Master Degree Project

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MAKING IT PERSONAL

Interrupting the status quo of game pedagogy

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Abstract

Previous research into personal game making has found that few creators have any desire to join the game industry or monetize their works. Instead, they view their making as a form of playful self-expression where they can explore the boundaries of games. However, the status quo of game pedagogy is to provide workers to the male-dominated and technologically focused games industry. This paper proposes a new, alternative game design model that is more aligned with and supportive of personal game making. Using participatory and co-operative inquiry methods, the DREaM model (Dream, Roleplay, Experience, and Make) was developed in collaboration with individuals interested in or experienced with personal game making. The findings of the study indicate that the DREaM model provided several benefits when used as a tool to generate personal game concepts. Further research is needed to evaluate the model's impact on game development that goes beyond the conceptual stage.

Keywords: personal game making, DIY, game pedagogy, self-expression

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1 Introduction

Game making is the most popular DIY-activity both inside and outside of schools (Kafai & Peppler 2011). The popularity of games among youth and the emergence of accessible game making tools, such as Unity and GameMaker, have no doubt contributed to this increased interest. While there is little research into personal game making, it has been reported that youth view game making as an attractive activity and are motivated to make games like ones they play themselves (Aresta et al. 2021). From an educational standpoint, game making has been noted to have a positive impact on several different areas such as communication, literacy, collaboration, and critical thinking (Kafai & Burke 2015; Aresta et al. 2021; DeVane, Steward & Tran 2016; Kalmpourtzis, Vrysis & Veglis 2016). These skills are regarded as key competencies within our 21st century (McGaw and Care 2012), which has further promoted game making activities within educational settings.

There is a clear need for game education. However, developing game pedagogies that enable students to realize the potential of games is not an easy task. As in all creative work, there is no one definitive way to create. Established game making practices do not rest on proven effectiveness but on the proposals and working experiences of individual designers. (Jayanth 2021; Ibrahim, Wills & Gilbert 2010). Within higher education and in extracurricular programs, the status quo is instead to serve the needs of the gaming industry (Rouse & Corron 2020; Rouse & Malazita 2023), a multi-billion-dollar industry that continues to grow for each year. Student motivation to join this lucrative industry is often assumed from the start (Ritzhaupt 2009), in turn influencing the curriculum and how game development is taught. As the gaming industry is dominated by developing and advertising its products for a model male player, current design practices have been primarily developed and evaluated with male players in mind (Ibrahim, Wills & Gilbert 2010; Kafai 1996; Dahya, Jenson & Fong 2017; Liao, Motter & Patton 2016). It does not come as a surprise that there is a great gender and race imbalance within game education as well (Liao, Motter & Patton 2016; Dahya, Jenson & Fong 2017; Rouse & Holloway-Attaway 2022). Even maker spaces, spaces with the sole purpose to be accommodating and empower all youth to create, are dominated by white boys (Davidson & Duponsel 2021).

Instead of improving on and fixing these troubles, a better approach might be to start fresh. The idea of starting from the ground up was something I employed when I was approached by the cultural centre Stureplan to design a game making course (see appendix A for an overview. However, a fundamental challenge, both within my own course and as expressed by game makers in previous research, is to develop an understanding of the expressive opportunities of games. In this research, I examine previous game making pedagogies and the motivations of personal game developers to develop a new game design model. The aim is to provide an alternative method to game making that resists industrial practice and positions games as a means of expression.

2 Background

This section examines the frameworks, focal points and pedagogies that have traditionally been used to frame game making. This is followed by an examination of personal game making, taking special consideration to motivations and experiences tied to game making present in these communities. As several studies rely on constructionism and participatory culture in their discussions of game making, an introduction to these theories is also provided. By highlighting what skills, benefits and motivations are emphasized within educational contexts as compared to the perspectives of individual creators, it can inform how game pedagogies can align itself more closely to support independent creator's needs over the industry.

2.1 Approaches to game education

2.1.1 Constructionist learning

Pioneered by Seymour Papert, a computer scientist and educator, constructionist theory is an educational theory building on the older constructivism theory by Jean Piaget. It was defined by Papert in 1991:

> Constructionism—the N Word as opposed to the V word—shares Constructivism's connotation to learning as building knowledge structures irrespective of the circumstances of learning. It then adds the idea that this happens especially felicitously in a context where the learner is consciously engaged in constructing a public entity whether it's a sand castle on the beach or a theory of the universe that can be shared with others.
>
> Papert (1999), p. 1.

Edith Akermann, an American psychologist who worked together with Piaget, later examined the differences between constructionism and constructivism. She describes constructivism as centring around children's developing interests and capabilities, "how children's ways of doing and thinking evolve over time, and under which circumstance children are more likely to let go of—or hold onto— their currently held views". Constructionism, on the other hand, centres around the learning of learning, especially through the act of making. She describes it as concerning "how learners engage in a conversation with their own or other people's artifacts, and how these conversations boost self-directed learning, and ultimately facilitate the construction of new knowledge" (Ackermann 2001, p.1). Both theories are centred around the worldviews and growth of youth. Through constructionism, Papert's positions the act of making and understanding through artifacts as a key part of learning.

The reading and consumption of media has historically dominated media education. In *Youth, Technology, and DIY: Developing Participatory Competencies in Creative Media Production*, Kafai and Peppler (2011) examine the role of creative media production within media education. They note that theorists and educators "either held disdain for or purposefully condemned students' creative media production", in part due to a belief that such work lacked scholarly merit and a "technicist" emphasis on production skills. However, the cultural, social and technological developments that have emerged over the last decades have put strain on older models to teach and analyse media.

In a related examination of the educational potential of video games from the prior decade, Kafai and Burke (2015) review 55 studies on game making and children's learning. In their work, titled *Constructionist Gaming: Understanding the Benefits of Making Games for Learning*, the authors note that constructionist to games are "glaringly absent" despite being a "prime example" of constructionist activity. Instead, the development and research into the educational potential of ready-made games generally follows one of two approaches: either focusing on games made to be educational or commercial games that are used for educational purposes. They link this absence to instructionist motivations to have a tutor (in the form of a product or teacher) be responsible for teaching, especially when technology is involved, the technology-focused reputation video games have, and the gaming industry's protection of their copyrighted products. They note that most studies have focused on coding—ranging from programming, debugging and remixing code—while leaving out social and cultural dimensions of learning. One notable finding lifted by the authors is that constructionist gaming approaches did not raise girls' interest in STEM careers despite performing equally to boys according to a study by Robertson (2012), which is contrary to the common approach to use game making to motivate girls to take an interest in STEM.

Kafai and Burke (2015) encourage future research to be more inclusive of constructionist approaches. When making games, the learner can construct, examine and revise connections between old and new knowledge which can then be presented in the form of an artifact, bringing personal knowledge to the public. “Games require children to build representations of the world according to their understanding”, the authors write, and in turn become objects-to-think-with, allowing the immaterial to be explored through the material and become personable:

> Games require children to build representations of the world according to their understanding. The key idea here is that knowledge about the rules, worlds, and interactions is represented in a public entity—the game—and that playing and making games highlights the personal, social, and cultural dimensions of constructionist learning.
>
> Kafai & Burke (2015), p. 315

In their work, Kafai and Burke (2015) propose a framework to game learning that considers personal, social, and cultural dimensions. While their framework does not deconstruct the game development process itself, it provides a framework educators can use to account for the wide range of learning that can take place within game education. The personal dimensions refer to the academic and attitudinal outcomes that making games can provide to learners. The social dimension focuses on collaborative learning, making and appreciation, and understanding of creator for an audience. Finally, the cultural dimension focuses on gender, race and other factors impact learning arrangements and outcomes.

Several studies published after Kafai and Burke’s (2015) review have explicitly used constructionist approaches for game making. The work by Kalmpourtzis, Vrysis and Veglis (2016) is one such example. The multidisciplinary nature of games, the authors argue, can build various competencies that students benefit from both inside and outside school in an increasingly technological society. In their study, the authors used a structured approach to teach game design, meaning that students were given a complete game that they could modify, and examined how the students perceived and understood the course material. Analysis of interviews revealed that the students enjoyed the firm workflow but had difficulty to recognize

and identify boundaries and possibilities in their making. The students designed their games with the idea that there was a "wrong" and "right" implementation, which limited student creativity according to the authors.

In *Embodying empathy: using game design as a maker pedagogy to teach design thinking*, Colby (2022) examined how constructionist theory can be applied to game pedagogy to teach empathic design. Within a maker pedagogy, a teacher's authority is decentred and distributed through-out the classroom, allowing students to construct their own understandings. Games, in turn, can model and enact social theories, co-construct emotions through interactions, and position players in another life and subjectivity. By encouraging learners to make games that confront social problems, makers can involve with these problems in an embodied way while simultaneously exploring and prototyping solutions. An analysis of survey responses from teachers who had asked students to make such games showed that game making allowed the students to position themselves empathetically to social problems and explore how these systems both interact and play out. Classes were often turned into "studios" where students freely worked and collaborated on their games, teaching and supporting each other. Students skilled in programming, for example, could share their expertise and receive help from students with different skillsets. While game making acted as a valuable tool to teach emphatic design, the authors warn that it should not replace other empathy techniques.

2.1.2 Participatory culture

The rise of Web 2.0, defined by its participatory architecture and driven by user-generated content, has provided a "global space for interaction, the sharing of ideas, collective intelligence, and democratization of content" (Ensslin & Skains 2017, p.302). Within such a landscape, users are not limited to receive and share content from a select few. Henry Jenkins, an American media scholar who took an early interest in these shifts, has made significant contributions to how media can be studied in a digital age, particularly in the area of participatory culture. A participatory culture is a social and cultural phenomenon where individuals are actively engaged in the creation and exchange of media, a shift from traditional media where consumers are passive recipients. *Confronting the Challenges of Participatory Culture: Media Education for the 21st Century* is specifically made to highlight the changing role of media to educators and institutions. In it, Jenkins (2006) defines a participatory culture as the following:

1. Low barriers to artistic expression and civic engagement
2. Strong support for creating and sharing one's creation
3. Informal mentorship where what is known by the most experienced is passed along to novices
4. Members believe their contributions matter
5. Members feel some degree of social connection with one another

In the same text, Jenkins also identified several challenges to participatory cultures. These include the participation gap, which he described as "the unequal access to the opportunities, experiences, skills, and knowledge that will prepare youth for full participation in the world of tomorrow"; the transparency problem, which he described as "the challenges young people face in learning to see clearly the ways that media shape perceptions of the world"; and the ethics challenge, which he described as "the breakdown of traditional forms of professional training and socialization that might prepare young people for their increasingly public roles as media makers and community participants" (Jenkins 2006, p.3).

Video games are used by Jenkins as an example of participatory culture throughout the text to highlight the different skills required by players to participate in not only the medium but the surrounding (or in-game) cultures as well. To characterize video games as a form of participatory culture, Raessens (2005), building upon earlier works of Jenkins, separated participation into three separate forms: interpretation, configuration, and construction. Interpretation and reconfiguration denote forms of participation within existing game systems. Interpretation is the reading of a text, a "lesser" participation when compared to reconfiguration, the exploration of the unknown and "the actualization of something that is virtually, in the sense of potentially, already available as one of the options, created by the developer of the computer game" (Raessens 2005, p.381). Construction, on the other hand, is the addition of new game elements, either in the form of making new games or deconstructing existing systems. It is the most "radical forms of participation", one that only a minority engage with as it requires the capability to create and co-create permanent components to the text.

Media literacy needs to include the skills needed for participation, "writing as well as reading, producing as well as consuming", according to Jenkins (2006). In their work examining the literacy of youth game making, Pelletier Burn and Buckingham (2010) note the difficulty of applying older literacy models to study these games. Many games were only "playable" in the context they were created, in contrast to commercial games that are designed to be commodities for a market and playable in a range of contexts by a range of players. The authors argue that the legibility of the games should not be judged according to these textual conventions, but as "signifying entities". By using existing cultural media resources and transforming them into something else, the students could signify meanings to an audience of their own choosing, which could range from a closed friend group to a wider audience. Games made by the students re-enacted social relations, conveyed personal views and commentary, positioned the maker within a specific fandom, and more. The act of game making, in other words, allowed students to both affirm and play with identity.

The findings presented by Rahimi and Kim (2018) in their work *The role of interest-driven participatory game design: considering design literacy within a technology classroo*m provides further insights into the identity work that youth engage in when participating in game making. Similarly to Pelletier, Burn and Buckingham (2010), the authors argue that the literacy youth develop when from interest-driven activities, such as game making, differs from traditional ideas of literacy. The authors build on Eric Zimmerman's theories of literacy and gaming literacy. Literacy is described as the ability to understand and create specific kinds of meanings while gaming literacy is described as the ability of a person to envision possibilities with personal choices regardless of context, or "understanding and creating systems, play, and design of a game, regardless of what a game refers to" (Rahimi & Kim 2018, p. 388.) By analysing the game making activities of youth when taking part of a participatory game design project, the authors developed a framework to explain the process that could be observed (see figure 1). During game making, students explored different ideas and ways to make games as well as exploring roles and responsibilities. When the game making is interest-driven, it can in turn allow students to express and affirm their identities, bringing objects or ideas significant to themselves into the public. Development was therefore not limited to the project itself but also included personal development, observed when students took initiative and used their skills and knowledge gathered from both school and their personal lives.

Figure 1 Interest-driven participatory game design by adolescents, framework by Rahimi and Kim (2018)

2.1.3 21st century skills & STEAM

The idea that working environments increasingly require new skills of its workers, such as technological and collaborative skills within multidisciplinary, and that these skills are not being properly taught in the current education landscape is a concern shared by several major IT corporations in the U.S. Three US-based tech companies (Cisco, Intel, and Microsoft) joined forces to sponsor a multi-year international research project to address these concerns, resulting in *Assessment of Twenty-First Century Skills*. In a summary of the project, Griffin McGaw and Care (2012) write that the aim of the project was to define the skills required to work effectively in a digital age, examine current employee assessments, and propose new employee assessments that align with educational and organizational goals.

The new skills, referred to as 21st century skills, were grouped into four categories: ways of thinking, ways of working, tools for working and living in the world. While Griffin McGaw Care (2012) provide a list of specific skills (such as critical thinking, information literacy, communication and so on), they expect educators to "make adaptions depending on contexts". What constitutes as 21st century skills and which skills are emphasised, in other words, is left

open to interpretation. Of note is that research into the learning potentials of game making, such as the those described by Gee (2007), informed what the author's called "key competencies" within a digital working environment, such as problem solving and technological literacy.

A related movement that has intensified and spread recently, especially across the United States is STEAM initiatives. STEAM has been described as an evolution of STEM, existing across, between and beyond the disciplines (Patton & Knochel 2017; Liao 2016). By adding a capital "A" for Arts into Science, Technology, Engineering and Medicine, current STEM Education is re-imagined by allowing student to "think through materials", creating and connecting knowledge by the act of making (Patton & Knochel 2017). The momentum STEAM currently has builds upon the belief that future economic growth and innovation relies on STEM fields, growth that is currently stunted because of decreasing interest of youth to pursue STEM careers and issues with the current STEM education (Liao 2016). By incorporating arts education into STEM, it is argued, STEM could reach a wider population while simultaneously build 21st century skills (Liao 2016; Liao Motter & Patton 2016; Gettings 2016). Art educators have also advocated for STEAM, emphasising its potential to strengthen those within the Arts and increase the domain of art materials to include the technological and biological (Liao (2016: Patton & Knochel 2017). Despite the excitement, STEAM education has been noted to be underfunded, marginalizing STEAM initiatives (Patton & Knochel 2017). Furthermore, maintaining the integrity of arts has been a notable concern for art educators, as arts is usually made to support STEM but not the other way around (Liao 2016).

There have been numerous proposals for how STEAM can be developed into a curriculum. In a comparison of STEM and art education practices, Gettings (2016) notes that they are related and build upon similar practices. The model for scientific inquiry, for example, has many similarities to the *Studio Habits of Mind* art education model as proposed by Hetland, Winner, Veenema, and Sheridan in their influential book *Studio Thinking: The Real Benefits of Visual Arts Education* (2007). Both methods allow students to slow down, engage in detail and critically examine the subject of inquiry. Gettings (2016) proposes a set of twelve actions and goals relevant to STEAM projects, drawing inspiration from both scientific practices and art education:

1. engage in real world problems that blend STEAM disciplines
2. allow students to envision multiple possible solutions
3. use artistic thinking skills to stretch beyond initial visions
4. intentionally apply artistic design aesthetics to all challenges
5. solve design problems with originality, flexibility, fluency, and imagination
6. use media, subject matter and symbols for expression and communication
7. use materials, methods, information, and technology seamlessly and creatively
8. observe and reflect during the process and envision different solutions
9. use a high level of craft
10. develop an understanding of roles, opportunities, and careers
11. develop an awareness of royalty and copyright requirements
12. articulate and demonstrate the use of aesthetics and its impact on the result

A different proposal by Liao (2016) builds on an examination between the newer STEAM movement and the closely related and longer established arts-integrated approach to STEM. STEAM is described as the "infusion of art and design principles, concepts and techniques into

STEM instruction and learning" while arts integration is described as an approach to teaching in which students construct and demonstrate "understanding through an art form" while connecting to another subject area, meeting "evolving objectives in both". The author suggest that educators draw on the long-established practices of arts-integration, emphasising creation and production in a transdisciplinary space, "where students do not categorize what they are learning as science, technology, or art".

In related research, Liao Motter and Patton (2016) propose digital artmaking as a suitable central activity within a STEAM curriculum. According to the authors, students "who make art projects using computer code, electronics, or even the Cartesian coordinate system, inherently apply STEM knowledge and skills in their artwork" (ibid., p.29). Art making was also positioned by the authors as a suitable approach to spark the interest of girls, referencing other studies who have done the same (such as Patton 2013). The authors further encourage educators to not teach specific digital tools, instead building on a "big idea" that can materialize through digital art. Examples provided by the authors are animations and video games that explore storytelling and personal experiences, allowing students to incorporate their personal worlds into their work and build 21st century skills. The students used the MARC-framework (Move, Avoid, Release, Connect) to frame their game projects, a framework introduced by Patton (2013) in a visual self-expression focused game curriculum (see 2.3.2). Analysis of pre- and post-surveys resulted in several findings. Students gained understanding and insights in technology (both as a tool and who can participate with it), the importance of collaboration within digital media creation, and the ways technology can be used as an expressive medium. The course also had a positive impact on girls' interest in joining technological courses in the future. This is especially notable as it is contrary to the finding reported in both Kafai and Burke (2015) and Patton's (2013) studies.

2.2 Personal making

2.2.1 DIY and maker movements

The rise of do-it-yourself (DIY) and maker movements in recent years has been noted by several researchers examining participatory culture, constructionist learning and STEAM initiatives. In *Building a makerspace in a youth centre and imagining futures*, Davidson and Duponsel (2021) describe the movement as a "worldwide phenomenon":

> The maker movement, also referred to as maker culture, is a contemporary worldwide phenomenon bringing together groups of hackers, hobbyists, do-it-yourself (DIY) enthusiasts, technology start-ups, artists, designers and educators through the development, exploration and appropriation of emergent and disruptive technologies such as 3D printers, laser cutters, vinyl cutters, electronic embroidery machines, open-source electronics, programming and hacking, internet of things technologies, and other new and old technologies.
>
> Davidson & Duponsel (2021), p.1

Several aspects that Jenkins (2006) uses to define participatory cultures are defining qualities of these movements, such as the encouragement to pass down knowledge and skills (Patton & Knochel (2017), strong social connections within a supporting community (Henderson & Iacovides 2020; Patton & Knochel 2016; Colby 2022), and the "hijacking" and exploration of

existing tools to lower barriers to creation and engagement (Henderson & Iacovides 2020; Davidson & Duponsel 2021; Hurel 2016). The skills youth build by participating with media in the form of construction, such as creative problem-solving and flexibility, are skills that are highly valuable within job markets in a digital age as well as valued by individual creators. Making games is by far one of the most popular DIY approaches both within and outside of schools (Kafai & Peppler (2011). These programs, often taking advantage of the popularity video games have and the skills required to make games, have included supporting youth to build multidisciplinary skills (see Kalmpourtzis, Vrysis & Veglis (2016), encouraging girls to gain an interest in STEM careers (see Liao Motter & Patton 2016; Davidson & Duponsel (2021), and more.

The emphasis on creation shares many similarities with STEAM as well. In the work *Meaningful Makers: Stuff, Sharing, and Connection in STEAM Curriculum* by Patton and Knochel (2017), the authors position "the availability of stuff, the ability to share, and opportunities to make connections" as central to both maker movements and STEAM. The STEAM rationale of thinking through materials is therefore nothing new but has been a central aspect of DIY cultures. The authors argue that the practices of maker movement can inform STEAM initiatives and curriculum. STEAM, in turn, can support DIY culture and strengthen the bonds between the two by providing the resources to make, share and connect, key components of “a maker’s practice”:

> We see the availability of stuff, whether it’s electronic components or Play-doh, as rethinking the domain of art materials to include the technological and biological, engaging learners and educators alike with new curricular possibilities. From this expanded domain, the ability to share new ways of thinking about art materials and artmaking is part of a maker’s practice. As teachers and students are eager to share what they made, the connections between all types of makers build community through the creation, presentation, critical viewing, and discussion of making practices. Forms of connection are vital to developing meaningful making by investigating, interrogating, and reinventing making through conversations held in person, online, or in hybrid spaces.
>
> Patton and Knochel (2017), p. 42

DIY and maker movements have a long history of resistance, which according to Davidson and Duponsel (2021) is a "fine blend of wanting to exercise agency on one's environment and DIY community reactions to short circuiting global industries and commercial formulas" (Davidson & Duponsel 2021, p.1). DIY crafts frequently centre around social creativity, where "creators transform intangible relations and social bonds into reconciled, tangible artifacts—such as games—enabling an assertion of self into market-centric world spaces" (Henderson & Iacovides 2020, p.3). Participation in the form of construction empowers individuals to insert themselves into media and redefine their positions within, narrowing the gap between those who control media and those with the possibility to create it.

While diverse in its practices and often aligned with or explicitly a part of feminist initiatives, the maker movement has a strong middle-class white male image. Despite the numerous initiatives to include and empower women and minorities to engage with maker spaces, they are persistently underrepresented from a young age. In *(En)gendering videogame development - A feminist approach to gender, education, and game studies*, Dahya, Jenson

and Fong (2017) argue that it is the intersection of capitalism and patriarchy that make computer programs and video gaming spaces uninviting for girls and women. While there is no difference in the abilities of girls and boys to construct computer games of comparable complexity, there are several conditions that result in the continued disenfranchisement of girls and women, including discrimination, stereotypes, and biased beliefs of who can succeed in STEM fields. Furthermore, they point out that while there have been several initiatives to challenge this, few studies have been designed according to inclusive pedagogy and feminist practices for both boys and girls. The authors broadly define inclusive pedagogy as being "adaptable and responsive to the intersections of differences" and feminist practice as centring "the lives, experiences, and needs of girls, women, and gender nonconforming individuals toward equal participation and opportunities":

> Broadly defined, *inclusive pedagogy* refers to theory and practice in education that is adaptable and responsive to the intersections of difference (class, race, culture, gender, sexuality, ability) and aims to support learning for students with varying experiences and abilities; feminist practice in education centers the lives, experiences, and needs of girls, women, and gender nonconforming individuals toward equal participation and opportunities for success.
>
> Dahya, Jenson & Fong (2017), p. 368

In their research, Dahya, Jenson and Fong (2017) designed an explicitly feminist project supporting girls to make games while documenting the outcome for both boys and girls. The program utilized non-hierarchical pedagogy where mentors and participants worked together co-constructively to make games in GameMaker, with mentors who were mostly female, non-white and queer. By giving both girls and boys an even playing field, the researchers could study both gender differences and similarities without re-inscribing stereotypes. An analysis of surveys and games made by both groups indicted that girls and boys engaged with the making in similar ways. Girls expected GameMaker to be less difficult than male peers and expressed less fear using it before engaging in developmental work. Girls also reported more than boys that they found the tool to be enjoyable and stimulating and had a hard time stopping once they started working. Despite this, girls performed technological incompetence more often when observed by researchers. In sum, the authors encourage future studies to consider how all young people can be given adequate support to make by taking socioeconomic considerations in mind related to tools, human resources, and training. They emphasize that such initiatives "serves more than to further a neoliberal agenda of creating more videogame industry workers":

> [T]he work of interrupting gender discrimination related to videogames and education serves more than to further a neoliberal agenda of creating more videogame industry workers; rather, such an intervention offers both greater avenues for all/any young persons to enter this lucrative field of work and additionally creates possibilities for a more varied community of people to participate in the making, playing, and critiquing of creative, social, self-expressive videogame worlds. This type of engagement may support more varied and representative videogame culture in future.
>
> Dahya, Jehnson and Fong (2017), p. 372

2.2.2 Personal game making

There has been a notable lack of research into personal game making. Even though personal game making characterizes video game development outside the industry, most research has approached these developers only when it could be useful to the industry or specific programs. Beyond the scholarly field, these game developers have barely appeared in media and seem to have been excluded from video game culture at large despite a staggering number of games being made in these contexts (Hurel 2016).

An early study into personal game creation by Kafai (1996) examined the gender differences in game creation by youth. The purpose of the study was to explore to what extend the activity of making games could reveal about children's preferences, motivations, and interests of games themselves. The author takes a special interest in the relationship between girls and video games, asking if "given the choice, what kind of video games would girls produce if the design of all the features – genre, characters, and interaction – was left to them?" (p.1). The study found several gender differences between the games made, but also similarities. The adventure genre was the most common and narrative was especially popular among both girls and boys. All games reconstructed physical settings, but girls favoured familiar settings while boys made more fantasy settings. As for differences, most boys gave the player an assumed male persona while girls left the gender up to interpretation (referring to the player as "you"). Boys provided game feedback violently, something that most girls openly disliked and avoided in their games. Furthermore, few girls had "evil" characters in their games and none had "evil" as a goal in their games, something several boys had. The study concluded that, at the time of the article, "most commercially available video games do not reflect the interests and tastes of half of the game playing population, namely girls" and that in many ways, girls created in their games "their own worlds […] compensating for the sexism and violence found in many video games" (p.14). The author proposes that further projects and game making activities provide children tool kits, where children are provided with pre-made assets that they then can adapt "according to the game's needs and their desires" (p.15).

In an introductory study of amateur game development, Hurel (2016) interviewed prominent members of game making communities. Despite the limited diversity of the participants (all were European, male adults), the study provides a valuable insight into the motivations and experiences of an understudied group. While the author makes a distinction between game makers who were in the process of professionalization ("amateurs") from those who were not ("hobbyists"), the vast majority were not interested to join the industry at all. By analysing the interviews, Hurel (2016) noted several links between the act of playing and making games. The participants tended to describe their "making styles" of games similarly to their play styles. By approaching the game as a toy, these game creators extended their style of play into the realm of creation, to create their own entertainment.

A study of autobiographical games by Werning (2017) examined the expression game creators engage in when creating autobiographical video games. The author lifts that the availability of free and accessible game creation tools have made game creation feasible as a cultural technique. A cultural technique is an "operative process for dealing with symbolic worlds", taking immaterial notions and incorporates it into material things (Krämer 2003). By creating personal games, game creators can both envision and express their identity in terms of play and share it with others. This observation has many similarities to the findings of Pelletier, Burn and Buckingham's (2010) study of youth game making.

In their work *It's just part of being a person: Sincerity, Support & Self Expression in Vignette*, Henderson and Iacovides (2020) arrive at similar conclusions. The authors closely interviewed creators of vignette games, focusing on personal games over autobiographical ones to include a broader range of works and creators. They define vignette games as "encapsulated game works with minimal interactions, focused on aspects of lived experiences":

> Personal vignettes are encapsulated game works with minimal interactions, focused on aspects of lived experiences. Often created by under-represented games creators, they draw on techniques of poetry, art and theatre to tell diverse and complex stories in small spaces.
>
> Henderrson and Iacovides (2020), p. 1

Participants in the study were self-identified creators of personal vignette games, ranging from full-time professional developers to hobbyists. Nearly all participants also self-identified themselves as marginalised creators, speaking on matters such as gender, sexuality, health, and trauma. In their analysis of the interviews, Henderson & Iacovides (2020) separate the findings into three categories: 1) design through restriction, 2) design as playful creativity, and 3) design for self-expression. Design through restriction refers to the praise and preference of the participants to work "small". This included using limited game making tools, such as Twine (2009) and Bitsy (2017), and making games for a limited audience. Design as playful creativity refers to the motivations of these creators to play with and reimagine conventions of games as a medium. This included desires to go against typical imaginings of what constitutes a "game" and making as a form of playing, similarly to the views expressed by participants in the study by Hurel (2016). Design for self-expression refers to the motivations of the creators to make games for the self, with personal and unique appeal distanced from the "games scene". Participants in the study also lifted several barriers to game making. These included technical and knowledge barriers and lack of safe creation spaces. The authors emphasize the need for tools that can lowers these barriers for marginalised creators, "prioritising inclusion in creative spaces over representation, creating spaces for people to playfully engage with their own personal dialogue" (Henderson & Iacovides 2020, p.14).

Tiny Online Game Engines, henceforth TOGEs, are engines made specifically to lower the barriers to game making. TOGEs are online game making tools that are often open-source. They allow for the creation of complete games within a web browser by constraining the engine to make specific types of games, allowing all aspects of the game engine to be heavily streamlined and simplified for specific use cases. Because of the low barriers of entry for TOGEs, they have praised to democratize game making and supporting marginalised creators (Friedhoff 2013; Ensslin & Skains (2017).

In a study of the landscape of TOGEs, Warren (2019) notes that a significant number of users of Twine (2009) and Bitsy (2017) were non-binary or female, while the majority of users of the PuzzleScript (2013) tool were male. PuzzleScript heavily emphasizes programming in its interface while Twine and Bitsy centre around storytelling and worldbuilding respectively. The user interests of each tool generally matched with the design philosophy of the used TOGE: PuzzleScript developers were interested in mechanics and systems, Bitsy developers were most interested in aesthetics, and Twine users were most interested in stories. The most common game making motivations within all groups was expression and the most common

inspiration was personal experience and a desire to "create fictional worlds". Lastly, the author notes that few developers expressed any interesting in monetizing their works.

2.3 Game making frameworks

Game making is a varied practice that can be motivated and build upon different ideas and pedagogies. The canon of game making itself does not build upon on proven effectiveness or truths, it relies on the proposals of individual game designers (Ibrahim, Wills & Gilbert 2010). As a result, there are numerous frameworks that have been proposed and used to deconstruct and teach games.

2.3.1 GIF

Ibrahim, Wills and Gilbert (2010) critique existing theories and models used within game design for not taking gender preferences into account. They argue that a majority of commercial games are being designed, developed, and marketed with a male player in mind. Initiatives that have focused on girls' preferences to rectify this in turn have excluded male players. By examining gender differences in game preference and play, the authors propose a gender-inclusive framework (GIF) to both deconstruct and design games. Some notable differences highlighted by the authors is that common game elements such as winning, violence, risk taking, and punishment is not important or even disliked by girls. The framework, the authors argue, can be used as a reference point when discussing and making gender-inclusive games and useable to break down gender-inclusivity into smaller, manageable parts. GIF divides games into three parts: genre, gameplay, and content. Genre describes the type of game (such as action, simulation, RPG), gameplay describes the game behaviour (such as non-violent action, personalization, and collaboration), and content describes the aesthetic elements of the game (such as character portrayal and the storyline).

2.3.2 MARC

MARC (Move, Avoid, Release, Contact) is a framework proposed by Patton (2013) to be used as a tool for game making, criticism and gameplay with intentional overlap between them (see figure 2). By using abstract language to describe common elements in games that can also be applied to the complexity of real life, MARC is to be broadly interpreted, allowing students to understand, deconstruct and reconstruct systems while remaining inclusive to their personal lives and worlds. In an analysis of student games and pre- and post-surveys, the game making course that was framed by MARC led to students gaining a greater understanding of game systems and how they can be used as a form of self-expression. Furthermore, the students were able to connect their game making to their daily lives, seeing overlap between the two and using knowledge from one to understand the other. A notable finding is that while students gained an increased confidence in using technology and many continued to make games after the course, the students also showed diminishing interest for technological careers and courses. This is significant as it goes against the common belief and practice of using games to support STEM. It is also contrary to the result of the study by later Liao, Motter and Patton (2016), which used the same framework (MARC) for game making yet led to an increased interest in STEM education.

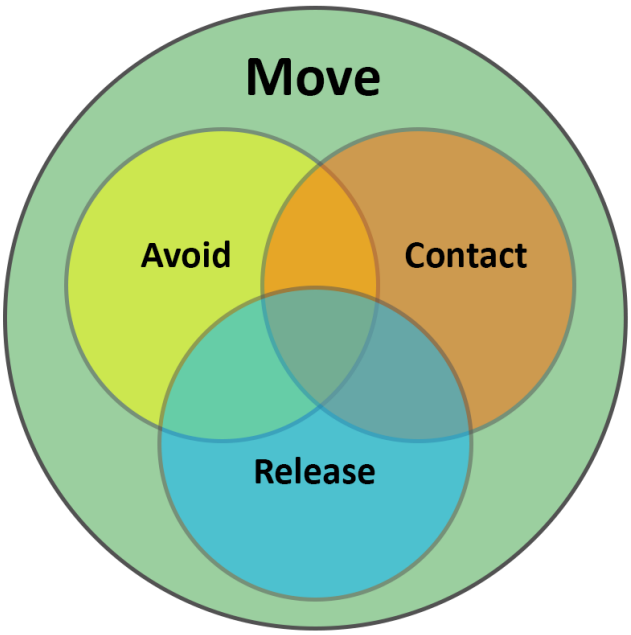

Figure 2 MARC framework

2.3.3 Structure ranges

The study by Kalmpourtzis, Vrysis and Veglis (2016), mentioned earlier during the overview of constructionist approaches of game making (see 2.1.1), taught game making to young students (ranging from 5 to 6 years). The authors identified three game design situations or scenarios that could be used:

1. A structured approach, which provides students with a complete concept which they modify and build upon
2. A semi-structured approach, which provides students with an ill-made game or set of tools based on which students build their own game
3. A free-structured, where students are free to propose games without or little external help

Kalmpourtzis, Vrysis, and Veglis (2016) research used a structural approach combined with a four-step process to game development that gradually removed external support. The first step was understanding, which centred around identifying resources, interests, and restrictions. The second step was design, where students discussed, analysed, and proposed game components and interactions. The third step was implementation, which constituted the game development and production. The last step was presentation, where students played, discussed, and critically viewed their work. While students enjoyed the firm workflow, they had difficulties to recognize the possibilities and boundaries of the tools they used.

2.3.4 Expression and structure

DeVane, Steward, and Tran (2016) discussed how expression and structure can be balanced within game education. They note that "a lack of structure may encourage creativity but

frustrate development of techniques of computation and problem-solving capacities" (ibid., p.47). By constraining development to focus on specific design tasks that incorporate aesthetics, function, and production all at once, the authors argue that it could help students see the relevance and potential applications of each skill. In their study, participants were tasked to build a racing level that was well-formed both mechanically and aesthetically. In their observations, they note that "when participants taught themselves new technical skills in programming, it was to use that capability in the expressive endeavour of game design" (ibid., p.47). The benefits of working within constraints has also been expressed by personal game makers, as noted in the study by Henderson and Iacovides (2020).

2.3.5 TOG

TOG (Technology, Ontology, Genre) is a framework proposed by Eladhari and Koenitz (2021) to challenge game designers to go against routine game design conventions. The authors introduce the term "techno-artistic minimum" to describe the technological and artistry needed for games to be understandable as a playable experience and be compared against the original vision. The challenge for game educators, according to the authors, is to develop both sides of the techno-artistic spectrum. They write that for students and teachers with engineering backgrounds, the challenge often lies in acquiring "sufficient consideration for aesthetic and experiential aspects in order to create a satisfying player experience", while those with artistic backgrounds "need to acquire sufficient proficiency to have a technological palette of options to work with" (ibid., pp.17-18). The TOG model encourages students to explore technology while setting the techno-artistic minimum as an end goal for students in their development:

- Technology is used broadly and denotes both the foundational architectural layer of game design up to the representational level. Examples include machine learning, drawing and procedural generation.

- Ontology is described as "a set of concepts and categories in a subject area or domain that shows their properties and the relations between them". All games have an ontology, the authors write, since the virtual world must be defined in its entirety which in turn determines which things exits and how they relate to each other. Examples include traffic, musical composition, and mythology.

- Game genre is genre conventions within games that impact both design choices and players' expectations. Making the choice of game genre an explicit decision in the design process helps to raise awareness of its benefits and potential pitfalls. Examples include racing, platforming, and strategy.

In their study, Eladhari and Koenitz (2021) implement the TOG model in a game making course that split the development into three phases: concept, realization, and reflection (see figure 3). In the concept phase, students develop a concept through the TOG model. This was followed by the realization phase, where students develop the artefact with the aim to reach the techno-artistic minimum. In the reflection phase, students considered their artefacts from three separate perspectives: mental model, expressive effect, and intentionality. Mental modes formed by players are identified and analysed whether these reflect the design intention of the ontology. The expressive effect is identified by analysing players' understanding of a system and its actual operation. Intentionality refers to if a player perceives agents in a system to act rationally, creating belief. Through evaluation of games produced during the course, the

authors found that those who put a strong effort into integrating ontology into the game and technology produced the most interesting projects, an assessment based on play tests conducted by students. The authors highlight that the TOG framework is not suitable to make games for public consumption, instead positioning it as a tool to make experimental works that demonstrate concepts while enabling critical reflection of its underlying concepts.

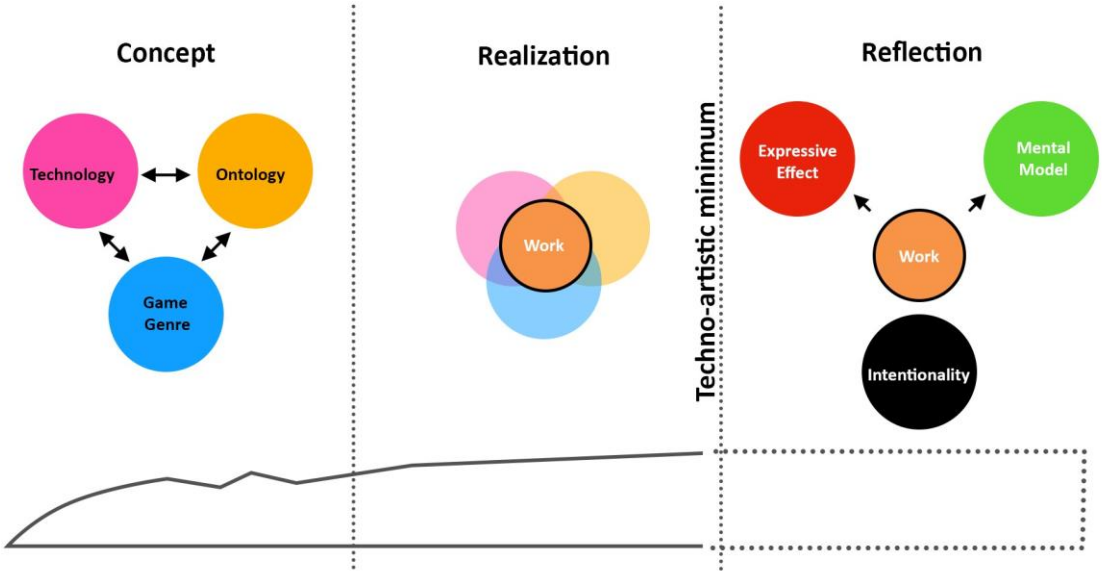

Figure 3 Implementation of TOG framework

2.3.6 Hive curriculum

In their work, Rouse and Holloway-Attaway (2022) criticise the current status quo of game pedagogy, building on their experiences as faculty members in a game development programs. As queer women with art-tech-humanities backgrounds, they write that they are often tasked to fix the problems that are the result of the troubled history and practices of STEM. They write:

> The current material form of Games pedagogy is the pipeline. It is an industry pipeline, with a long, entangled military-industrial history, designed to seamlessly produce compliant workers for the production of commercial games.
>
> Rouse and Holloway-Attaway (2022), p. 554

Rouse and Holloway-Attaway (2022) argue that fixing these problems is not sustainable. Beyond the lack of resources and value given to such work, they argue that it ultimately absolves others of the need to act and cements their roles as outsiders. They encourage future game pedagogy to not continue repairing what is broken and instead start anew. The authors propose a new game pedagogy set in opposition to the current pipeline pedagogy, which they refer to as a hive curriculum:

> Instead of training pipeline students to master a particular software package, hive students are guided to learn on their own to make their own tools. Students graduating from the hive program would not necessarily become the next Game industry stars, but would instead create entirely new industries, indeed new

> industrial paradigms, having learned the power and craft of world-building by having participated actively in their own pedagogical machine-making.
>
> Rouse and Holloway-Attaway (2022), p. 555

The curriculum, envisioned as a hive, provides multiple entry-points and paths through and within to maximise accessibility (see figure 4). Hive students would move through the curriculum in their own way, allowing students to traverse it in their own pace and take ownership of their own knowledge-making. The framework is described by Rouse and Holloway-Attaway (2022) as a living structure that can be changed from within, always capable for additions, subtractions, and revisions. As such, the authors do not propose a fixed curriculum that follows a specific order or list of content. Instead, the hive acts as an alternative approach that allows for a broader understanding of what games are, how they are constructed, and what purposes they may serve.

Figure 4 Hive curriculum

3 Problem

An overview of the findings from previous research (see table 1) makes it clear that there are both common motivations and identified challenges to game making as observed by personal game makers themselves. While game makers are driven by a common desire to use games as a playful way to express themselves, they are often met with several obstacles in their creative work. The most significant obstacles were a lack of programming knowledge and the ability to understand the expressive potential of games.

Motivations to making games	Expression & Identity	Pelletier, Burn & Buckingham (2010) Martin (2017) Werning (2017) Warren (2019) Henderson & Iacovides (2020)
	Play	Hurel (2016) Henderson & Iacovides (2020)
	Storytelling & World-building	Kafai (1996) Warren (2019 Aresta et al. (2021)
	Create games like games they play	Hurel (2016) Card et al. (2021) Aresta et al. (2021)
	Challenging perceptions of games	Hurel (2016) Henderson & Iacovides (2020)
Obstacles to making games	Understanding limits/potentials	Kalmpourtzis, Vrysis & Veglis (2016) Henderson & Iacovides (2020) Card et al. (2021) Eladhari & Koenitz (2021)
	Expensive tools/costs	Henderson & Iacovides (2020)
	Lack of safe spaces. curating audience, & managing expectations	Hurel (2016) Henderson & Iacovides (2020)
	Programming/computer knowledge	Warren (2019) Henderson & Iacovides (2020) Eladhari & Koenitz (2021)

Table 1 Motivations and noted challenges as expressed by personal game makers

As early as 1996, Kafai identified the need for game educators to provide students with game making tools. The author proposed a video-game-design tool kit, where makers "could create their own characters, design their own environments or worlds, and determine the rules of the game". While the makers are "provided with primitives in terms rules and actions", they can "adapt the parameters according to the game's needs and their desires" (Kafai 1996, p.15). Within such an environment, students are given tools and resources while still retaining creative freedom within their making. This approach was put into practice in my own game course (see appendix A for an overview). Students were given pre-made scripts, graphics, and other resources to make it possible for anyone to make a game. During class discussions where students were able to give feedback on the course, all students expressed that the tool kit was the "most useful" or "most valuable" resource they had. A student that was more experienced with programming stated that he liked that he could expand upon the tool kit himself and that it gave a good "starting point". Another student stated that it "freed" her from having to program at all, which gave her more time to do the things she wanted.

In a scenario where students are given the resources they need to realize their own game ideas, another challenge appears: How can personal game making be taught when the medium itself is almost owned by the gaming industry and its model player? This problem was highlighted by Kafai and Burke (2015) in their overview of constructionist gaming:

> Video games and the wider gaming ecology are contested spaces, and some players—often Caucasian and Asian males—claim priority in determining what qualifies as a good video game and a good player. How does children making their own games undercut such singular authority and allow for multiple perspectives as to what qualifies as good play?
>
> Kafai & Burke (2015), p. 315

This problem surfaced within my own game making course. One student described her game as "bad" because it did not have things she felt like were needed in games, such as challenge and progression. In play, her small game world was excitedly explored by the other students and received much attention, arguably more than games that were more traditional in their design. This feeling of making games "the wrong way" when it goes against gaming conventions has been noted time and time again by personal game makers. Some developers describe it as making "trash games" (Henderson & Iacovides 2020), others as "corrupting" game development itself (Hurel 2016). In other words, even if technical barriers are lowered, the problem of understanding the expressive potential of games remains.

This research attempts to develop a design model that focuses on personal making, to give these makers methods that is not concerned around the industry idea of what qualifies as "good play". As such, the model needs to allow for a broad understanding of games, be relevant to common personal game making motivations, and help both students and teachers realize the potentials (and limits) of games as an expressive medium. The aim is to provide more positive descriptions and labels than the current ones in use (such as "bad" and "trash" games) while still centring around the same motivations to game making. The research question for this study is: *How can one develop a pedagogical model to support personal expression within game making?*

3.1 Method

To answer the research question, a qualitative approach is utilized with an inductive analysis method. A qualitative method was chosen as it allows for a deep exploration of the subjective experiences and perspectives of game makers and helps uncover dimensions of game making that might otherwise go unnoticed. An inductive analysis approach was used as it allows for the emergence of new ideas, concepts, and theories based on a wide range of data. The aim of this study is not to validate existing theories or models, but to develop a new model using a ground-up approach.

The study will have two separate participant groups. The first group will participate in the project phase of this study to co-design a game design model with the researcher. The second group will evaluate the model developed by the first group. The sampling method is purposive, meaning that participants are selected according to specific criteria. All participants are required to be experienced with playing games but not necessarily with making games. As the aim of the model is to be accessible to all creators regardless of age and gender, participant diversity will be prioritized in the selection process. Experienced game makers will be recruited from game workplaces and game development schools located in Skövde, Sweden. Participants that are only experienced with playing games will be recruited through online advertisement in game-aligned spaces, contact networks, as well as upper-secondary schools located in and around Västra Götland, Sweden.

3.1.1 Project method

The project phase of this study is divided into three stages: 1) theory crafting, 2) prototyping, and 3) refinement. In the first stage (theory crafting), findings from previous research into personal game making along with my own observations from my course will be used to formulate an alternative game design model. The analysis is inductive in nature, working from the experiences of personal makers up to a theory, or model, that can unify the practices and motivations within this group.

In the second stage (prototyping), the prototype model will be presented to the first participant group consisting of personal game makers to be prototyped further. Each prototyping session will have at least two participants to aid the discussion and last approximately one hour. From these sessions, the participants and researcher will identify problems with the design model and develop new iterations. The results from one prototyping session will serve as the starting point for the next session, allowing the model to be influenced by each participant group.

This prototyping stage is based on the cooperative inquiry methods proposed by Druin (1999) in *Cooperative Inquiry: Developing New Technologies for Children with Children*. By teaming up with users and developing new ideas through iterative low-tech and high-tech prototyping, the researcher can gain a better understanding of the needs and experiences of the intended user. The researcher begins by presenting the software or prototype under study and uses it with the participant. After using the software or prototype, the participant and the researcher discuss their experiences with it. To aid the discussion, both persons use prototyping techniques to visualise the discussion and materialize specific ideas. By using "low-tech" materials (such as paper, crayons, and scissors), the researcher and participant can communicate on equal footing. Druin (1999, p.593) argues that there is no need to teach how to prototype "since using basic art supplies comes naturally to the youngest and oldest design partners". This method is well suited for this research as it focuses on the needs of its users,

using methods where both the participant and researcher learn by making. All of these steps will be used in the prototyping stage of this study.

In the third stage (refinement), the low-tech prototype developed from the previous stage will be developed by the researcher into a high-tech prototype. The model will in other words advance from paper to more advanced materials, to refine the model and make further testing easier. An example is turning paper clippings and sketches into a digital flowchart or diagram.

3.1.2 Testing method

Once the project phase has concluded, the model will be evaluated by the second participant group. Data from this stage will be gathered through qualitative semi-structured pre- and post- interviews, photographs, and observation. The raw data and participant data will be interpreted into codes that capture recurring topics and viewpoints. These codes will be applied to the whole dataset to evaluate the scope of each code and develop new codes for data that falls beyond the initial coding. This process will be repeated until the codes can be developed into themes that can be used to present the data in a clear manner.

First, participants will be introduced to the aim of the research. The study will be described as examining different ways to make and think about games and includes both experienced and inexperienced makers in its research. Participants will be asked to consent to being recorded and having photographs taken of their testing results.

In the pre-interview, participants will be asked to discuss their history and experience with games. The questions will centre around the participant's reason for playing games, their personal game preferences, their opinion of the current state of games, and more. Afterwards, participants will discuss game making. Experienced game makers will be asked what motivated them to start making games, what they are specialized in, if they are interested in personal game development, what games they would like to make, perceived barriers to game making, and more. Inexperienced game makers will be asked if they are interested in game making, perceived entry barriers, what games they would like to make, and what would help them to realize their game ideas.

Afterwards, participants will be introduced to the DREaM model. The model will be described as a prototype for alternative game design method and that the participant's role is to test and give feedback on it. The participants will also be informed that the researcher will take a more active role in the model testing and would collaborate on the steps that required a discussion between two people. This will be described as the researcher "stepping away" from their role as an observer and joining the test on equal grounds as the participant. As such, the data gathering will be conducted through audio-recordings, written notes by the researcher and participants, photographs of the test results, and observations. The participant will be guided through each step of the model and use it to develop a game idea.

Last, the participant will participate in a post-interview where they will be asked to give feedback on the model. The post-interviews will be the least structured to allow the participants to discuss the model in their own terms and to focus on their own experiences of using it. However, some questions will be prepared to steer the interviews on topic if needed (such as "What do you think are the benefits/drawbacks of using this model?" and "What were the differences between your first game idea and your second game idea?").

4 Project description

The aim of the project was to develop a game design model that can support personal game making. The project was divided into three separate stages: theory crafting (4.1.1), prototyping (4.1.2), and refinement (4.1.3). Through this iterative process, the game making model DREaM (short for Dream, Roleplay, Experience and Make) emerged. The following section provides an overview of the development process.

4.1 Theory crafting

The common practice of making games that is significant only to very limited audiences (or only the creator themselves) is a key difference between personal making and conventional game design. Current design practices, such as the MDA framework, build on the idea of conveying meaning to an imaginary player or end consumer (Card et. al 2021), which holds little use if the audience if the "end consumer" is the maker itself. Furthermore, the alternative labels personal game makers feel the need to describe their games to manage the many expectations that come with games points to the need to find alternative ways to frame games. The MARC framework (see 2.3.2) follows a similar approach of using more abstract language in place of game-specific terms. The common act of "shooting", for example, is described as "releasing" within the MARC framework. However, the verbs that make up the MARC acronym (move, avoid, release, contact) are based on common game actions, meaning that the framework is more suited to teach what games are rather than exploring what games can be.

The emphasis on "making for myself" that many personal creators often have, of "self-focused, self-reflective, playful creativity" where "games can exist as they are outside the general ideal of a game" (Henderson & Iacovides 2020) made the idea of using dreams as an allegory emerge. Dream worlds, like many personal games, often build on personal experiences and can be both meaningful or nonsensical, playful, or sombre, long or short. Just like personal games are not always legible outside the context they are made, only signifying meaning for a very limited audience (Pelletier, Burn & Buckingham 2010), dreams can similarly be conventionally ineligible but personally significant. Furthermore, the quality of games being able to position the player into "another life and subjectivity" (Colby 2022) holds true in dreams, allowing both the dreamer/player to explore different ways of being and knowing. The constant fluctuating nature of dreams and with a broad understanding of what purpose they can serve has many qualities of the hive curriculum (see 2.3.6) as proposed by Rouse and Holloway-Attaway (2022). As living structures, both a hive and a dream can be traversed in the learner's own pace and "can be changed from within, always capable for additions, subtractions, and revisions".

The concept of using dreams as an analogy of games has been done before. In *Revisiting Jean louis Baudry's Concept of the Ideological Apparatus: Linking Virtual Reality to The Dream Analogy*, Velonaki (2019) author argued that dreams were a suitable analogy for virtual interactive environments, even more so than films which it previously has been used for (such as by Jean Louis Baudry). Both in a dream state and virtual environment, the author writes that a person enters an "other world" filled with "unfamiliar objects, characters, and scenarios". The person can either choose to engage with the world and become a part of the scenario or act as a passive spectator. While both can be revisited, the first engagement can never be repeated. When the person leaves that "other world", it is "like awakening of a dream", the experience has left only a suggestion of what has been observed. Velonaki relates

this experience to the Greek work “anamnesis”, meaning a “mental souvenir or a trace of a past experience”.

Jean Piaget, whose works later came to influence constructionism, also wrote about the similarities between games and dreams in his book *Play, Dreams, and Imitation in Childhood* (1952). Both in games and dreams, children enter an imaginary world full of symbols where they can fulfil wishes, confront fears, and play. When a child retells a dream, “he arranges it in his own way and makes it more like a story with the element of play” (s.176). While games and dreams have some key differences, such as “the dreamer believes what he dreams, while belief in the pretence of play is always very relative” and “the construction of games is much more deliberately controlled”, Piaget wrote that the resemblance is still “striking” (s.176-179).

Once the idea of using dreams as an analogy was decided, pedagogical practices of using dreams for creative expression were examined. In *Psychopedagogy of Dream*, Montefiori et al. (2022) used dreams as a tool to be monitoring and facilitating intellectual and emotional development of children between the ages of 11 to 13. Building on previous research that has found that communicating dreams and drawing could act as a creative way to communicate imagination and identity for children, the researchers conducted a study where students were asked to draw out their dreams. In their study, they found that dreaming, drawing, and playing became interviewed “because the mental images of the dream are transformed into visual images which are fixed on paper”, and after being observed, “moved again in the mind”. Once the dream had been drawn, it became easier for the students to recount their dreams. The researchers concluded that drawing out dreams allowed students to develop their inner worlds, give them an ability to express it in a non-intrusive way, while able to touch upon delicate themes that would not happen in other contexts. Drawing dreams, the authors argue, “releases from the individual’s responsibility since it carries with it the presupposition that in a dream everything is possible” (p.14).

The practice of using dreams to explore inner worlds was also used in *Memories of a Girl Between Worlds: Speculative Common Worldings* by Pretti et al. (2022). Drawing on the works of Donna Haraway and memory research, the authors examine their collective childhoods and, through “dreaming, metamorphosis, and play”, resist the human exceptionalism that the author’s identified to be central to major education practices and pedagogies. They argue that by writing, sharing, re-writing dreams and memories, children and adults alike are able to explore “many kinds of worlds”, “many ways of being in the world”, and “many ways of knowing reality”. While the authors do not propose a specific method to practice this “common worlding” as they describe it, the words used to describe the various ways of exploring dream worlds (such as relating, attuning, and morphing) were identified as key words for the dream allegory.

The pedagogical methods of both Pretti et al. (2022) and Montefiori et al. (2022) were used as a basis for a model that uses dreams as a starting point for game making. In the first step, the person chooses a dream and draws it out using simple materials. In the dream, they relate to their surroundings, establishing their role in the world and the relations that exist in the world itself. The person freely explores the dream world and slowly attunes to the world, learning about how it works and how it feels. Through the process, the world, and the person themselves morph in various ways. Last, the person shares their experiences, exploring what resonates with others and themselves. Key words for each of these steps were chosen, resulting in Dream, Relate, Explore, Attune, Morph, and Share.

4.2 Prototyping

In the prototype phase, the model was introduced to the first participant group (see table 2 for an overview). The first iteration of the model was tested with four participants (two female, two male). Of these, two participants were completely inexperienced with making games, one was a game development student, and one was a professional game designer. The results from these testings were combined to make a second iteration of the model. This second iteration was tested by two students from my game course (15-year-old female and 18-year-old male). Participants partook in the development according to their own capabilities, taking notes and making observations in their own methods. During the development, I made quick written notes to record specific quotes and took photographs[1]. All prototyping sessions were guided by the method described by Druin (1999), where the researcher talks naturally, "free from note-pads, and becoming part of the active experience" (p.594), where all parties involved co-operatively gather "data, initiate ideas, test, and develop new prototypes".

	Gender	***Age***	***Game exp.***	***Dev. exp.***	***Proto. phase***
A	Female	25	Moderate	None	First
B	Male	23	Much	Student	First
C	Female	21	Little	None	First
D	Male	23	Much	Professional	First
E	Female	15	Little	Student	Second
F	Female	18	Moderate	Student	Second

Table 2 Group 1 participant gender, age, game experience, game development experience, and the prototype phase they participated in

4.2.1 First prototyping phase

In the first prototyping phase, the initial model (as outlined in 4.1) was used as a starting point and tested by participant A, B, C, and D. Each step of the model was cut into a separate piece to make the addition, re-arranging and discarding of pieces possible (see figure 5 for a digital recreation).

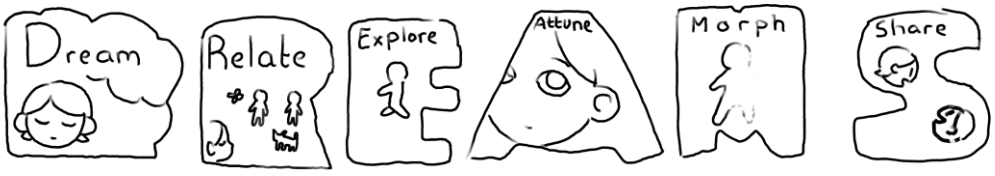

Figure 5 First iteration of the model

[1] Photographs and notes were taken with consent, with additional parental consent from design sessions that included minors.

All the people that took part of this process found that using dreams were an interesting starting point and wanted it to remain a part of the model. Participant B suggested that memories could act as a suitable replacement, but participant C found that approach to be "too open". Participant A felt that "Attune" and "Relate" were similar and was all part of the "whole experience". The "Share" step was viewed to be a part of the whole process by all participants. All participants used the "Morph" stage to discuss how they would "morph" the dream into a game. Finally, all participants found that retelling or roleplaying their dream was what was the most helpful to them, along with drawing out the dream.

4.2.2 Second prototyping phase

Based on the feedback from the previous prototyping sessions, the model was simplified. The Dream step was kept but the rest were changed. As the roleplay-aspect of the activity was well received, the next step was changed into Roleplay. The relate and attune stages were combined into Experience. The sharing was removed from the model as the sharing was part of the whole activity. Last, morph was changed into Make as all participant enjoyed discussing how they would make and translate their dreams into games. The result was a model in four steps of (D)reaming, (R)oleplaying, (E)xperiencing (a)nd (M)aking. While the drawings made to represent each step made the initial introduction to the model easier, the drawings were removed to encourage participants to discard pieces more freely. Each step was instead represented by a keyword written out on a paper cutting (see figure 6).

Figure 6 Second iteration of the model

The updated DREaM model was introduced to participants E and F, two students from my game making course. The students followed the steps of the model, which was once again presented as a low-tech prototype. The students seemed to enjoy using the model and were excited to share their dreams (see figure 7 for an example drawing). Participant E jokingly said that they wanted to "steal" the dream of another, which was encouraged and appreciated by the original dreamer. The same student noted that drawing her dream made it easier for her

to find “what I want to spend time on”, or what parts of the making was the most enjoyable. During the prototyping of the model itself, both students pointed to and picked up the paper cuttings that represented each stage to aid their discussion. For example, when a student talked about how she wanted to make her dream into a game, she picked up the “Make” paper cutting.

Neither wanted to make any changes to the model, but instead discussed how it would be best put into practice. Participant F said that if he would teach game making to someone else, he would first let the person use the start kit “to play around and get a feel of what’s possible” and then use the DREaM model to brainstorm ideas. The other student suggested first introducing students to the model catch the “big ideas”, then introduce the start kit where students follow step-by-step instructions, and then use the model again. The student explained that in that way, they will have two different options, where the first idea “could be anything” while the second “is made when they know more about the tools” available to them.

Figure 7 Dream drawing by participant E, made during a prototyping session

4.3 Refinement

At this stage, the prototype was determined to be ready to be refined into a high-tech prototype. The steps from the second iteration were sorted into a table with a short summary and explanation of each step (see table 2).

(D)ream	Choose a dream & draw it
(R)oleplay	Retell the dream in your own way
(E)xperience	Describe your experience & take part of others
(M)ake	Materialise the dream world into a game world

Table 3 Refinement of the model

First, the person chooses a dream. The dream can be a real dream, a memory, or a different world. The world can be familiar or alien, violent or peaceful, meaningful or nonsensical. They

can experience the dream as themselves, as someone else, or something else. To be able to convey the experience of a dream to someone else, the dreamer must provide an entry point to that dream world and retell it in their own manner. This entry point is made through drawings. The dream can be portrayed in whatever manner they choose, whether it is as a comic, one big drawing or many. The drawings can be elaborate or simple., and can portray different locations of the dream, the characters, or a memorable scene. Once the dream has been drawn, it moves from the inner world of the dreamer into the public. The dreamer then roleplays, or acts out, their dream to someone else. In their storytelling, they can use gestures, do voices, point to different parts of their drawing, or whatever comes naturally to them. This allows the dream to be "moved again" (Montefiori et al. 2022), but this time experienced by an audience. After retelling their story, the dreamer and the listener share their experiences of the dream. Through sharing what resonated with them in the dream, different meanings and interpretations of the same dream can be brought out. Something that can feel tragic or confusing can feel entirely different for the dreamer. Through sharing and exploring different parts of the dream, the subjective experience of different worlds and stories are brought to the front. In the process, both can also examine their personal relation to the contents of the dream itself, unravelling and exploring emotions, memories, and associations.

To convey these feelings and experiences to others, the dreamer then must materialise them in some way. Here, the dreamer turns into a maker. The maker, using the tools and materials available to them, starts making a game world. Through playing their game, they can compare the experience of the game world to that of their dream world. The maker makes decisions, makes stuff, makes meaning, until they arrive at a functional interactive "sketch" (Warren 2019). As they continue their making, the game world will take a life of its own, either aligning with the original dream world or metamorphosing into something else. Throughout the process, the maker repeats the dream steps, of entering and dreaming in the world, taking roles and playing it out, experiencing new feelings or amplifying existing ones, following by "an immediate need to say or make something" in an "impulsive design practice of making" (Henderson & Iacovides 2020).

Applied in a course, the model could be used as an introductory activity. It would allow students to get acquainted with their classmates, able to share their inner worlds and take part of others in a non-intrusive way (Montefiori et al. 2022). In the words of a student, by placing it at the start of a course the model could be used as an exercise to express "big ideas". At this stage, the Make step can be loosely described, depending on the student's own knowledge of game development. Afterwards, students would be introduced to a game making tool kit, where they are given step-by-step instructions to make a small, interactive prototype. After acquainting themselves with the tools available to them, they would use the model again. This time, the Make step would be used to describe how they would use the tools available to them to make the dream into a game. Other students could give their own suggestions of how they would solve certain problems and translate the dream experience into a game experience.

This method of entering imaginative worlds and exploring in an unpredictable way retains the exploratory worlding as described by Pretti et al. (2022). Both their research (of weaving together childhood dreams and memories to write collective biographies) and the DREaM model (of using dreams as a method of finding and telling stories) could be seen as speculative fabulation in practice. Speculative fabulation is a concept by Donna Haraway, who describes it is a "mode of attention, a theory of history and a practice of worlding" (Haraway 2016). Speculative fabulation is thinking as well as making practice, a method of imagining new

worlds that are different from our own in creative uncertainty. Such a method requires one to be present, open to unfinished configurations of places, times, matters, and meanings, by remaining open to alternative ways of thinking, being, and knowing (Pretti et al. 2022). According to Haraway (2016), the use of the word fabulation over narrative is a deliberate choice, as the connotations of the word "narrative" are not as open:

> What I mean by speculative fabulation is much more closely tied to the everyday storytelling practices of storytellers, who aren't all writers, who aren't all professionals, but in the way mothers and fathers tell stories to their children or the way someone tells the story of their life to a reporter.
>
> Donna Haraway, 2016 (transcription)

To better incorporate this speculative thinking process into the model, the model was reimagined as an iterative loop (see figure 8). The model begins with a dream which, through the repeated process of roleplaying, experiencing, and making, solidifies into a game. The looping represents the idea that the original dream can be re-imagined and re-visited during any point in the making process. The making process might reveal unfinished configurations of the dream or require an expansion of what was originally imagined. In these cases, the maker can revisit their dream and, through their newly acquired experience, can dream new possibilities for their game. This emphasises that the dream is a living structure which can, through change and iteration, take on the structure of a game.

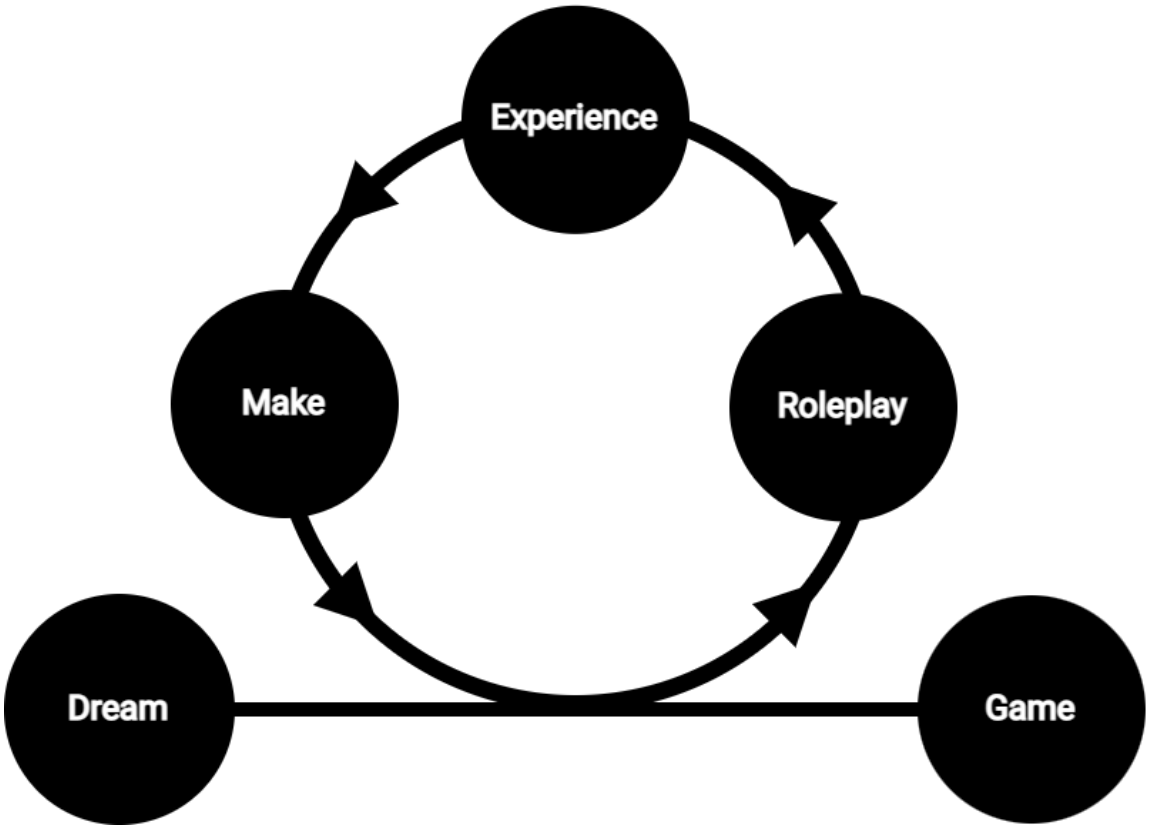

Figure 8 Final version of the DREaM model

5 Analysis

Eight people in total participated in the evaluation of the model. Table 4 below contains a full overview of the participants. Four participants were female, three were male, and one was non-binary[2]. Three participants were experienced with game development (one professional, one student, one hobbyist), two participants were knowledgeable about game development (through acquaintances or own interest) but had not made games themselves, and two participants had little to no knowledge about game development.

	Gender	***Age***	***Game exp.***	***Dev. exp.***
G	Female	53	Little	None
H	Male	26	Much	Informed
I	Female	17	Much	Student
J	Female	26	Moderate	Informed
K	Male	21	Moderate	None
L	Female	17	Little	None
M	Male	23	Much	Professional
N	Non-binary	23	Much	Hobbyist

Table 4 Group 2 participant gender, age, game experience, and game development experience

Each session lasted between 50-75 minutes. All were held in person to allow the participant and researcher to communicate and prototype using crafting materials. Each session was conducted at a table with the participant and researcher sitting opposite from each other. Beyond the paper, scissors, and pens available on the table, the researcher had access to a laptop to record and take notes. The DREaM model (see figure 8) was drawn on a piece of cardboard and was revealed after the pre-interview had concluded. Each step was introduced individually. The purpose of presenting the model as a low-tech prototype was to emphasise to the participants that the model was a work in progress, as well as to allow the participant to interact physically with the model during the discussions.

The following sections provide an analysis of the pre-interviews (5.1), model testing (5.2), post-interviews (5.3), and comparisons of game ideas developed with and without the model (5.4). Appendix B contains a more detailed summary and quotes from each testing session and appendix C contains all the dream drawings made in the model testing.

[2] This participant was comfortable with all pronouns but referred to themselves with they/them-pronouns, which will also be used in this text.

5.1 Pre-interviews

Analysis of the pre-interviews generated two themes. The first theme relates to the participant's own relationship and history with games (5.1.1), often discussed early in the interviews. Topics include how the participant first got interested in games, their current game habits, as well as their view on games today. The second theme related to game making. As the discussions related to game making differed substantially based on participant experience, these themes will be presented separately: making games from the viewpoints of inexperienced makers (5.1.2), and making games from the viewpoints of experienced makers (5.1.3).

5.1.1 Relationship and history with games

As the participants were all required to be experienced with games in some form, all participants were able to discuss their history and introduction to games with ease. Common reasons for getting into games was being introduced either through friends or family. For example, participant I recalled that both her close family and relatives played games throughout her childhood, which made games a natural part of her upbringing:

> Games become something you can bond over and talk about. If you enter the gaming bubble, it becomes difficult to leave it.
>
> Participant I

G, K and L were the participants that played games the least. For these participants, games acted as a mainly social activity, meaning that they played games almost exclusively with friends and family. Participant K and L played more when they were younger and regarded time and a lack of interest as the main reasons for why they started playing less once they got older.

When asked to go into more detail about their own personal views and opinion on games, many participants (G, H, I, J, and N) mentioned a dislike for the gaming industry. Of these, all but one (H) identified as female or non-binary. They highlighted several common issues, including poor working conditions, an excessive focus on profits, and a lack of variety in the games produced. The industry's effect on games made some feel completely detached from mainstream games:

> The industry feels super capitalist and toxic. [...] There are so many games made, but mainstream games just do not interest me.
>
> Participant J

This finding can provide some additional context into the findings of Warren (2019) and Henderson and Iacovides (2020). Both studies observed a lack of interest in joining the gaming industry and monetising games among personal game makers that were composed of mainly marginalised creators. This parallel suggests a shared sentiment among these participants regarding the industry's appeal and commercialisation, highlighting a preference for exploring games outside the industry.

5.1.2 Making games, from the viewpoints of inexperienced makers

Participant G, H, J, K, and L were completely inexperienced with making games. However, H and J stated that they were relatively informed about game development and had insights into

how games are both designed and developed. Both H and J had been exposed to game making through friends and family that were active within game development, and H had further gained knowledge through own research.

G, H, and J had a great interest in discussing game development, were interested in trying it themselves, and could easily share their own game ideas. G was inspired by the interactivity and graphics that games can offer, H was motivated to make games that he would like to play himself, and J was motivated to make games as a form of expression. These motivations align with common motivations found among personal game makers, as identified in Warren's (2019) study. This alignment of motivations highlights the applicability of using the experiences and motivations of personal game makers as a guide to engaging a broader audience in games. It suggests that the perspectives and motivations of personal game makers can serve as valuable insights for understanding and attracting individuals who are interested in exploring game development and creating their own games.

On the opposite end, K and L were not interested in making games at all. The two participants had difficulty discussing what kind of games they would like to make themselves and were not interested in game development in general. When asked about what kind of game they would like to be made at all, both mentioned that they wanted a sequel to a game series they had played in the past. Participant L mentioned a feature that she wanted added (online functionality) while participant K only wanted "more" of his favourite game. This finding further reinforces the findings of Hurel (2016), Card et al. (2021), and Aresta et al. (2021) regarding the influence of existing games on personal game making. All three studies found existing games to be common motivations to game making. While these participants were not interested in making their own games, their responses reinforce the idea that existing games can shape preferences and expectations in the gaming community.

Participants that were inexperienced but interested in making games (G, H, and J) pitched their own original game ideas. G pitched a garden simulator game, citing an existing simulation game as inspiration but also providing key differences between the game concepts. She connected the game idea to her own line of work, saying that games have untapped potential to be used more within workplaces. H was similarly inspired by an existing game and pitched a character driven action game. He wanted to make a game he would play himself and would be driven to make the game as "fun" as possible from his own point of view. This is similar to the style of making explored in Hurel's (2016) study, which also found that many personal game makers were driven to extend their personal playing styles into their making. Notably, both participant H and participants in Hurel's (2016) study were males. Last, participant J wanted to make a simple story-based game where the player explores a small world in their own pace. She was motivated to make a simple game to "learn the ropes" first.

When asked about what stopped these participants from making these game ideas, all mentioned technical knowledge as the largest obstacle as well as needing to come up with "good ideas". This aligns with the problem identification of this study (see section 3) which also found technical knowledge and the ability to understand the expressive potential of games as significant entry barriers to game making. Participants G, H, and J mentioned that a game making course focused on beginners would greatly benefit them and lower the technical barrier. G lifted that while she enjoyed discussing games "in theory", she found that it was a "sensitive" subject, especially for those that were more experienced with game making. This

further emphasises the problem of games being contested spaces, as argued by Kafai and Burke (2015).

> When you discuss game ideas, it tends to get sensitive… And my ideas often get ripped to shreds. [laughs]
>
> Participant G

5.1.3 Making games, from the viewpoints of experienced makers

Participant I, M, and N were experienced with making games. I was studying game development, M was a professional game programmer, and N had both studied games and developed games in their free time. M had studied game programming in the past and was currently employed as a game programmer in a midsized game company. For M, game development provided him with interesting problems to solve. He found inspiration mainly in existing games. His emphasis on the problem solving of games align with common arguments for game making, such as its ability to hone critical thinking skills and technological literacy (Liao, Motter & Patton 2016). For participant I and N, game making was a form of creative expression. Both mentioned finding inspiration from their personal life, art, psychology, and games, being motivated to explore and share these topics through game making. Their descriptions resonate with constructionist making, namely that topics and knowledge from a learner's personal world can be explored and brought into the public through the act of making (Rahimi & Kim 2018).

When asked to share a game idea, all three could pitch a game with ease. Participant I pitched a story-based game that explored the social dynamics of a friend group. She lifted several existing games as inspiration sources but was mainly inspired by her interest in psychology. M pitched a puzzle game with advanced physic simulations. M also lifted existing games as inspiration but was mainly motivated to make the game as it would be fun to develop from a technological standpoint. Finally, N pitched a "cinematic platformer game", also inspired by an existing game.

When participants were asked about barriers to game making, an obstacle mentioned by all was a lack of time. However, upon further exploration, it became evident that there was a clear division in responses based on the participants' self-identified "field" within the realm of games. Participant M, who did not consider themselves an "artsy" developer, expressed more comfort in technology than in art. On the other hand, participants I and N felt limited by programming and exhibited greater comfort in the artistic aspects of game development. This division reflects the findings of Eladhari and Koenitz's (2021) study, which revealed that participants with primarily technological backgrounds, such as engineering, often faced challenges in the aesthetic and experiential aspects of game development while participants with artistic backgrounds often lacked technical proficiency. When asked what they believed stopped people in general to make games, programming was once again lifted as a significant barrier. M noted that despite the large number of free resources available for learning games, there is a lack of quality learning resources:

> There is so much material available, free materials… But a lot of it is amateurs teaching amateurs. In the beginning, I found programming difficult. […] They teach how to write specific scripts, not how to program. You don't learn the concepts.
>
> Participant M

5.2 Model testing

The following section will provide an analysis of observations made during the model testing. To give further insights into how participants shaped their dreams into game ideas, three participant dreams and their process are described in detail. The samples were selected to showcase the process of participants with varying experience levels with game making. The first two examples detail the process of an inexperienced maker that identified as male (5.2.2) and female (5.2.3) respectively. The last example details the process of an experienced maker (5.2.4) that identified as male. Appendix C contains further details about all participant dreams.

5.2.1 Observations

The model was presented as a method to "think about and design games" using dreams as a starting point. Each step was introduced individually to allow the participants to follow along with its structure and ask questions as the test progressed.

When asked to draw a dream, several participants were surprised and mentioned that they often do not remember their dreams. Despite this reservation, all participants were able to quickly choose a dream and start drawing. Some participants spent considerable time drawing (up to 20 minutes) while others were finished within minutes. While all had access to several sheets of paper and scissors, none opted to use them. Instead, all participants made their dreams using a single sheet of paper and coloured pens.

Interestingly, there was a noticeable mood shift that occurred when the participants started drawing. During the pre-interviews, the mood was generally pensive in nature, with few participants going off topic. When drawing, almost all participants started laughing and smiling, telling jokes and reminiscing about their dream and what caused it. This was the case for participant L. She was reserved during the pre-interview and had difficulty answering some questions as she was not interested in making games. When drawing, L shifted completely in her demeanour and became more energetic. She could easily answer the questions that followed and showed considerably more interest in the rest of the testing.

After finishing their drawing, the next step of the model was introduced. Participants were asked to roleplay, or retell, their dreams to the researcher. While telling their dreams, many participants used voices, gestures, or pointed to various parts of their drawings to enhance their storytelling. This was especially the case for participants that had humorous dreams, such as participant H and J.

Participants that described their dreams as nightmares were K, M, and L, whose dreams included giant evil toys, accidentally dismembering an arm, and a monster in an elevator. Participant G, I, and N described their dreams as melancholic or stressful. G's dream showed her childhood home in ruins which made her think of her own place in life and question where she belongs. I's dream included an ocean of kittens that she had to round up without hurting or killing them. N dreamt of a tower that became more ruined the further down they went, which they described as a "liminal space". The participants that had mainly humorous dreams were participant H and J. Both these participants had dreamt these dreams recently. H dreamt seeing a famous radio host on a train and seeing her acting completely different from how she appeared on radio, and J dreamt of her friends conspiring to kill her with a walnut salad.

Afterwards, participants were asked to detail their experiences of their dream, both when dreaming it originally and when revisiting it in the test. Most participants detailed personal events that had caused or influenced their dreams. For participants with humorous dreams, this gave some comedic context and allowed the researcher to "get in on the joke". Participants with stressful dreams or even nightmares could provide context for why their dreams originally upset them and understand nuances to the real-life scenarios or location that many depicted. For G and N, they could go into further detail about why their dreams invoked melancholic feelings in them. For G, the dream explored difficult topics that were important to her waking life. For N, the dream depicted an environment that caused feelings that were difficult to convey in words, relying mainly on their drawing to convey the "liminal" space that the dream captured.

The experience step marked the point when the researcher joined in on the discussions and started collaborating with the participant in their creative process. While this would ideally have been conducted by a separate researcher to allow another researcher to act as an observer, the limitations of this study required the researcher to act as both an interactor and observer. In the experience step, the researcher provided her own experience of each dream and connected it to her own personal experiences and dreams. For example, in the case of participant N, the researcher could connect N's dream about an endless tower with a dream of her own. This sparked a discussion about the shared experiences of climbing stairs and the feelings it can invoke. Another example was for participant I, who dreamt about an endless ocean of kittens. The researcher could relate to the absurd but still stressful feeling of the dream, providing an example of a dream with a similar tone. This also sparked a discussion about shared experiences, this time related to growing up in a rural environment and taking care of kittens. This repeated itself in all participants, with the researcher able to connect to the dream content through her own experiences which in turn provided a connection between the researcher and participant. This process has many similarities with the common worlding described in the study by Pretti et al. (2022), which also used dreams and personal experiences as a method to bridge the inner worlds of different individuals in order to find and explore common worlds. In both studies, this process was often intimate and allowed the people involved to explore their own pasts in collaboration with others.

In the make phase, participants were asked to transform their dreams into game ideas. The discussions from the experience stage were often carried into this stage, used as a method to evaluate the game idea. For example, participant G's dream about seeing her childhood home in ruins sparked a discussion about personal life choices and regret which in turn were explored in her game idea. Another example is participant N, whose dream about the endless tower sparked discussions about shared experiences of seemingly mundane environments. Their game idea in turn relied extensively on environmental storytelling with a goal of capturing the liminal dream space within a game environment.

5.2.2 Example 1: Participant H

H started laughing immediately when asked to draw a dream. He was able to choose a dream relatively quickly and could easily start drawing it out. Once finished, he commented that his drawing was "so stupid, but it'll have to do." Figure 9 shows a scanned version of the dream drawing, made using ballpoint and fibre pens.

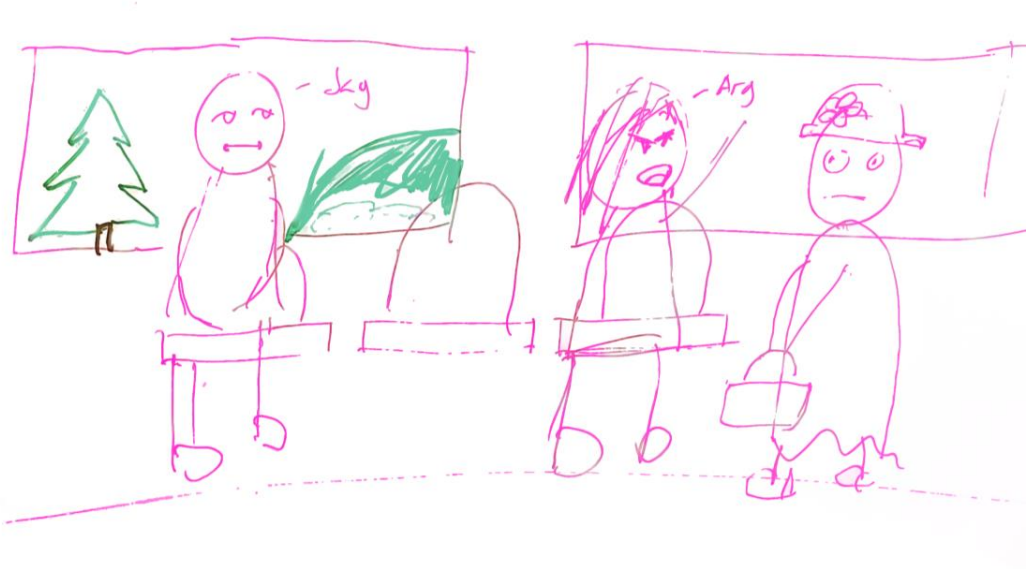

Figure 9 Dream drawing by participant H

In the next phase, H was asked to retell the dream. Once again H started laughing and said that the dream was "stupid", but happily shared it to the researcher:

> I was on a train on my way to Gothenburg for some weird reason. I was sitting there when I saw Titti Schultz. If you don't know who she is, she is a radio host for a program I always listen to. Anyway, I saw her screaming and being angry at an old lady! I didn't know why! I was just sitting there awkwardly, thinking 'Is this how she is in real life?' (laughs) And that's my dream.
>
> Participant H

When asked to share his experience of the dream, H related it to his everyday life. He mentioned that his line of work means that he listens to radio a considerable amount of time each day, making the radio hosts become a natural part of his life. The dream felt like a "snapshot" from a slightly different reality, something that could possibly happen. The researcher agreed, commenting that there is just enough familiar elements in the dream to make it easy to believe when dreaming, which makes the absurd parts stand out more. H nodded his head, saying that the dream felt "incredibly real" despite it making little sense.

In the make phase, H said that he knew "exactly" what kind of game he would make:

> I know exactly what I would make. You play as a random nobody on a train. The game ends when the train arrives at the last station when everyone gets off. Before that, you can walk around in the train, talking with people and learning their stories. And you can help people, like one might have dropped something somewhere on the train, and if you help them it can lead into a different side story. Oh, this is fascinating! The game would have different paths, depending on what you do and who you talk to. In one path, the train might even crash! And since everything takes place on a train, it becomes easier to make since you can constrain everything to a pretty small area.
>
> Participant H

After H hade pitched his game idea, both the participant and researcher continued discussing and brainstorming ideas for the game. The researcher said that it would be interesting if you could tell how much time there is left before the train arrives at the station by looking out the windows and estimating where the train is based on the landscape outside. H liked the idea and said that there could be numerous indications on how much time is left before the train arrives instead of just having a timer on the screen, such as through voice announcement and character dialogue. H mentioned that he wanted to have a mysterious character that is difficult to meet on the first playthrough. The researcher joked that they might sit on the toilet on the whole ride, which the participant liked and wanted included.

5.2.3 Example 2: Participant J

J was at first unsure what dream to choose, but once she started drawing, she was able to finish it quickly. While drawing, she laughed and said that "I'm not sure if I can draw at all now". Once finished, she said that the dream "might not be the funniest, but it's the one that came to me." Figure 10 shows a scanned version of the dream drawing, made using fibre pens.

Figure 10 Dream drawing by participant J

When asked to tell their dream, J recounted the dream using gestures and voices, laughing almost through-out:

> I was visiting a family. The mom had cooked some food, made a salad. And it had walnuts in it! [laughs] And when I ate it, I thought, "Not this shit again", because this had happened before! The son was the one who gave it to me, and he had an evil smile on his face. [laughs] He was like, "Hihi, you will die", and I was like, "Huh?!" And the mom was in on the conspiracy!
>
> Participant J

In the experience phase, J explained that the family in the dream had given walnuts to her in real life, not realizing that she was allergic. The dream was in other words based on a real situation. Despite her being poisoned by family friends, she found the dream to be "pretty

chill", with her mostly being confused on why they were trying to murder her. The researcher said that the "normalness" of the dream made the murder much more terrifying since it became easier to believe. J agreed but pointed out that she almost always believes her dreams while dreaming.

Turning the dream into a game idea was difficult at first which resulted in the researcher and participant brainstorming ideas together. The participant lifted the idea of a simple action game where walnuts act as a "kryptonite" against the main character who is allergic. The researcher pitched an idea for a game where the player has to figure out which foods contain nuts and which do not through various means. Both returned to discussing the experience of the dream to find what was the most intriguing component of the dream. For both, the mystery of why the family tried to murder J was the central component. From this, participant J pitched a mystery game parodying classic detective stories:

> You are trying to figure out why the family would do something so evil. The twist is that the "murder mystery" is actually just misguided kindness. The family has a traumatic backstory of someone close to them dying of an allergic reaction. They don't want it to happen to me, so they are trying to "cure" my allergy by giving me walnuts. They are trying to make me stronger.
>
> Participant J

5.2.4 Example 3: Participant M

Participant M said that he usually does not remember his dreams, but one dream in particular stood out to him. He was at first unsure how to draw it, saying that he "doesn't know how to draw". Once he came up with the idea of drawing it like a small comic book the drawing process went by quickly. While drawing he commented on various elements of the dream, providing context to what he was drawing and trying to make him remember more details. Figure 11 shows a scanned version of the dream drawing, made using a pink ballpoint pen.

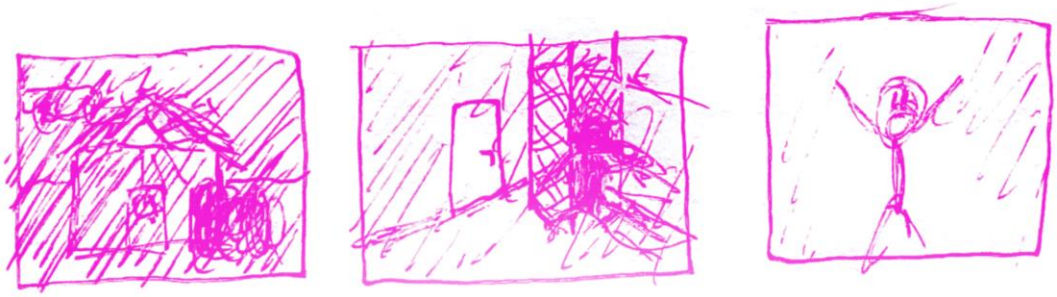

Figure 11 Dream drawing by participant M

When telling their dream to the researcher, the participant used full-body gestures and pointed to various parts of their drawing:

> I arrived at my grandmother's house. It is dark outside, just after sunset, I think. There was a bright orange-red light coming out of the window at the top floor. [points to the first panel] Once I stepped into the house, I realized that the roof was suddenly incredibly high! [stretches out his arms] It was hot inside and there was orange light everywhere. I had no idea where grandma was, she was nowhere to be seen. Everything was familiar, but so different. In the middle

> of the hallway there was an old elevator. It looked old, like it was made in the 60's... metal net and fence around it. You couldn't see the top of it. Then I see something coming out of the elevator. It was a giant monster. I can't remember how it looks like anymore. I was terrified, and then I woke up.
>
> Participant M

In the experience phase, M described the dream as being uncanny. The locations of the dream were familiar, a place that M had been to many times, but morphed into something unfamiliar. The researcher pointed out that relative homes often feel both familiar and distant, capable of changing between each visit. M agreed completely, saying that the house often changed in some form for each time he visited since he lived far away from her, which might have influenced the dream. He found that the slightly morphed locations and persons in dreams can be uncomfortable, and this dream was just one example where it was taken to the extreme. M also mentioned that while drawing, he could remember additional details of the dream. One detail he had forgotten was that the house almost looked like a factory, which made the elevator fit in more with the rest of the dream.

In the make phase, M was quickly able to pitch an idea for a game, turning the dream into a horror game:

> It would be a horror game, indie horror game. You would need some background to get to know the "normal", learning how things should be. So you would have a storytelling part where you meet grandma and visit the house, learn the locations and settings. And then one time, everything is just completely different. And you have no idea why. And you know grandma is not part of it, because you trust her and know her. That's why you go into the house, because you want to find her, and save her from whatever has happened.
>
> Participant M

5.3 Post-interviews

Analysis of the post-interviews generated three themes: exploring boundaries (5.3.1), expression and connection, (5.3.2), drawbacks of the model, (5.3.3), and game discussion (5.3.4).

5.3.1 Exploring boundaries

Almost all participants said that the model expanded their view of games and its possibilities. Participant G, for example, noted that it made her realise how "barren" games are in their content state and that her game demonstrated one exciting possibility that can be made. Participant L, who initially did not see herself as a "creative person", mentioned that the model broadened her view of creative work in general and expressed a desire to use it in future projects. Participants G, H, J, K, L, and M emphasised that the model enabled them to generate game ideas that were not reliant on existing games. Some participants, such as H and J, believed that using other inspiration sources than games lead to more unique ideas since it is not "just a copy of something". For Participant K and L, looking outside of games was what allowed them to come up with game ideas at all:

> If you just asked me to come up with a game idea, it wouldn't have worked. Before, I could only think of games that exists, and copy them. I never thought I could have come up with my own idea.
>
> Participant L

Among the participants, I and N were the only ones who did not feel that the model expanded their view of games. However, for both participants, the model resonated with their existing or desired approach to game making. For instance, participant N mentioned using dreams as inspiration for their games, with their current project revolving around dream-like locations. The model provided them with a practical framework for structuring their game development process, which was also appreciated by participant I.

The use of dreams as a starting point for game ideas was seen as a contributing factor to expanding participants' perspectives on games. Participant K theorized that people generally remember "the interesting and crazy dreams", so using dreams as an inspiration makes the game idea "automatically interesting and crazy". Participant I jokingly said that she "never could have come up with a game like this when awake" but now needed to make it into a reality. Participant M regarded himself as "tech" person and was surprised that he could come up with "something artsy, something with a story" through using dreams. This realization led him to believe that he could create games of different genres and styles, broadening his game-making capabilities.

5.3.2 Expression and connection

Beyond generating unusual ideas, using dreams encouraged many participants to explore personal topics and themes. This aligns with the findings from Montefiori et al. (2022) which found that dreams could act as a non-intrusive means of bringing personal matters into educational contexts. It also aligns with the study by Pretti et al. (2022) which found that sharing and exploring dreams in a collaborative manner can allow individuals to connect to their own pasts, presents, and futures.

All participants could relate their dreams to personal life events, which, in turn, influenced the games they developed based on their dreams. Participant I noted that the model made her think about "how much inspiration you can take from all around you, even things that just pass by". For some participants (such as participant G, L, M, and N), revisiting their dreams made them uncover additional feelings and details, allowing them to delve deeper into their dreams. Participant G found the model especially impactful for this reason it allowed her to explore and materialize difficult emotions:

> The dream touched on my pressure points. It had the same feeling I have in real life, a melancholic feeling I carry all the time. I've thought a lot about this dream, but I've never disassembled it like this. And now I could analyse it, break it down into small components, and gain more insights on it. I could get an even stronger feeling of what the dream was about [...] The dream was developed in my subconscious; about something I care about. [...] The second game was much cooler, just because the theme was so much more interesting to me. It came from me.
>
> Participant G

The ability to share their dreams and collaboratively evolve them into games was highlighted as a strength of the model by participants G, H, I, J, M and N. They appreciated the opportunity to discuss their ideas, have them challenged, and gain a deeper understanding of their own creative visions. This aligns with the study conducted by Patton and Knochel (2017), which identified sharing and connection as key parts of a "maker's practice". Participants G and H highlighted the Experience step of the model specifically for encouraging collaboration:

> I liked that I could get some feedback, that we could discuss it together. You can get some conformation, or have your idea challenged. You get an even stronger sense of your dream, and you learn what carries it and gives it weight.
>
> Participant G

> I liked that you could give your input, that we could trade ideas and brainstorm together. It's easy to come up with more and better ideas, to have a vision, if there is something to base it all off [gestures to dream drawing]. The best ideas come from when you just talk and think, going with it.
>
> Participant H

5.3.3 Drawbacks of the model

During discussions of the model's drawbacks, dreams reoccurred as a discussion topic. While all liked using dreams and saw it as a central component of the model, some participants lifted potential issues that it can bring. Participant G, K, L, and M said that they often do not remember their dreams which can limit the use of the model. K said that he would only be able to use it "five or so times" before he would run out of dreams. Several participants also emphasised that some dreams might not be "possible" or "suitable" to make into a game. Participant G explained that "just because you think something is interesting, doesn't mean others do", a view shared by I, J, K, and L.

Participant K and N suggested using memories instead of dreams as a starting point. For K, they personally preferred using dreams but argued that "for some, memories might work better". Participant N also preferred using dreams but saw potential in using memories. For them, memories could allow participants to make games based on their day-to-day life. Ultimately, none wanted to replace dreams as a starting point as they both saw more benefits of using dreams. For both K and N, dreams were "more interesting" and created more unexpected results as compared to memories.

In discussions about the model's specific steps, "Roleplay" and "Make" were questioned by some participants. Participant G found "Roleplay" confusing since he did not think the step had a lot of roleplaying elements. Participant M found the "Dream" and "Roleplay" steps to be "arbitrarily separated" in the model. He was the only participant who talked about his dream while drawing, with other participants drawing mostly in silence. He explained that both steps were "just two different ways to tell the dream" and therefore found "Roleplay" to be unnecessary.

Regarding the "Make" step, two participants (K and J) shared that they did not feel as if they had properly started the step. They lifted that they did not know how to continue making their game after their initial concept was made. Both participants described the model as a theoretical or brainstorming tool that helped them to "think" about games, but that they needed more resources in the "Make" step than the model provided.

5.3.4 Game discussion

All participants were asked to compare their first game idea as pitched in their pre-interview with their second game idea as developed with using the model. Table 5 below lists each participant's first game idea as described in the pre-interview compared with their second game idea developed with the model.

	Game idea 1	***Inspired by***	***Game idea 2***	**Inspired by**
G	Garden designer	Work, existing game	Narrative game about life choices and regret	Melancholic dream about being stuck in the wrong time, seeing your home in ruins
H	Character-driven "hack-n-slash"	Existing game	Narrative game about a train and its passengers	Humorous dream about seeing a radio host on a train
I	Psychological game about a friend group	Psychology, friends	Party game about herding kittens	Stressful dream about herding kittens
J	Adventure game in a small world	Existing game	Satirical murder mystery about walnut allergy	Humorous dream about being fed walnuts by friends who know you are allergic
K	Sequel to existing game	Existing game	Party game about stealing body parts from others to grow your own	Nightmare about seeing a baby lose her arm like a doll
L	Sequel to existing game	Existing game	Horror game about giant dolls	Nightmare about being kidnapped by giant dolls
M	Puzzle game with physics	Existing game	Horror game about grandmother's transformed house	Nightmare about arriving at one's grandmother's house that has shape-shifted
N	Cinematic platformer	Existing game	Horror game about climbing an endless tower	Melancholic dream about climbing an endless tower that progressively gets more ruined

Table 5 First game idea pitched in the pre-interview compared with second game idea developed using the DREaM model

It is noticeable that almost all game ideas pitched in the pre-interview (game idea 1) were described by the participants as being based on existing games. Participants generally described the game as something they would "like to play themselves", aligning with previous

research (Hurel 2016; Card et al. 2021; Aresta et al. 2021) that existing games commonly influence and motivate personal game making. While there is great variety in genre, most ideas were described relatively vaguely by participants. The exceptions were participant I and M who were both experienced game developers.

Participants that had similar experience or interest with game making generally discussed their game ideas in a similar manner. Participants that were highly interested in game making but did not have any experience (G, H, and J) preferred their dream game ideas over their first. All three regarded their games as easier to start making and more interesting than their first. G regarded her dream game as more personally relevant. J and H regarded their dream games as more unique, with H going so far as saying that his first idea was not worth making after coming up with his dream game:

> My first idea was just a copy of games I like. It had no vision, nothing original, nothing that justifies its existence. But the other is a fun concept that is entirely doable and something that I haven't seen before!
>
> Participant H

The experienced makers (participants I, M, and N) liked both game ideas and did not prefer either idea. Common for all three participants is that they regarded their first ideas as more ambitious, difficult to start making, and difficult to complete. In contrast, their dream games were viewed as easier to make and had a more manageable scope. Participant M theorised that using dreams automatically lends a good scope "since dreams often aren't overly long or complex". All three also believed that they would be capable to make their dream games on their own as short projects, while the other games required either a team or significantly more time to complete. All three were motivated to make their games, with N saying that their dream game was the most likely project they would develop next.

The two participants that had little interest in making games (participant K and L) preferred their first game idea. Both participants pitched a sequel or addition to their favourite game. Participant K explained that his dream idea would be fun "maybe for an evening" while the sequel idea would be something he would "want to play for a long time". However, he had no interest in making that game and only discussed it in theory. When discussing the dream game, he found that it would be "actually fun to make", "actually possible", and "much more unique". Participant L reasoned in a similar way, preferring her sequel game idea in theory but not wanting to make it in practice. She regarded her dream idea as more unique, creative, and feasible to make.

The implication that the DREaM model is well-suited for smaller game projects, based on these participants statements, is particularly notable. Previous research on personal game making, such as the studies conducted by Henderson and Iacovides (2021), Hurel (2016), and Warren (2019), has consistently highlighted the preference of personal game makers for working on smaller-scale projects and within limitations. This alignment between the DREaM model and the inclination towards smaller projects can be seen as one indication of the model's effectiveness in catering to the needs and preferences of personal game makers.

Several participants noted that games developed with the model tended to prioritize narrative elements over mechanics. Out of the eight games developed, five (G, H, J, L, M) were explicitly described as narrative-driven. Interestingly, when comparing participants' initial game ideas with their dream games, those who initially pitched mostly mechanics-focused games often

shifted towards more narrative-driven concepts for their second game. In the pre-interviews, four (G, H, L, M) out of the five participants who described their second game as narrative-driven had initially pitched mechanics-focused games. In the post-interviews, four participants specifically highlighted the model's suitability for generating narrative games. Participants H, J, M, and N, who were familiar with or experienced in game making, noted that the model did not place as much emphasis on mechanics compared to other game design models. While they acknowledged this as a limitation, they also recognized the model's strengths in facilitating the creation of other types of games, namely shorter narrative-focused games.

6 Conclusions

This study focused on exploring alternative approaches to game making and development with a specific emphasis on personal game creation. A literature review examining both an educational and personal making perspective highlighted two significant challenges to game making: technological knowledge, as well as the ability to understand the expressive potential of games. Previous research (Kafai 1996; Warren 2019; Henderson & Iacovides 2021) has found that the technological barrier in game making can be mitigated through the availability of accessible game making tools. This was further supported by findings from a game making course conducted by this study's researcher (see appendix A). However, the expression barrier remains as a significant challenge. While there have been initiatives to address this barrier (Patton 2013; DeVane, Steward, & Tran 2016; Kalmpourtzis, Vrysis & Veglis 2016; Eladhari & Koenitz 2021), no resources have been developed that align with motivations to personal game making. This paper argues that these motivations are crucial to understand in order to create inclusive spaces that can support a wide range of expressions and allow for a broad understanding of what games can be.

The aim of this study was to develop a pedagogical model that could support personal expression within game making. Using participatory and co-operative inquiry methods, the DREaM model (Dream, Roleplay, Experience, and Make) was developed in collaboration with individuals interested in or experienced with personal game making. The model was then evaluated by a second participant group consisting of individuals interested in games but with varying levels of game making experience. These participants used the model to create and discuss their original game concepts, while also participating in interviews that explored their personal experiences in both playing and making games.

To answer the research question ("*How can one develop a pedagogical model to support personal expression within game making*?"): The findings of the study indicate that the DREaM model provided several benefits when used as a tool to generate personal game concepts. Using an approach that incorporated the experiences of personal game makers resulted in the development of a game design model that was highly appreciated by both inexperienced and experienced game makers. Using dreams as a creative starting point allowed participants to explore unconventional sources of inspiration and generate game ideas that were seen as both feasible and personally interesting to make. The model's emphasis on collaborative brainstorming and the exploration of ideas beyond traditional gaming contexts further supported participants in expanding their creative horizons. Participants who did not perceive an expansion in their views noted that the model aligned with their existing creative practices and motivations, inspiring them to apply it in their own projects. By empowering participants to express themselves, regardless of their initial reservations or skill levels, the DREaM model demonstrated its efficacy in supporting personal expression within the game-making process. However, it is important to note that the evaluation of the model did not include the actual development of the generated game concepts. This raises questions about the model's impact on the practical aspects of game development. While the DREaM model provided a framework for generating and discussing game ideas, its effectiveness in guiding participants through the entire game development process requires further investigation.

6.1 Discussion

The creative process observed in this study sheds light on the untapped potential of dreams, not only within the realm of games but also in pedagogical contexts. The positive effects observed in this study strengthen the assertions made by Pretti et al. (2022), who advocated for the use of writing, sharing, and re-writing dreams and memories to explore diverse perspectives and modes of thinking, while simultaneously challenging traditional educational practices. Bringing this line of thinking into games allowed participants in this study were not only able to explore the boundaries of games but also completely reimagine them. Some participants confronted personal boundaries, such as perceived lack of creativity or skill, while others confronted boundaries within games as a medium. The support provided by the model enabled both to back against the constraints they faced. This demonstrates the transformative power of dreams when integrated in pedagogical contexts.

The use of dreams in this study, as well as in the studies conducted by Montefiori et al. (2022) and Pretti et al. (2022), also uncovered a common phenomenon: it acted as a non-intrusive means of inviting others into inner worlds. By sharing dreams, participants provided a glimpse into their personal experiences, perspectives, and imaginations. This process created a space for empathy, exploration, and the exchange of diverse ideas. It provided a platform for participants who did not initially perceive themselves as fitting into the traditional gaming landscape to find their voice and contribute to the creative discourse. By tapping into their dreams and personal experiences, they were able to explore game design in a way that resonated with their unique perspectives and interests. On the other hand, participants who had extensive experience within games found an opportunity to break free from established conventions and explore alternative approaches.

The findings of this study reinforce previous research by Henderson and Iacovides (2020), Hurel (2016), and Warren (2019) regarding the impact of personal experiences on game making. The interviews and games created by the participants provide additional evidence that personal experiences play a significant role in motivating and shaping their interest in game creation. While most participants were influenced by existing games in their own making, inspiration from personal sources were found to engage participants further and was able to capture the interests of individuals who originally had no interest in game making. Game pedagogies aiming to reach a broader audience should recognise and incorporate personal narratives, emotions, and experiences to create a more inclusive and engaging environment. Offering diverse tools, encouraging self-expression, and valuing diverse perspectives are important strategies for game pedagogies to attract and resonate with a wider range of individuals. Situating game design within the realm of personal dreams has proven to be one possible approach in capturing the imaginations of both experienced and inexperienced game makers. This approach highlights the potential of game pedagogies to position game creation outside the confines of the industry.

Co-operative and participatory methods played a pivotal role in enabling the emergence of a non-hierarchical environment. This approach aligns with the call by Dahya et al. (2017) for study methods that can address the specific needs of marginalized groups within games and provide them with equal opportunities. By adopting Druin's (1999) methods, the study actively sought to create a collaborative and participatory space where the lives, experiences, and needs of girls, women, and gender non-conforming individuals could be explored. The analysis of interviews reinforced the existing findings that current games fail to represent the preferences of a significant portion of the gaming population (Kafai, 1996; Ibrahim, Wills &

Gilbert, 2010) but provided valuable perspectives for pushing back against these limitations. By understanding the dreams and aspirations of underrepresented individuals, the gaming industry can gain insights into what captures their interests and imagination. Embracing these perspectives can diversify games, offering a wider range of experiences, a desire expressed by participants regardless of gender. This underscores the significance of inclusive research methods that empower marginalised groups and contribute to a more diverse and inclusive gaming environment.

The infusion of the DIY and maker culture into game design created an environment that fostered ownership, collaboration, and inclusivity, echoing the findings of Kafai and Peppler (2011) as well as Kafai and Burke (2015) regarding the benefits of embracing constructionist approaches in media education and game making. By providing participants with the key components of a "maker's practice," including the resources for making, sharing, and connecting, as identified by Patton and Knochel (2017), all participants were empowered to actively participate in the creation and exploration of their game ideas. A significant transformation was often observed when participants were given the tools to make, leading initially hesitant individuals to enthusiastically engage with games. The availability of simple materials enabled participants to materialise their thoughts and actively participate, regardless of their previous experience or expertise. However, it is important to note that the making in this study was limited to conceptual work. The tools provided (paper, pen, scissors) does not reflect the resources needed to support game making that moves beyond the idea stage. This study demonstrated in other words how a maker's practice can be incorporated to encourage an inclusive design environment within the earliest stages of game development.

If game making advances into digital prototyping and development, it becomes crucial to incorporate accessible resources and tools that align with the key components of a "maker's practice" (Patton & Knochel 2017) in a digital development environment. These resources would need to support an open space for making, sharing, and connecting in a digital context. One possible approach would be to utilize Tiny Online Game Engines (TOGEs). Web-based game engines with simplified game making tools have been highlighted in previous research to lower the entry barrier to game making and support the voices of marginalised creators (Friedhoff 2013; Ensslin & Skains 2017; Warren 2019). TOGEs provide practical resources for game making through user-friendly interfaces, pre-built assets, and templates. As web-based games, the developed games have minimal requirements to both share and play. Furthermore, TOGEs are often accompanied by thriving online communities that foster connection among creators.

While finding inspiration through dreams was a significant benefit of the model for many participants, it can also have several drawbacks. As mentioned by a participant, memorable dreams are often strange, unsettling, or even traumatic, which can present challenges when used as a basis for a game. Starting from distressing dream material may involve revisiting or reliving negative emotions, which can be emotionally challenging and potentially limit the accessibility or appeal of the resulting game to a broader audience. While participants have the freedom to choose any dream as a starting point, it is important to acknowledge that some may not have an extensive pool of dreams to draw from. While this did not present itself as an obstacle for any of the participants in this study, several participants highlighted the potential issue this could have for others. Using other starting points, such as memories as suggested by two participants, could act as a potential alternative in such cases.

As noted by participants in the study, the model also tended to produce more narrative-driven game design. It is difficult to draw conclusions due to the limited participation group and the fact that the games are only in a prototype stage. Nevertheless, these observations provide some indications of the impact of the DREaM model on game design. The model's framework and approach may encourage participants to explore and express stories in a specific way, leaving out other ways games can be used for personal expression. The roleplaying stage of the model, for example, might have influenced the participants to view their dreams as stories to be told rather than experiences to be had. Alternative steps could provide substantially different games while still using dreams as its starting point. However, it is important to note that there were examples of games by participants that explored a specific experience from a dream only throughs its mechanics (such as a game about herding cats that used the stressful dream experience as an inspiration source for its gameplay).

6.2 Limitations

It is important to note that the observations made in this study should be interpreted with caution and considered speculative. Several limitations in the data limit the generalisability and robustness of the findings. One significant limitation to the study is the small sample size and recruitment from a specific region (Västra Götaland, Sweden). The participants also had a relatively narrow age range, with only one participant being over the age of 30. These factors raise concerns about the applicability of the findings across different age groups, cultures, and geographical locations. Furthermore, the purposive sampling method used introduces the risk of researcher bias. While purposive sampling allowed the study to examine the experiences of both experienced and inexperienced makers, it is difficult to determine the representativeness of the participant group. The consistency between the views expressed in the pre-interviews and previous research conducted on personal game makers provides some indication of the representativeness of this study's participant group, but it is not a definitive measure.

The method used in the evaluation also introduces the potential of bias. Unlike Druin's (1999) study that had several researchers acting as interactors or data gatherers respectively, this study was conducted by a single researcher. The active involvement of the researcher in the discussions also implies that the researcher, to some extent, generated and interpreted their own data alongside participant data. Although the researcher's interaction was limited to the second half of model testing, it is possible that the researcher's involvement could have influenced participants' responses in the subsequent stages, particularly during the post-interviews. The potential bias introduced by the researcher's connection to the DREaM model raises questions about the evaluation itself. Participants may have felt compelled to provide responses they perceived as favourable due to their awareness that they were assessing work associated with the researcher. This awareness of the researcher's connection to the model may have influenced the participants' perceptions and potentially affected the objectivity of their feedback.

Furthermore, as noted by some participants in this study, the "Make" step in the testing was not completed. The testing was limited to the creation and discussion of game concepts only, meaning that the making did not involve practical development. This limits the evaluation of the DREaM model and the game concepts that were developed with it. For example, while many participants regarded the game concepts developed with the DREaM model to be more feasible to make, these discussions were speculative in nature. The impact of the DREaM model on game development that moves beyond the conceptual stage is in other words

unknown. While it is notable that the model provided several benefits when used as a brainstorming and idea generation tool, the aim of the model is to support personal game making to completion. The benefits that were observed in this study should therefore be regarded with caution as they might not apply for game development that moves beyond the conceptual stages.

As a resource, the model should not be regarded as being able to lower the entry-level to game development on its own. While the developed model addressed the common barrier of comprehending the expressive potential of games, most often brought up by inexperienced makers in this study, technical knowledge remains as a significant challenge. The need for better programming resources and game tools was lifted by both experienced and inexperienced makers, indicating that the technical barrier affects makers of various skill levels. This need has been repeatedly stressed by both personal game makers, educators, and researchers for almost a decade (Kafai 1996; Werning 2017; Warren 2019; Henderson & Iacovides 2020). If the aim is to lift game making as a medium of self-expression, it is critical that the medium itself is accessible. The DREaM model contributes to lowering the expression barrier to games, but it only through the availability of accessible, open tools that these expressions can move from dreams to games.

6.3 Future work

The evaluation of the model has several limitations that raises concerns about the validity of this study's results (see 6.2). Co-operative and participatory study methods was a critical aspect of this study. However, the validity of the study would be significantly improved by having more researchers. By diversifying the team of researchers, the study can benefit from more perspectives both in the interaction and interpretation process, increasing the overall reliability of the evaluation process.

While this study included participants with varying levels of game making expertise, focusing on a specific demographic or skill level in future research could provide deeper insights into how the model supports and enhances the learning experiences of that group. Despite the limited sample size in this study, the model was noted to provide distinct benefits to participants with varying levels of experience in game making. Tailoring the model to a specific group could enhance these benefits and better address the unique needs of these different groups.

Future research can strengthen the validity of the model's evaluation a quantitative approach. This could help minimizing bias and enable data collection from a larger participant group. It would also enable comparisons with other pedagogical approaches and game making tools with similar goals, such as the MARC framework (2.3.2). For example, a quantitative survey could be used evaluate the impact of different models in a game making course. The survey can include a range of questions focused on assessing various aspects of each model's impact, such as participants' perception of its effectiveness in enhancing their game design skills, its ability to support personal expression, its effect on game making motivation, and more. By administering the same survey to participants in game courses using different models, comparative analysis can help identify the relative strengths and weaknesses of each model in relation to other approaches while also highlighting potential areas for improvement.

This study primarily focused on the theoretical aspects of game design and the exploration of participants' ideas. As a result, the practical implementation and realisation of these ideas

were not fully explored, making it difficult to determine the applicability of the model in real-world game making contexts. While the model showed promise in stimulating participants' creativity and expanding their views on what can be made into a game, its effectiveness in practical application remains uncertain. Future research would benefit from examining the model's practicality in game development that moves beyond the initial idea stage. One possibility is examining the model when implemented in a game making course, such as the course described in appendix A. This could give insights on the model's long-term impact and its impact when combined with other pedagogical resources.

Future research could also examine how the DREaM model interacts with existing game making tools, such as TOGEs (tiny online game engines). As noted by previous research, the specific design and structure of game tools can effectively address technical barriers, but it can also limit creativity and give the impression that there are "right" and "wrong" ways to develop games, limiting expression (DeVane, Steward, and Tran 2016; Kalmpourtzis, Vrysis & Veglis 2016). The DREaM model, with its focus on personal exploration and creativity, could potentially be used to address this issue. By encouraging a personal exploration and creative usage of specific resources, it could enhance understanding of the tools and how they can be used for personal expression. Such an approach is similar to the semi-structured approach to game development education as described by Kalmpourtzis, Vrysis and Veglis (2016), where learners are provided with tools and resources but have the freedom to create their own games. Additionally, by combining resources that target different barriers to game development, future research can gain insights into how they interplay and identify strategies that can address barriers to game development more holistically. As noted by Eladhari and Koenitz (2021), the dual nature of games as both artistic and technological works pose unique challenges to game makers of different backgrounds. A fundamental challenge for both is to develop an understanding of how technology and art can be combined.

The availability of resources that enhance understanding of the potential uses of technology comes at a critical time. The rapid advancements in AI and other technological resources are predicted to have a transformative impact on computer science at large (Welsh 2022). As technology becomes increasingly automated and advanced, the ability to use these both creatively and critically becomes essential for their effective use. This has long been predicted and plays a key role for why creativity and critical thinking skills, and not teaching specific tools, are at the forefront of 21st century skills and STEAM pedagogy (Liao 2016; Liao Motter & Patton 2016). Examining resources that can complement and work alongside these technologies is an exciting area of research that can enable a wider range of individuals to personally engage with these technologies. As noted by Werning (2019), the availability of production tools has played a crucial role in expanding the reach of game making to a broader audience, transforming it into an expressive and cultural tool. As the technological barriers to technological mediums continue to be lowered, resources such as the DREaM model can inspire more individuals to see technology as a means of self-expression and make creative use of the resources available to them.

By continuing this work, future research can contribute to the advancement of game design and pedagogical approaches that empower individuals to express themselves and explore the potential of games as a medium. This study, while limited in both scope and generalizability, demonstrated one promising approach to encourage participants to dream new possibilities in the world of games.

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Appendix A - Game course overview

This section provides an overview of the course I developed for the cultural centre Stureplan. The centre is funded by the municipality of Skara and provides extracurricular courses and activities for youths in the area. Previous courses teaching game development held at Stureplan had only been able to attract a very specific demographic, namely young boys interested in programming, despite the wide interest of game development among the youths at the centre. Previous game educators had been men with technological backgrounds, which the cultural centre observed to be alienating towards girls.

My position as a woman in games, my near-peer status to the students, and my background in both arts and technology were contributing factors to me receiving this role. I was provided with licences to the commercial game engine GameMaker (1999), locales, and computer hardware by the municipality. Besides some prerequisites set by the cultural centre (a target demographic of teens, a course length of 10 weeks with two-hour classes, and the location), I had free reign when developing the course. The course was free and open for 10 students, running for two semesters (2022-2023).

The studies by Warren (2019) as well as Henderson and Iacovides (2020) were used to identify personal motivations and barriers to game making. The notion of participatory culture, as describe by Jenkins (2006), also guided the development of the course. To appeal to the popular motivation to create worlds and self-express through games, I decided to centre the course around creative expression rather than specific skills such as programming or graphics. A focus on arts over technology was also encouraged by the municipality, as they had observed that technology centred courses was attended by fewer girls.

The barriers (or participation gaps) identified were economical, technical/knowledge, and social in nature. The economical barrier was circumvented by the cultural centre as all required hardware and software were provided for the students and the course was free through funding from the municipality. The social barrier was addressed by encouraging a low-pressure environment where students could create under their own terms. This was prioritized not only to be inclusive to students with different needs and motivations but also to create a safe space for creativity.

GameMaker solves some technical barriers by simplifying several aspects of game development, such as graphics creation and programming. While these barriers are lowered, they are not eliminated. The simplified programming language and visual scripting options provided by GameMaker still require fundamental programming knowledge to use. To address this, a starter kit within GameMaker was developed for the course. The kit contained pre-made assets (such as scripts, graphics, and animations) that could be assembled in various ways to create a simple adventure game. The starter kit was designed to encourage participation on all levels with the starter kit itself. Students could either use the assets as they were and create a game by reassembling them in various manners. However, the affordances of GameMaker also allowed the students to expand, modify or replace these assets freely, allowing for more freedom.

The starter kit brought with it a new knowledge barrier. All tools need instructions, and this was no exception. To address this, an online instruction manual was written for the students. The manual served two purposes regarding participation. For one, it made it easier to

participate with both the engine and the starter kit by passing on existing knowledge. Second, it made this knowledge easily accessible. Finally, to further address the knowledge barrier, an example game was developed using only the available assets in the starter kit. The purpose of the game was to demonstrate how the assets could be put together and act as a possible source of inspiration for the students.

The course was advertised by an animated trailer which was uploaded to the cultural centre's social media channels. The trailer, featuring non-violent imagery and cute characters, emphasised the inclusive nature of the course and its focus on expression over teaching technological skills. I also toured several schools in the municipality of Skara along with the manager of the digital department of the cultural centre to advertise the course directly to students. In the first semester, 5 students participated in the course while 4 students participated in the second.

In the first session, students were introduced to the course and their peers. A short introduction to games were given which emphasised the expressive potential of games as a medium. An example game made for the course was showcased and played with the students. This game was made with the same game making tools the students would also use. The students were then tasked with coming up with their own game idea by answering questions loosely based on Ryan's (2004) definition of narrative. The example game was also developed according to these questions. These questions were (with the example game in parentheses):

1. What exists in your world? (A village, a theatre, a forest, villagers, a playwright, an assistant)
2. What will happen in your world? (The play does not have enough actors or props, the playwright expects the assistant to fix this, villagers will be reluctant to help)
3. What perspective do we have of the world? (The culture in the village, experienced from the assistant's perspective)

In the second session, students were introduced to the game making tool. They were tasked to re-create a simple game by following along with instructions. This was to allow the students to get familiar with the tools while also giving them an understanding of what potentials, but also constraints, that were in place. In the third session, students presented their game ideas which were then workshopped together with the student to fit the game making tools they were provided. Students who did not want to create their own graphics received help in finding pre-made, free to use graphics from various online databases. In the rest of the course, students continued to develop their own games. I assisted the students by troubleshooting both technical and other game making problems. In the last session, students were given the opportunity to showcase their game if they felt comfortable to do so. While some were reluctant at first, all students ended up presenting and playing through their games. The games that were more narrative and experimental in nature, as opposed to more traditional games with a clear challenge to overcome, received the most attention during these play sessions.

All students made their own graphics. Some used the pre-made graphics and animations as bases, drawing over them directly in the program. Others made their own characters from scratch. Only one student did his own programming. The rest used the various pre-made scripts and adjusted them as needed. It is notable that all students expressed appreciation for the tool kit during the course, with one student crediting it for being the reason she could participate in the course at all.

All students but one re-joined the course the following semester. As the students were already familiar with the game making tool, the course resumed from where it left off. Some students continued with the same idea while others started new. A new example game was also showcased to the students which demonstrated other capabilities of the game making engine. The game was centred around my childhood memories, made to show the students how they could connect their personal lives with their game making. It was during the second semester that some students participated in the prototyping of the game design model as described in section 4.2.

Appendix B - Interview and testing quotes

Pre-interview	*G*	*H*	*I*	*J*	*K*	*L*	*M*	*N*
Game exp.	Little	Much	Much	Moderate	Little	Little	Much	Much
Games played most	Puzzle and party games	Action and platformer	Indie games, adventure games	Console games	Online multiplayer	Games with friends, simulation	Platformer, puzzle, adventure	Platformers, indie
Game history	Family	Friends, family, community	"Games become something you can bond over and talk about. Once you enter the gaming bubble, it becomes difficult to leave."	Friends and family	Friends	Friends	Family	Family
Game opinion	"The majority of games do not interest me. There is just so much untapped potential."	"Ordinary people are able to contribute with ideas, and then the industry sees what is possible to do with little."	"Having to earn money [to make games] is a problem, because it limits what you can do."	"The industry feels super capitalistic and toxic. […] There are so many games, but mainstream games do not interest me."	"There are some periods you just play a lot… but it doesn't happen as much anymore."	"I don't play games anymore; I don't want to waste time on it."	"It's difficult to say something that applies to all games…"	"[The industry] is worse than it ever has been…"
Dev exp.	Minimal	Knowledge able through friends & community	Moderate. Studies game development at school.	Minimal (choose your own adventure, paper fortune teller)	Minimal (Scratch assignment in school)	Minimal (board game assignment in school)	Professional (programmer)	Student, personal making
Interest in game making	"When you discuss game ideas, it tends to get pretty sensitive… And my ideas often get ripped to shreds."	Yes, but need idea.	Yes, as a passion project.	"I wouldn't be able to have an idea and make something good out of it on my own."	No.	No.	"I want to make games I want to play myself."	To express themselves.
Game idea 1	Garden design simulator. Realistic graphics. Inspired from existing game	Character driven and stylized action game. Inspired from existing games	Interactive storytelling game, focus on narrative and graphics. Social game exploring friend group dynamics	Simple story-based game, a world you explore with an objective.	Sequel to favourite game	Sequel to favourite game	Technically complex game, puzzle game with lots of simulation	Cinematic platformer inspired by existing game.
Barriers	Technical knowledge	Technical knowledge	Time, technical knowledge,	Technical knowledge and	Lack of interest and time	Lack of interest.	Self: Time and energy. For others:	Self: Time and energy. Others:

			knowledge about how to make games at all.	understanding how to put something together.			Programming.	Programming.
Helpful	Understanding limits & technological assistance	Programming & graphics	Game course with freedom to make own game	"A game course, like 'How to make a game for dummies.'"	"If someone makes the game for me…"	Nothing lifted	"There is so much material available, free materials… But a lot of it is amateurs teaching amateurs. […] They teach how to write specific scripts, not how to program. You don't learn the concepts."	Game making tools

Model testing	***G***	***H***	***I***	***J***	***K***	***L***	***M***	***N***
Reaction	"Oh, that's hard… I don't usually remember my dreams."	"Oh, nooo… [laughs] It'll be so stupid."	"Any dream? [long pause, then laughs] Okay!"	"Maybe not the funniest one, but it's the one I can come up with now."	"Oh… When I dream, it usually looks so real." [gestures towards the paper and pen]	"I have a super detailed dream from when I was three… But how should I draw it…?"	"I don't usually remember my dreams… but this one I remember well."	"Oh noo… Okay."
Dream	Can start drawing quickly. She looks concentrated and works silently.	Laughs and smiles through-out. Works quickly.	Smiles and shakes her head. Laughs.	"Now I'm questioning if I even can draw…" Smiles and laughs.	Laughs. "You won't take a photo of this, right…?" Talks about the dream while drawing.	When drawing, she starts rememberi ng more details which she adds to the drawing. Spends a long time drawing	"I'll draw it small, it'll be less noticeable if it's ugly then." Talks about his dream while drawing.	Looks concentrated, smiles occasionally. Spends a long time drawing.
Roleplay	A melancholic dream. Explains her drawing first, which is an abstract representation of the dream. Recounts the dream in a serious manner.	A funny dream. Laughs and points to different parts of the drawing while retelling his dream.	A stressful and absurd dream. Points to different parts of the drawing and laughs while talking.	A funny dream. Laughs and does voices.	Nightmare. Summarizes the dream quickly as he talked about it while drawing. Laughs but explains that he dream was originally a nightmare.	Nightmare. Looks at the paper while telling the story, gestures. Laughs.	Nightmare. Makes many gestures while talking and points to the drawing. Laughs.	A melancholic dream. Does gestures and looks at the drawing while retelling it.

Experience	Discussion about life and the parallels it has to games; how belief and personal morals can be incorporate into a playable story	Discussion about how ordinary things can creep into dreams and play a central role	Discussion about growing up in a rural setting and taking care of kittens, the stress of taking care of animals	Discussion about believability in dreams and trying to solve dream mysteries using dream-logic	Discussion about things we do not understand often emerging in dreams and taking on a central role	Discussion about how the most absurd and silly ideas can be terrifying if it's experience in a dream	Discussion about how familiar places and people morph in dreams, giving an uncanny effect	Discussion about the shared experiences of entering and interacting with specific spaces, such as spiral stairs
Make	Narrative game with several possible playthroughs, acting as a metaphor for life and the (lack of) importance the choices we do not make	Mystery game set on a time loop	Party game, making dream nonsense playable	Mystery game that does not take itself too seriously	Party game that is fun to play for short sessions with friends	Horror game, aim is to capture both the silly and terrifying aspects of a child's nightmare	Horror game, aim is to capture the uncanny feeling of dreams and the morphing of the familiar into the unfamiliar	Horror game, aim is to capture the liminal feeling of the dream

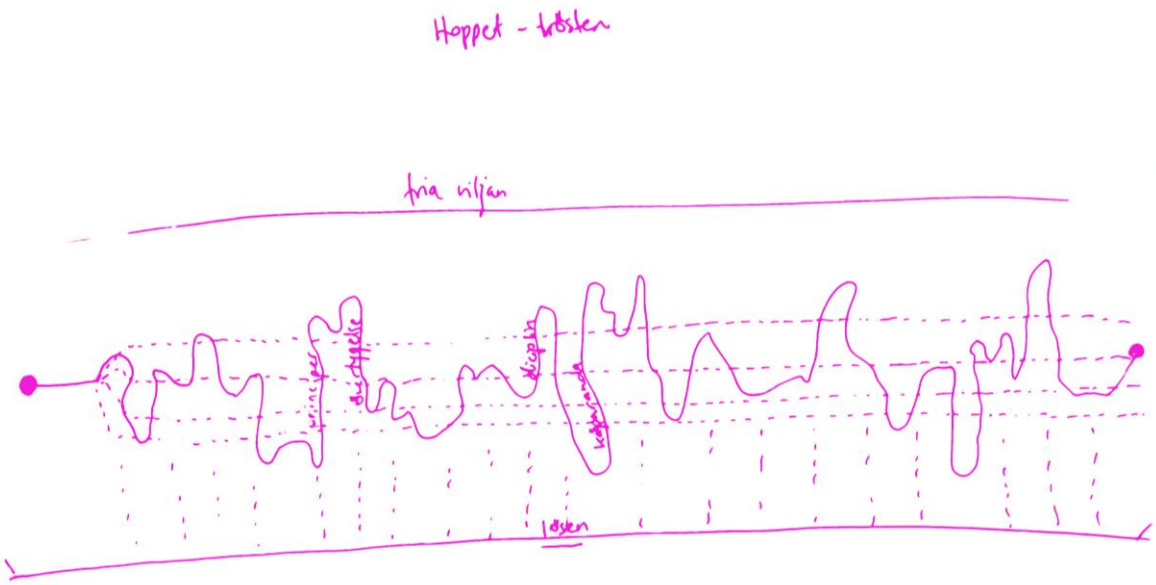
Post-interview	***G***	***H***	***I***	***J***	***K***	***L***	***M***	***N***
Liked/disliked	Liked	Liked	Liked	Liked	Liked	Liked	Liked	Liked
First impression details	Allowed one to process and "find inspiration from personal experiences and emotions".	Interesting and easy to use, allows one to brainstorm ideas playfully and "make games that are not copies of existing games."	Find inspiration from "things you normally wouldn't" and passes you by	Starts thought process and gives guidelines that can be used through-out.	"I could never have thought of this on my own… or awake"	"I couldn't have come up with anything without this"	Method to come up with games that are "different from what I usually do."	Aligns with own making style
Best part	Experience	Experience	Dream	Experience	Dream & Make	Dream & make	Dream & Experience	Dream & Experience
Worst part	None	None	None	Make	None	None	Roleplay	None
Using dreams	Liked	Liked	Liked	Liked	Liked	Liked	Liked	Liked
Using dreams details	"Dreams are from one's subconscious, not yourself."	"You can't control dreams. Using dreams [allows one] to not use other games when coming up with your own."	"You don't decide on the inspiration source yourself. Since dreams are based on your past experiences, it is automatically	"Fascinating […] gives lots of ideas that are personally interesting and relevant."	"Crazy ideas" because you often remember "crazy dreams."	"You think of things you never could do while awake."	"Dreams are often unique and personal". "Dreams are not usually overly long or complex, so it automatically gives a good scope."	"You start with an abstract concept and are given limitations … it makes you more creative. And it suits with making

			something you can connect to."					short games."
Drawbacks	Some dreams might not be interesting to adapt.	One method out of many. Might be more suitable for storytelling and finding a starting point.	Some might not remember their dreams or have interesting dreams. Might be difficult to "break free from the dream".	Some might not remember their dreams or have interesting dreams.	Doesn't remember many dreams, lose details as time goes by.	Doesn't remember many dreams.	Focuses more on narrative than mechanics, might not be suitable for all kinds of games.	Some might not remember their dreams or have interesting dreams.
What should change	Nothing	Nothing	Nothing	Nothing	Nothing	Nothing	"Maybe combine Dreams and Roleplay" since "they touched upon the same thing"	Nothing
Game impression	Liked, preferred dream game over the other	Liked, preferred dream game over the other	Liked both	Liked, preferred dream game over the other	Liked, wants the first one more	Liked, wants the first one more	Liked both	Liked both
Game differences	"The second explored the coolest things on the planet"	First had "nothing original to justify its making". Second game was a "fun concept, entirely doable, and unique"	First required more planning and was more difficult to start, the second was easier to do and know where to start	Completely different, first starts more with mechanics, the second with a story. Dream game was "more creative" and coherent.	First was more realistic and based on existing game, other was unique	Second is much more unique, the first is just a copy that is impossible to make	First is more mechanically heavy, like and based on existing games. Second is "more unique, artsy, and story driven"	Second less traditional and more doable. Shorter and more "organic".
Fit with their motivations	Yes	Partly (but might not be suitable for all kinds of games)	Partly (one tool out of many)	Yes	/	/	Partly (one tool out of many)	Yes
Want to make the game	Yes	Yes	Yes	Yes	If supported, yes	No	Yes	Yes
Want to use the model	Yes	Yes	Yes	Yes	No (but would if I did creative work)	Yes, for other creative work (writing, drawing)	Yes	Yes
Expanded game view	Yes	Yes	No (aligned with own making)	Yes	Yes	Yes	Yes	No (aligned with own making)

Appendix C - Dreams

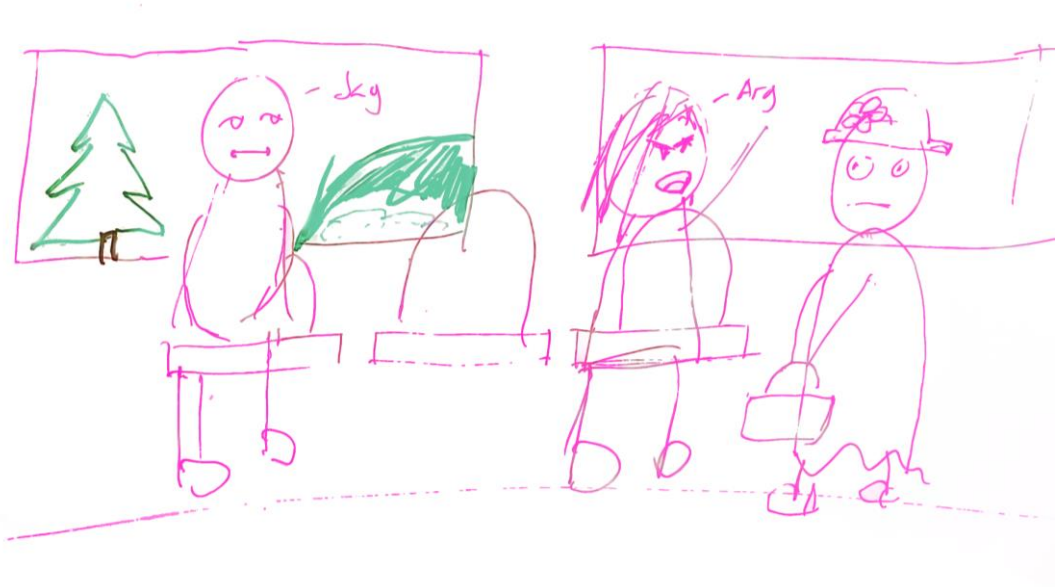
Participant G

The dream started on G sitting on a bus on her way home. When she stepped out of the bus, she noticed that her home was in ruins. She realized that she was at the right place, but in the wrong time. Seeing her home abandoned was terrifying and made her think of where one belongs: Is it a place? Is it in time? Is it with friends? With family? The drawing represents the choices one can take and the effect it has on your life.



Participant H

H was sitting on a train when he overheard a radio host (one he often listens to in real life) screaming at an old lady. He felt awkward and shocked, thinking: "Is this what kind of person she is in real life...?!"



Participant I

An ocean of kittens was surrounding I's home. She ran around and gathered them into baskets, but she stopped once she realized the kittens at the bottom got squished by all the kittens on top. The kittens were in the trees, the roads, on the roof, everywhere. Her mom arrived with some glass jars which they used to scoop the kittens into. Then, her mom started pouring milk into the bottles. She insisted that “hey needed something to eat." The kittens started splashing around in the milk and trying to escape the jars.

Participant J

J was visiting a friend. The friend's mom came in with homecooked food and gave it to J with an evil smile on her face. The friend was grinning too. D looked down onto the plate and noticed that it was filled with hazelnuts. J had visited this friend just recently (both in the dream and in real life) where they accidentally gave her hazelnuts. She couldn’t understand why they were now serving to her again, on purpose. Were they trying to murder her?!

Participant K

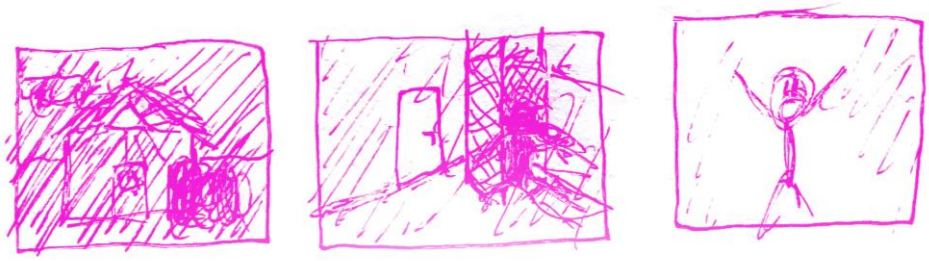
K watched his grandmother play with his little sister. When the grandmother grabbed his sister's arm, it popped off like a doll's arm. There was no blood or gore, but the arm was completely severed off the body. K was terrified and woke up.

Participant L

L was sleeping when suddenly an army of giant toys burst into her room. They kidnapped her and led her into the family's garage which was filled with gym equipment (both in the dream and real life). In the garage there were even more toys. They bound L to a machine and forced her to bench press.

Participant M

M arrived at his grandmother's house after sunset. An upstairs window is emitting a bright orange light. When M stepped into the house, he noticed that the ceilings were incredibly high. The air was hot and there was orange light everywhere. M's grandmother was nowhere to be seen. In the middle of the hallway stood an old metal elevator. Suddenly, the elevator started moving. The elevator door opened up and a monster lunged out. M woke up, terrified.



Participant N

N was in a tower. The interiors resembled an old bath house, its walls lined with showers and lockers. Each level was connected by spiral stairs. There was no way to go but down, meaning that N had to keep moving down the tower with no visible exit. The further N climbed, the more ruined the tower became. The tiles on the walls and floors started cracking and water started seeping in through the walls. On one level, a literal stick figure was standing in the middle of the room. It did not scare N, but it added to the uncomfortable atmosphere. N continued climbing down until they came to the basement. It was pitch black and filled with dirt. In the darkness N could see a face floating.