration in these prototypes included 'Collaboration', 'Competition', 'Challenge based learning' and 'Problem Solving'. Considering the scope of the project, inclusive of my own ability to realise said scope, I recommended against the first two suggestions that appeared indicative of multiplayer or AI games that would be non-trivial to implement. We agreed on the production of three games, down from a potential five, each with a different focus relating to potential learning goals. I drafted brief design documents for each of these that mentioned their focus, learning goals, inspirations and required assets. In addition, I made notes on how these games could be developed beyond their minimum viable product in an addendum labelled 'Feature Creep'. We distinguished from the earliest stages of development, what would be essential for the games and what else would just be 'nice to have'. Despite this effort to stay fully aware of feature creep, before too long the prototypes were on the path to overscoping, much to the detriment of the project brief.

At this stage the simplicity of the (Working Title) 'Environment' game was clear enough, requiring little more than a character controller and a set of environment assets. (Working Title) 'Puzzle' was the more intriguing game, a 3D adventure game inspired by the likes of *Myst* and *Return to Obra Dinn*, with a first-person perspective that could additionally demonstrate game mechanics found in physical escape rooms and VR environments. (Working Title) 'Narrative' was a blank page, with development paused while searching for an appropriate story or client. We agreed that each prototype would be developed in the Unity game engine, being not only the software behind many of our inspirations, but also a program providing an established WebGL pipeline for browser-based games. Structurally, I thought to develop the 'Narrative' game with the 'Yarn Spinner' asset for Unity, a tool for branching narrative dialogues I had some prior experience with, best known for being utilised in one of the commercial game we had been demonstrating to potential users, *Night in the Woods*.

The learning outcomes of 'Environment' were clearer than the other two prototypes, teaching the player how to navigate a 3D space whilst being designed for an audience of educators who may have never played any videogame before. The educational content was far more literal here and not dependent on any external content. We had taken inspiration from Jesper Juul's 'playable essay' [10], a simple third-person browser game in which the player interacts with a physics-based system whilst reading related academic text

on the nature of videogame objects. Juul's essay had referenced the 'Low Poly Game Kit' used in the creation of his game, and I set up this free asset to act as the foundation for the first Unity project. Immediately, I started to experiment with other character skins to better disguise the appearance of the third-person character to try and disguise any similarity with Juul's game, and found the underlying character mesh and animations provided a solid setup for the game. With the character now up and running, I started scouring online marketplaces for any more unique 3D environments they could explore.

I was personally leaning towards similar low poly environments owing to their ease of implementation and modification in the game engine. While I was given a budget for obtaining any relevant materials, I still preferred to find free assets wherever possible and after a few false starts, started to convert a colourful, cartoon forest environment into Unity, setting up all the appropriate colliders for the character and manually assigning and updating materials where necessary. After this busywork, it became apparent on hitting play that the static environments alone were not really going to cut it, with additional animations, rigging and particle effects all needed to breathe any life into the surroundings. I could better identify time-consuming work at this stage, and felt such effort should be left until more of the game structure had been agreed on. Beyond these graphical woes, the end result of running around a cartoon environment just felt off to me, and I started to second-guess how this would be perceived by the target audience – how far could educators, potentially playing a game for the first time, be able to look past this cartoon setting and project their own vision of how such game frameworks could serve their needs? I felt it may be preferable to present more of a sterile environment, something akin to the test rooms of *Portal*. My manager had suggested that there should be an option to switch to a first-person perspective when previously sharing gameplay footage. I considered the implementation of this different perspective, which in videogames is associated closely with different genres, as an opportunity to incorporate a more interesting second environment to provide contrast with the first. I leant on a bit of game magic to connect these two environments, with the player having to travel through distinct doors that would stitch these genres together, doors being a motif that has particular popularity in games research [4, 8]. The feature creep had settled in as I grew ever more excited thinking of all the different genres that could be presented within the game, from the top-down JRPG to the side-scrolling platformer, all the time advertising as many different control schemes and frameworks as possible to potential users, expecting that through this multiplicity that they could better recognise the specific game they wanted aid in developing. In consideration of the audience, I had already settled on the instructional name 'How to Play a Videogame', which inspired in me the idea of a detached, sardonic narrator that would persist throughout the game, starting from the traditional text adventure.

The 'Puzzle' game was still lacking a setting, and nothing had yet inspired me greatly yet from searching through free environment assets online. We had considered setting the game on our campus, reproducing some of the unique building architecture around us, and have the player character literally take on the role of an educator, perhaps trapped in a lecture hall or a library. We envisioned

this literal interpretation of a game for educators with puzzles relating to projectors, USB sticks and lecture notes. To demonstrate the application of knowledge, we thought to include puzzles that would require contextual information found from outside of the game, a form of interpretive challenge [1]. While such outside-the-box thinking was an attractive design proposition, it still felt a little disingenuous and not representative of the 3D adventure genre as a whole. I discovered early on that building custom assets to accurately represent the campus space would require far too significant a time investment, so paused that idea. After a few weeks we settled on a more suitable theme for the game, incorporating actual educational content to better represent the games we wanted to showcase. This emerged from an extracurricular course I was taking on quantum game development, inspiring the idea of an adventure game where the player would have to escape a locked campus lab, all the time learning the basic concepts of quantum physics thanks to the incorporation of learning material and additional support provided by the educator.

A meeting was arranged with another educator for the 'Narrative' game, who shared materials relating to their introductory course on accounting. From the start we thought it may be a combination that would be difficult to pull off, besides there was already an existing *Accounting+* commercial VR game that riffed on the absurdity of adapting such dry subject matter into something exciting and ludically engaging. We shared with the educator a number of the reference points we had for this prototype, such as *80 Days* and *Night in the Woods*, although within our limited time together it may not have been entirely possible to demonstrate how these games succeeded in presenting unique narratives to the player. The educator shared several resources from his class notes, a PDF presentation that provided an overview of the fundamental costing concepts required in the course, and a case study intended to be utilised as a homework exercise, with students tasked to fill in the appropriate cost information as it related to a firm of delivery drivers. Looking through this case study, I thought to share another game that I had thought provided a relevant example of game narrative, *Sunless Seas*. The educator somewhat amusingly shared that he thought the dark atmosphere of the game was fitting for their subject matter, and I further elaborated how we could try and recreate the story behind his case-study into a prototype game, centering it around a delivery firm and have the player need to understand the basic costing concepts behind the business, such as the variable cost of fuel and the fixed costs relating to insurance and goods. We decided that the game would cover all of the concepts covered in the first half of the lecture PDF. The educator proposed that players could be challenged to complete the missing information from a figure in the PDF, using a simple sort of drag and drop mechanic that I agreed upon for now, all the time plotting many more elaborate mechanics related to fuel and resource management. The idea of developing the game later past the prototype stage was first raised by the educator which inspired me in widening the scope a little further, thinking that the game could even be structured episodically as a companion to the entire lecture series, with an overarching narrative thread that could further motivate the students to continue playing and learning.

Returning to the 'Puzzle' game, I had started to get taken aback by how much Unity had evolved since I last spent any significant

time with it. I felt that at the time it was worthwhile to learn how to best implement, for example, the new render pipelines and input systems, despite the additional learning cost. I started to block out ('greybox') a rough version of the game environment before utilising some modular assets and basic geometry modelling to create a school corridor, based on reference images of the university's science department. A game demo was produced once the environment was complete, incorporating additional functionality for the player to look at, describe and pick up objects. I felt that this more realistic setting was not the most interesting backdrop to try and demonstrate quantum theory in an engaging manner, with concepts such as entanglement or superposition perhaps being better represented with abstract demonstrations that could have the player embodying a literal particle or otherwise observing protons beyond what could be perceived from a human perspective. I also hesitated around the licensing terms for the assets I had utilised to build up the level, thinking it might be better to create the relatively simple environments myself to avoid any licensing issues in the future should the prototype templates be developed further by others. In light of these issues, I built another demo of the game using a combination of self-made and fully open licensed (CC0) assets. While researching the game topic, I had discovered the phrase 'Spooky Action at a Distance' which Einstein had used to describe quantum entanglement, and felt it was a perfect name for the game. The prototype would attempt to explain quantum entanglement by having the player observe how particles can be connected when light-years apart, which would necessarily involve them journeying into outer space. I had thought to include Einstein's brain in a jar as a companion for the player but upon discovering how litigious the late scientists' estate could be, replaced him with an original character, a human sized anthropomorphic proton called Quanty. The character offered a way to communicate additional educational information via dialogue text, but I remained concerned the game was still not educational enough, and almost in desperation I thought to add literal scientific papers as content for the player to optionally read on the walls. While there was an idea there, I felt the game turned out looking far too ugly to be considered seriously, that the puzzle content had been simplified so much to simply searching a room for an item and that the educational content still lent so heavily on fantasy to be confusing. My confidence took a hit with how this game seemed to struggle in all aspects, aesthetically, mechanically, and educationally. This negativity was further compounded by how I felt the stumbles with development here were actively taking time away from the other prototypes.

Building out the narrative of the third game continued through conversations with family and co-workers and I was very interested in how we could tie this knot of narrative adventure and accounting information. The original case file involved the logistics of providing accounting for a delivery firm, but I liked the idea of more closely relating it to the student experience – having the player character take an accounting course that was necessary for their business to continue operating successfully. I was particularly inspired by some instrumental music I had found while searching through free music assets, a dark jazz track evocative of Nordic noir that I imagined playing over the games title screen as a delivery van was seen driving down a highway road at night from an isometric perspective. The educators passing remark that accounting was suited to a dark,

foreboding atmosphere had stuck with me and it was something that I wanted to explore more, despite the potential inappropriateness of such a tone within this educational context. The project manager seemed less keen on including a murder mystery element to the game, regardless of how well I could try and conceal it. I was also advised against the idea of giving the player an antagonist from a rival accounting firm, instead preferring that the accounting characters would generally be shown in a more positive light. I set the game at a border town in a Nordic country, but removed most of the references that side characters would make about a missing person. Part of the thinking to set the game in a town were that it would require many less assets than the city described in the case study and while this was comparatively true, I had not further considered how many assets make a town. I was still excited by the game at this town-scale anyway, from the variety of characters that could be engaged with in branching dialogues, to the many other potential mechanics that could be included. Besides the timed deliveries between locations consisting the core game loop, I started planning racing minigames with the locals, gambling machines at the petrol station and all the resultant economy that would entail. It should have been clearer at this stage that I was overscoping wildly, and that the whole concept of a narrative-led 3D delivery van driving game teaching accounting was the wrong fit for a prototype. While I could easily find related tutorials on gambling machines or basic car A.I, over time more and more scripts that I did not fully comprehend were being added to the project so that when things stopped working, it was difficult to start unpacking.

While still discouraged from further work on the 'Puzzle' game, although it could claim to be finished, I continued to develop ideas for 'Environment' that were all unfortunately tied to expanding the game beyond the original remit. I developed a user interface in which the control instructions for each genre would remain on-screen in a central location, removing the friction of even pressing a help menu for the presumptive inexperienced player. As I wanted these instructions to take up a significant part of the screen, I was left with some empty space to fill. I first included only the game logo in the corner, but later thought to improve this by creating unique logos for each genre, and even later thought about animating each logo, in addition to already reskinning the appearance of the entire UI to more authentically match whatever genre was being played at the time. To fill another empty space in the UI I had thought to include historical information about the currently played genre, specific content that could be considered educational for students of games, art or media. I planned for each genre to contain a shared set of elements, so that the player would always need to locate a key to open the door to the next world, and that there would always be an additional hidden notebook to unlock the historical UI information, rather than keeping it visible at the start. I had the idea of hiding a code somewhere in the 'Environment' game that could be used in the 'Puzzle' game to unlock an item in the 'Narrative' game, which stoked the imagination of my game designer mind, but was also something I could recognise would be of more interest to me than the majority of players. Whilst at this point I had received an extension to my contract to allow for five more months of development, I was still starting to hit against my limits as a self-proclaimed one man game studio. Looking back, attempting to tackle the three prototype games simultaneously was

already spreading myself too thin, so the idea of trying to develop multiple genre prototypes within this one 'Environment' game was pushing the limits of my cognitive load. I needed more personal experience in order to still better get a grip of scope and make better predictions of how long development tasks would take me personally to implement, and in the absence of this, the difficulties I faced in the project started to compound.

The 'Narrative' game soon started to take up all of my development time. Weeks passed without any visible progress at all as I experimented with Unity's terrain and lighting features, a swath of different road builder assets that were each terribly broken in their own unique way, whilst also working through multiple tutorials on vehicle movement and car AI, settling with implementing whichever was the least bad option. While the technical side of development was starting to get difficult, on the art side I was relieved to discover a large amount of high quality and open licensed assets to build the town. The quality of these assets helped me to feel far more confident that the final product could be appreciated by users, as personally it was suddenly far more pleasing visually to continue work in the game engine. Still, building up the town environment to utilise these assets proved to be another time sink to add further to the delayed project. I thought that now the game had a core loop of travelling between different building locations that it would be more rewarding to model the town realistically rather than have it be a simple mishmash of different roads and buildings. I used a small town in central Finland to provide the foundation, an appropriately sized environment that had enough interesting side roads and traffic connections to potentially provide interest for the player. After experiments with several assets claiming to transform open map data into useful level designs, but only causing their own unique problems, I eventually resigned myself to creating my own replica town map, and placing every building by hand. Set-dressing the environment added even more time to the process, as far too many trees and fences were eventually left being placed by hand, even after the discovery and subsequent dissatisfaction of tools to automate the process. Again, once the static structures were finally in place I was only left disappointed, and it was not until I added multiple AI cars with terrible driving skills that I could rediscover something playful and fun in what I had built. As more moving parts were added from smoke, water, trains and windmills, some feeling of life started to grow.

I was grateful that the narrative part of our 'Narrative' game would be largely handled by my project manager who produced a short script that fleshed out some of the characters and story in the game. The original intention was to discover through dialogues with characters the four key costing concepts that would be necessary to complete the figure with missing information from the PDF lecture notes. I found this an unsatisfying end to the game, as the missing information was so slight that it would take less than half a minute, even guessing, to solve this final challenge. As the size of the game environment had grown, I pushed to include more content - namely additional accounting terms from the learning materials, incorporating them into more dialogues with more characters. The game had developed to have the player character be a student of accounting and I was inspired by the school building model I had included in the level design to have the game culminate in an extended test to be sat at the school. Approximately ten questions would be included, incorporating filling in the blank information from the PDF figure, but also additional tests on the specific terminology that had been presented to the player during the game. I expected that this literal test at the end of the game would be a straightforward way to measure how the player had absorbed information in the game while also functioning as an assessment tool.

As work moved into the summer months, the project hit a number of setbacks - our accounting educator was unavailable to provide feedback on our work translating their materials into dialogue, and the project manager had left for alternative employment. In my continuing development of the game, I started to incorporate additional features both relevant and not. While some of these features were clearly unnecessary such as the day night cycle, hidden stunt jump mechanics or accounting themed soundtrack, other elements I felt were essential to the player experience such as mission timers, a navigation system and additional on-boarding. Some of the more decorative systems were added to the game as a way of avoiding having to deal with more insidious issues with the game, such as the recurring bugs relating to the car controls, car AI, lighting system and story progression. I had expanded the dialogue script gradually over time until it had grown far too long, and then also had significant issues wrapping up the story. I had tried to approach this process from a more detached perspective then in personal projects but I still felt overly attached to the dialogue, being a more literal communication between myself as an artist and the player. In adapting so much accounting information into branching dialogues and story beats, I fluctuated between hoping someone would read all of this text and hoping that nobody does.

Without intention, once I had stopped conceptualising the 'Narrative' game as a prototype, I had started work on a much larger game which required additional systems and polish that went far beyond the original brief of the project. Once I had started working with such a large game environment, everything else had to be sized up to fit, from the dialogues to the educational content, and all the entailing bug-fixing. Development of the prototype took at least twice as long as estimated, almost six months in total, with the resultant game taking the developer over 25 minutes to complete. While the game has merit as a promotional product and potential template for future games, it did fail in meeting the requirements of the original promotypes brief. With the game complete, finally given the name 'Cost Driver' when finalising the games title screen, I returned to the other promotype games I had paused development on some months prior. I was better able to recognise why certain tasks, such as writing the narrative for the text adventure, I had found more difficult to return to than others. Beyond personal reflections, I expect there is additional value in the process recorded here, and not just as a warning to designers who may be more inexperienced than they expect or to better inform the next developer of an accounting videogame. Through this process, I have attempted to elucidate something about a personal design process, from where particular ideas can originate and where else they seem to dissipate. By developing games within an academic context we are allowed a method through which we can illuminate the process of design communication, by sharing the personal reflections that can give way to dialogues beyond the individual.

6 OBSERVATIONS

The reflection of our academic game designer is highlighting aspects of game development that are not unique to academic contexts - but more general to any game development processes. Game making is a creative process, where emotions, valuations, self-esteem, and interpretations of the creative individuals impact the processes greatly. Academic aspirations of the projects just add an additional level for design challenges.

6.1 Motivation vs. Feature Creep

What is interesting from our project, is how the struggle between motivation and self-doubting creates a dynamic that can lead to, for instance, overscoping and feature creep - no matter how much one would try to avoid them intentionally. Being less disciplined in not introducing fine-tuning and polish too early on in the project, because the designer might be afraid that the game will appear too rudimental, was visible here. Personal values for 'good games' also impact the expectations that the designer puts on themselves. This can also lead to positive outcomes when the client (the external educator on this project) and the creator find common ground to work with inspiring ideas. Even if the game is not perfect, and the creator would see many aspects in them to improve, the end result might still be of a positive experience for them both.

As the game development is a human process, it is important that creators are able to maintain their motivation. In our project, one of the sources of motivation was, for instance, the successful sourcing of inspiring assets. These micro-successes on the project are also part of the coping mechanisms required of burdensome creative work. By being able to depend on pre-made assets, one is able to make shortcuts in the development schedule whilst also providing a level of quality that might motivate the creator in creating a 'good game'. However, in its current form, the workflow of utilising existing assets and tutorials can still be an unreliable shortcut in saving development time. The development process can eventually involve a lot of additional repair work in order to make all of the different pieces, such as gameplay scripts, fit together. The additive nature of the game development process do build up gradually and can result in a bloated and fragile project.

6.2 Precedents are Praxiologically Black Boxes

While adding to the designer's motivation, the development process did suffer from the use of 'good games' as references, in spite of the promotype project hoping to avoid this very same problem. The demo games that appeared relatively simple to reproduce, are more often than not products of design processes that have taken far longer and with many more skilled hands involved than what was in the scope of our brief. To better understand what kind of games would fit the low-resourced academic game development projects, we need to have a better understanding and transparency of game development realities in general, rather than in the specific. This is information that we will continue to gather, considering its vital bearing on the future planning of projects. Precedents that would fit closer to the reality of the lowered production pipeline have been more challenging to find, and even so, it remains onerous to limit oneself to the practices of copying and cloning in the creative process of making games. Furthermore, while existing games possess design knowledge of solutions, they do not mediate the knowledge of how long it would take to adopt those solutions into other games. This relates to the notion of game development being paradigmatically treated as an iterative process [13].

6.3 'Realism Paradigm' Pushes Attraction Away

One relevant challenge to the development of educational games is an approach that we call the 'Realism Paradigm', where the initial attractiveness of games being free from the laws of our physical and social realities is lost to the demand for accuracy concerning chosen educational topics. This can be observed several times in the journey of our academic game designer. Where some design decisions would have led to interesting game experiences, they were hampered with the assumption that realism in the game would translate to a heightened accuracy in the learning outcomes of the players. While other observations from this project have aligned with anecdotal information on game development processes, there is specific knowledge that has emerged from this friction between learning and entertainment that is at the core of many academic projects and educational games.

6.4 Non-Intensive Development Takes More Time

The inflated irregularity of academic game work creates an interesting observation that might be more typical for academic game development processes than their industry counterparts. As the academic game making is not currently a career track that one would be able to pursue through stable self-improvement processes, the development processes of academic games are more prone to suffer from the need to update knowledge in game development platforms and tools. Game development is a fast-moving creative domain due to its connection to evolving technology, and one often needs to keep themselves updated on it very regularly [14]. This was visible in our project and will most probably also affect the scheduling of any kindred projects. A similar case of scatteredness in how a designer might need to wait for an answer from a client, manager, or other stakeholders was also evident in our project. We assume that 'academic waiting times' are longer than what they are in commercial game development projects, making it also impossible to directly adapt the pipelines from the industry.

7 DISCUSSION

While our game design post-mortem describes the work of an early-career academic game creator, we believe our observations are relevant, timely and constructive advice to others working within academic game development. Even more so, the conditions described in this paper are more likely to be common for academic game development. Rather than trying to figure out how to make certain boundary conditions (such as lack of resources) disappear, we suggest that we aim to learn from the limited game development processes - to excel in them on their own terms.

Making games with lowered resources require purposefully limited example cases, from which we could systematically learn how to improve our processes. The lack of academic knowledge on how long the entire creative process for each reference game has taken, is keeping us in a loop of unrealistic budgeting and unsatisfied

outcomes. The very commercial games that motivate us to make academic games are contributing to a toxic relationship of expectations between the creator, clients, and the potential players, while remaining an important factor in the motivation of the creative process. While game development tools, as well as creator economies (e.g. asset stores) are developing towards reducing the development times and resources needed, this trend is still relatively slow. We are especially interested in how the low-resourced academic game projects can be planned mindfully: focusing on expectation management via producing our own promotypes. We believe that internally produced promotypes help us communicate better with the future stakeholders of these projects, as well as improve our own understanding of the production realities of academic games in our local context.

Furthermore, we would like to point out that the 'realism paradigm' deserves to be further challenged in the context of academic game development. Even though the friction between accuracy and enjoyment of fictional spaces has been anecdotally known to create challenges in game development projects, this has not yet been fully explored. We know that it is a challenge to create a game that would depict the chosen academic topic accurately while, at the same time, maintaining the enjoyment of a game that frees us from the boundaries of realities. A commercial game is typically required to be fully standalone, and the user experience fully polished in order to maintain the players interest. This requirement takes up a huge part of the development time. An educational game, or academic game in general, does not necessarily have the same need for polish, as it might be used in a classroom or as part of an educational whole [15]. The development process of an educational game could benefit greatly if the resources needed for a standalone (teacher-less) experience would be used for focusing on creating content that supplements the academic program. For instance, we could create purposefully diverting fictional worlds, which can then be further reflected after the gameplay in a classroom setting or in social gathering. We see that the 'realism paradigm' is preventing us from developing alternative educational games that could provide strong emotional experiences as a result of a sustainable development pipeline.

8 CONCLUSION

In this paper, we have reflected upon the design process of three academic games: *How to Play a Videogame*, *Spooky Action at a Distance* and *Cost Driver*. The design process of these games were undertaken by a single academic game designer, and their experience was captured via meeting notes, design diary entries and GitHub update commits. The reflection of the project showcased us a colourful organic process of design decisions, where some of the main dynamics centralised on the relationship between the positive force of motivation and the negative force of feature creep. In addition, the experience highlighted the issue of 'realism paradigm' and the challenge of non-intense game design projects - more unique to the developing games within the academic context. As a central contribution, we introduced the concept of 'promotypes', prototype games that would be praxiologically transparent working as communication tools when with stakeholders of the creative process in academic game development.

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