

# Designing Applied Games with and for Young People: Factors for Co-design

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## Abstract

Applied games, designed for purposes beyond entertainment such as health and education, have emerged as a promising medium to respond to the increasing mental health challenges of children and young people (CYP), be it to raise awareness, provide support, or deliver interventions. However, designing effective applied games requires balancing the entertainment aspect with the applied context, e.g. mental health. Many view participation from end users in the design process as essential to achieve this balance. Despite growing interest in co-designing applied games with young people, there remains limited guidance on effectively involving them in ethical, meaningful, and productive ways.

This thesis investigates the methodological challenges, opportunities, and factors influencing the successful participation of CYP in applied game co-design. Through a systematic literature review, I found a highly fragmented field of practices with little consensus on conducting co-design with young people. In response to those findings, interviews with practitioners of co-design focus on the importance of participant engagement but struggle to describe the methods to evaluate or observe engagement. Finally, a series of iterative workshops provides empirical insights into factors impacting CYP participation, including engagement dynamics, interaction preferences, and facilitation techniques.

Taken together, the findings challenge the prevailing assumption that deeper participation always leads to better outcomes. Instead, the findings of this thesis suggest that young people can be more comfortable in shallower roles with less decision-making and more task-based activities. This thesis suggests that involving children and young people in short sprints and utilising familiar activities and technology may be more feasible and effective in producing applied games. Furthermore, the thesis identified barriers to participation, including behavioural dynamics, accessibility of design concepts, and shifting preferences towards interaction influenced by digital technologies. The thesis contributes towards understanding “successful” participation, offering practical recommendations for researchers and designers while questioning pre-existing narratives on engaging young people in the co-design of games.

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*“Experience is the best of schoolmasters, only the school-fees are heavy”*

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# Declaration

I declare that this thesis is a presentation of original work and I am the sole author. This work has not previously been presented for an award at this, or any other, University. All sources are acknowledged as References.

Chapter 3 describes contributions collectively supported by the supervisory team. Though I was the lead author in the subsequent publication, the analysis of texts was collaboratively conducted with my supervision team.

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# Chapter 1

## Introduction

Applied games are interactive experiences designed for a primary purpose outside of entertainment (Abt, 1987; Hrehovcsik et al., 2014). Applied games design involves the bridging of game mechanics, the interactions and systems within a game, with an *applied* context goal, for example, to promote awareness for mental health. That example is also an area of growing interest. Games already evidence their impact on mental health and wellbeing (Barr and Copeland-Stewart, 2021), providing social connection (Cheng et al., 2018), stress reduction (Barnes and Prescott, 2018), and coping with depression (Väkevä et al., 2025). In addition, approved games such as *EndeavorRx* are used to support ADHD treatment (EndeavorRX, 2025) (currently the only FDA-approved game for health), leading to similar advances in the UK with *Thymia*, a game to help doctors and other medical professionals detect and diagnose mental health issues (Molimpakis, 2025). Applied games for mental health could provide further support, providing an engaging and motivating experience tailored to specific audiences. Applied games have been suggested to offer an ‘engaging potential’ (Fleming et al., 2017), where experiences may be seen as enjoyable, prompting a desire to ‘win’ or progress through a story, which may improve retention.

A growing area of interest in applied games concerns mental health of children and young people. The prevalence of mental health challenges is increasing, especially as children mature into adults, symptoms progress and often lead to co-morbidity of issues (NHS, 2021). In the UK, it is estimated that one in eight (18%) 5-19-year-olds had at least one mental health problem (NHS, 2021). Young people (aged 4-18) need support, and public services have stretched or scarce resources to support them with mental health challenges. In response, there has been both commercial and academic interest in designing games applied to mental health contexts (Bevan Jones et al., 2022; Halldorsson et al., 2021a). Digital mental health technologies, like applied games, have been suggested as a potential approach to improve access to care (Bevan Jones et al., 2022; Orłowski et al., 2015).

So why do applied games work for mental health? Current research describes how applied games for mental health increased reach and accessibility, particularly for young people (Fleming et al., 2017). Regarding young people, games can offer a reduced stigma, where young people feel less shy to ask for help, given the resources are accessible via a game (Schoneveld et al., 2017; Olivet et al., 2019). In addition, games are described as much more engaging activities and interactions when compared to more traditional methods or

materials (such as leaflets, webpages and books) (Fitzgerald and Ratcliffe, 2020; Fleming et al., 2017). An economic motivator for applied games is that they can be cost-effective in addressing mental health concerns, alleviating health concerns and informing people of key information through tailored solutions (Gentry et al., 2019; Hollis et al., 2017). A key example is with *Plan-it Commander*, an applied game designed to support children with attention-deficit/hyperactivity disorder (ADHD) through time management, planning, and organising tasks. However, there are few applied games for mental health which are widely regarded for supporting mental health, particularly for children and young people, which leaves us asking what are the barriers and challenges are to designing applied games for mental health?

Designing applied games for mental health is not without its challenges. A challenge for all games, commercial and applied, is managing engagement and retention (Liverpool et al., 2020; Saiger and Khaleque, 2022). Applied games often face the challenge of being a ‘one-shot’ experience, with nothing further to add after one play-through. And it isn’t a simple fix, challenge and engagement affect players differently, where time restrictions may improve challenge (Cox et al., 2012), others may look to personalisation, and rewards in games (Jessen et al., 2018; Saiger and Khaleque, 2022).

Specific to applied games for mental health, there are the challenges to adherence, where the games lack follow-up to mental health support (Halldorsson et al., 2021b). More recently, there have been concerns that digital tools, including applied games, lack a consideration for developmental preferences<sup>1</sup> in children and young people (Halldorsson et al., 2021b; Bevan Jones et al., 2022). This leads to additional challenges around access and inclusion. Is the design appropriate for the target age and audience? Would young people have access to specific technology? These challenges aren’t unique to applied games, though; they can occur in the design of other digital tools and even commercial games. A key challenge to applied games is balancing the fun and efficacy (Breuer and Bente, 2010). Applied games often have juxtaposed goals, which can lead to incoherent experiences Malinverni et al. (2017); Mitgutsch and Alvarado (2012). They may need to engage a player through time-sensitive constraints to create engagement, but at the same time, alleviate anxiety and stress. Herein lies the main challenge of designing applied games for mental health.

Various methods and approaches could be explored when considering designing applied games for mental health, specifically when designing with and for young people. There are widely regarded frameworks and processes such as the mechanics, dynamics, aesthetics (MDA) framework (Hunicke et al., 2004), the transformational framework (Culyba, 2018), the critical play iterative design framework (Flanagan, 2009), and more bespoke methods such as cognitive game design (Starks, 2014). These frameworks provide a structure and theoretical approach to design but miss the practical hands-on *how-to* of design. These can be seen more in examples such as Abbas and deMajo (2025) prototyping kit, a short guide on prototype games with paper. Though these frameworks offer structured approaches, they are rarely tested or reported on their efficacy or feasibility for designing applied games.

More recently in research, users, such as young people, have been involved in the design of games or digital interventions (Bevan Jones et al., 2020; Halldorsson et al., 2021b). Children

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<sup>1</sup>Halldorsson et al. (2021b) describes how technologies, such as games, have not accounted for developmental differences in children maintaining mental health, in addition to the additional preferences to be considered when co-designing with CYP

and young people’s participation describes more user-centred approaches such as participatory design, iterative design, collaborative design and more frequently, co-design (Halldorsson et al., 2021b; Bevan Jones et al., 2020). Design processes involving children and young people have faced critique for a lack of detail in their reporting (Preston et al., 2023; Hill et al., 2018). This lack of reporting leads to assumptions on why some outcomes fail to engage, reduce adherence/retention, or lack acceptance from end-users (Bevan Jones et al., 2022; Shah et al., 2018). Across disciplines (Bromark et al., 2023; Halldorsson et al., 2021a), there are calls for a wider understanding of design processes.

Co-design commonly refers to a participatory approach to designing solutions wherein end-users are involved in the design process of a solution, service or product (Simonsen and Robertson, 2013). It is commonly positioned as a specific form of participatory design (PD), which describes interactions between designers and users more broadly, learning together to develop and express their ideas (Simonsen and Robertson, 2013). Participatory design, and subsequently co-design, focus on the *how* of designing, with (Simonsen and Robertson, 2013) describing PD as *‘reflection in action’* where the use of design methods, tools and techniques should be reflected upon as ‘design experiments’ that facilitate users to propose, present and discuss the various aspects of a design process.

Co-designing applied games with CYP could bring about varied benefits. For example, Watkins et al. (2024) and Paracha et al. (2019) describe how children can offer unique perspectives and ideas. Co-designing with children can also help reveal developmental preferences and suitability (Arnab et al., 2019; Hourcade, 2015). Regarding the applied games experience, previous research has suggested co-design methods can improve the user experience too (Zhu et al., 2019; Hourcade, 2015). For instance, paper prototyping is widely regarded as an accessible, engaging and cost-effective (Musfiqon et al., 2019; Lee et al., 2019) and as facilitators, we should afford plenty of time and space for young people to explore their creativity (Bossavit and Parsons, 2016a; Kangas, 2010). Furthermore, a shared language can help children engage with design tasks (Gulliksen et al., 2003; Benton et al., 2012). However, few studies describe the role children and young people play when co-designing applied games. The seminal text on participatory design by Simonsen and Robertson (2013) described how effective PD is the shared collaboration between users and designers, though it often considers adults as co-designers, it leaves an uncertainty about how children and young people are involved, and when they are involved.

Involving young people in the design of applied games is not all benefits, though, with challenges around transparency of involvement, variability of methods, and effective tools for engagement (Halldorsson et al., 2021b; Maheu-Cadotte et al., 2021; Bevan Jones et al., 2022). We don’t know how young people are involved in designing applied games and what role that looks like. Simonsen and Robertson (2013) definition of participatory design suggests and the involvement of children rarely appears to reflect on *‘how’* co-design occurs and *‘what’* design methods, tools, and techniques impact the children’s ability to propose, present and discuss ideas. Therefore, the focus of this thesis is to explore how children and young people have been involved in the design of applied games, what factors appear to impact their participation and engagement as co-designers, and whether co-design approaches are accessible, acceptable, feasible and effective at involving CYP in the design of applied games. These issues apply to most applied game development, but in this thesis, applied games for mental health are used as a case study.

## 1.1 Research Question

The overall question of my research is: *How do we involve children and young people in the design of applied games?* This entails identifying the current methodological approaches to involving young people, understanding opportunities and barriers, and what constitutes good practice in co-designing games with young people. To reiterate, the context of this research considers how we approach the design of applied games for mental health, specifically around CYP mental health. To further our understanding of how best to approach co-designing games with children and young people (CYP), this thesis intends to address the following four research questions, which are to find out:

1. How have CYP been involved in the design of applied games for mental health?
2. What factors impact CYP's participation and engagement?
3. What constitutes 'successful' participation in designing applied games?
4. How to consider CYP participation within co-designing games?

These questions are not separate but build upon one another to address the overall question. The findings integrate insights from each study to provide a broader perspective on the methodological approach to co-designing applied games with young people. As described in the next section, I employed a diverse range of methods to achieve these aims.

## 1.2 Research Methods

My epistemological perspective aligns with pragmatism and instrumentalism, which prioritizes the practical application of research and its actionable value for practitioners and stakeholders Creswell and Creswell (2018). This perspective emphasizes solving specific, real-world problems, such as identifying the factors that impact children and young people's (CYP) involvement in design processes, rather than purely theoretical knowledge generation. Instrumentalism naturally connects with user-centred design and design science approaches, as these methods are iterative, solution-focused, and focus on the development of usable products, services, or frameworks. This pragmatic stance also supports qualitative and empathetic inquiry, positioning end-users (in this case, CYP) as essential collaborators of whether solutions are appropriate and effective, rather than relying solely on researcher assumptions. My positionality is shaped by over 10 years of experience working in and out of higher education within digital games and health technologies, which influences how I approach research problems by viewing them through the lens of design, development, and real-world implementation.

Therefore, this thesis employs a design science research (DSR) methodology integrated with qualitative inquiry to explore CYP involvement in the design of applied games for mental health. DSR is particularly appropriate for this research because it aims to create novel solutions via frameworks, methods, models, or tools, that address practical problems. The DSR framework consists of three interconnected cycles (Hevner and Chatterjee, 2010):

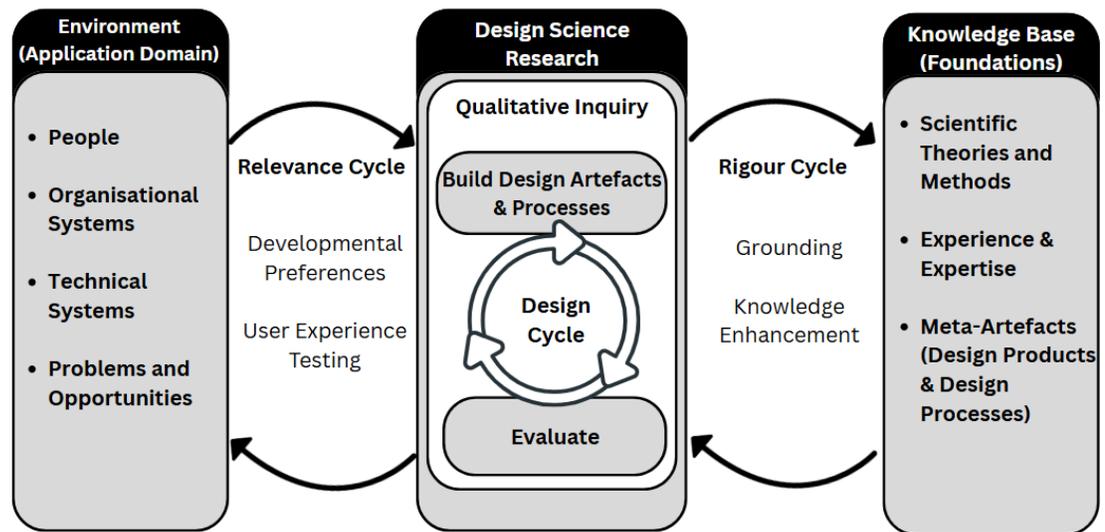


Figure 1.1: Research Methods: Design Science Research and Qualitative Inquiry, own image based on (Hevner and Chatterjee, 2010)

1. The Rigour Cycle: Provides knowledge enhancement exploring foundational literature, methods, and artifacts, ensuring the research builds upon established expertise.
2. The Relevance Cycle: Ensures the research addresses real-world problems by examining the contextual environment where CYP are involved in design processes.
3. The Design Cycle: Involves iterative design, development, and evaluation of solutions—in this case, exploring factors and considerations for co-designing with CYP.

Qualitative inquiry is embedded within the design cycle to ensure CYP are active participants in evaluating the design process, activities, and outcomes, rather than passive subjects of study. This participatory approach aligns with my epistemological commitment to centring users' perspectives in determining what constitutes effective practice. Figure 1.1 is a representation of both DSR and qualitative inquiry for how this thesis approached the research question.

By combining DSR with qualitative inquiry, this research bridges theory and practice, generating knowledge about CYP's involvement and actionable guidance for practitioners designing applied games with young people. This is presented in the following chapters where I discuss 1) the background literature and conducting a systematic review, (Chapters 2, and 3, 2) Generating knowledge about CYPs involvement in Chapter 4, and 3) presenting actionable guidance from conducted workshops (Chapter 5 and evaluation (Chapter 6). To provide a brief roadmap, I have provided an outline of methods under the framing of the DSR framework.

### 1.2.1 The Rigour Cycle

Chapters 2 and 3 together constitute the rigour cycle of this thesis, drawing on two key sources of knowledge: prior experience and existing artefacts and solutions. Chapter 2 provides foundational background on applied games, user involvement, and methodological approaches for involving users in the design of applied games. This synthesis highlighted a gap in understanding which methods are successful at involving CYP in game design. Addressing this gap, Chapter 3 presents the first empirical study in the form of a systematic review of CYP involvement in applied game design. A systematic search and selection process was employed, alongside inductive qualitative content analysis (Miles et al., 2014; Vears and Gillam, 2022), to break down textual data into categories and frequencies, enabling the identification and categorisation of factors influencing CYP involvement across studies. Together, these chapters provide a state-of-the-art account of existing expertise and frameworks, addressing the questions of *how CYP have been involved in designing applied games for mental health* and *what constitutes ‘successful’ participation in applied game design*. This foundational knowledge informs and contextualises subsequent research, with findings iteratively situated back within the rigour cycle throughout the thesis and synthesised in Chapter 7. Both chapters support, but remain supplementary to, the central design cycle of DSR, which focuses on the development of the artefact or solution.

### 1.2.2 The Relevance Cycle

The relevance cycle of this thesis addresses where the research applies and how it engages with the people, systems, technologies, problems, and opportunities within its contextual environment (Hevner and Chatterjee, 2010). This cycle bridges the research context with design activities, establishing how the research seeks to improve that environment by accounting for users’ developmental preferences and lived experiences. Chapter 4 contributes to this cycle through semi-structured interviews with facilitators who have lived experience of conducting or participating in workshops with CYP to design technologies, including games and related digital tools. These interviews explored how facilitators considered CYP experiences, supported participation and collaboration, and navigated the challenges of involving children in design processes. Reflexive thematic analysis was employed to analyse the data, providing transparency regarding my positionality and situating the findings within my epistemological stance Braun and Clarke (2021). In parallel, Chapter 2 contextualises the relevance cycle by describing persistent challenges in involving CYP in game design, differences between working with children and adults, and the potential impacts of CYP involvement. Together, these chapters address the research questions of *how CYP have been involved in the design of applied games for mental health* and *what factors impact CYP’s participation and engagement*. The relevance cycle underscores the importance of understanding how research affects people, systems, problems, and opportunities, and emphasises the need to test design solutions within the intended environment.

### 1.2.3 The Design Cycle

Chapters 5 and 6 present the qualitative workshops and subsequent synthesis of findings, representing the culmination of the rigour and relevance cycles within the design cycle of this thesis. These chapters describe a series of iterative workshops conducted with CYP to co-design applied games for mental health. In adopting an iterative qualitative inquiry, the workshop design was informed by design-based research (Armstrong et al., 2020; Council, 2019), with structured stages for review and reflection that enabled ongoing refinement of the workshop activities. Data collection comprised a combination of audio recordings and field notes to capture observations of co-designing with CYP. The data were analysed using Deductive Qualitative Analysis (DQA), which integrates deductive and inductive approaches to engage with existing evidence while developing theory that better fits the present sample and phenomenon under examination (Fife and Gossner, 2024).

The design cycle centres on iterating a workshop-based approach to co-design with children and young people, addressing the research questions of *the implications of specific factors (such as CYP's comprehension) on the games produced and the factors that impact CYP's participation and engagement*. Rather than producing a prescriptive method, the outcome of this cycle is a set of reflective factors and considerations for involving CYP in the design of applied games. These factors are traced across the thesis, emerging from foundational observations in Chapter 3, explored through facilitator expertise in Chapter 4, and culminating in reflective synthesis through the design and analysis of workshops in Chapters 5 and 6. The design cycle purposefully embraces qualitative inquiry, ensuring CYP are actively involved not only in designing applied games, but also in reflecting on the workshops, activities, and the co-design process as a whole. The design science research method grounds the research question in rigorous foundation research, considers the contextual application and environment, and considers these throughout the design cycle.

### 1.2.4 Ethics Statement

All research conducted as part of this thesis was ethically considered, especially when involving children and young people. To ensure a high standard of ethics, the following actions were taken:

- **University Ethical Approval.** All three studies conducted as part of this research sought and received ethical approval from the University of York
- **School Ethical Approval.** Concerning the workshops, one of them was located at a school where appropriate gatekeepers and safeguarders were consulted on the ethical participation of students.
- **Background and Disclosure Approval.** With the work with young people, I ensured I was approved to work with young people and locations for workshops were suitable and safe for young people.
- **Participant Consent.** Before the two user studies, I ensured participants fully understood the nature and purpose of the study, why and what data was being collected,

and that informed consent was provided. In the case of children and young people, both parents/caregivers and children were given individual participant information sheets (see Appendix H)

- **Data Protection.** All data collected was securely stored using the University's software in password-protected files and complied with the General Data Protection Regulation (GDPR). Additionally, the data handling adhered to the University's guidelines on data protection (<https://www.york.ac.uk/library/info-for/researchers/data/ethical-legal/>).
- **Data Anonymization.** All of the data has been anonymised, and to have greater transparency, there are data sets in the appendices and available on Open Science Framework, Appendix D. I ensured that the data has been sufficiently anonymised by combing for identifiable information and redacting references to locations, names, or other identifiable information.

### 1.3 Thesis Structure

The following section provides an overview of the thesis chapters:

- **Chapter 1 Introduction** - Provides a short overview of the purpose and rationale. In addition to providing an ethics statement and overall research methods.
- **Chapter 2 Literature Review** - The literature review provides a linear background examining the goal of applied games, participatory methods across disciplines, methods for involving young people and the discussions around participation.
- **Chapter 3 Systematic Review** - This chapter presents the first study where I systemically searched and analysed the wider literature surrounding children and young people's involvement in the design process for applied games or similar interventions.
- **Chapter 4 Interviews with Co-designers** - The systematic review presented interesting findings regarding some of the factors that impact young people's facilitation and participant engagement. However, the systematic review concluded little reporting of how CYP are involved in the co-design of games. Because of this, this chapter details in-depth interviews with co-designers.
- **Chapter 5 Design and Delivery of Workshops with CYP** - This chapter details the design of co-design workshops with children and young people. Specifically, it provides a high-level overview of each workshop and a personal design-based research reflection on the design and delivery of workshops.
- **Chapter 6 Analysis of Workshops** - Following the design and delivery of workshops, this chapter is dedicated to analysing the qualitative data recorded from the workshops. Through analysis of voice recording and ethnographic field notes, this chapter presents the factors of participation and engagement.
- **Chapter 7 Discussion and Conclusion** - The final chapter of the thesis ties together the findings from all three studies, discussing the contradictions and coherence with wider literature. In addition, I present recommendations for designers, researchers, and children who are participating in co-design-like methods going forward.

## 1.4 Contributions

This thesis examines the intersection of co-design, game design, and mental health awareness in relation to children and young people. It examines the challenges and opportunities in engaging CYP in applied game co-design, particularly in fostering their comprehension of design methods, applied game design, and mental health. The contributions of this research can be categorised into the following key areas:

### 1.4.1 Short, Targeted Roles are More Achievable for CYP

Though it was not an intended goal of this thesis, it does contribute to ongoing discussions about what constitutes ‘successful’ participation in co-design with young people. Through interviews with practitioners and empirical studies, the research challenges the notion that deeper participation is inherently better. Instead, the findings suggest that CYP’s roles as validators, testers, or informants may be more achievable and familiar within the constraints of short-term participation. While longer-term engagement may facilitate deeper involvement, this thesis suggests that increased participation, such as deeper roles, does not equal high quality games. In contrast, shorter targeted roles are more achievable and productive for the overall co-design process.

### 1.4.2 Increased Participation Does Not Equal High-Quality Games

The thesis also examines the relationship between co-design participation and the quality of game prototypes. Prior research has measured the success of applied game design by factors such as engagement, adherence, and societal impact (Schepers et al., 2018a; Waddington et al., 2015; Regal et al., 2020). However, this study finds that CYP participation does not necessarily result in high-quality, cohesive prototypes, as most participants struggled to integrate both entertainment and applied (mental health) elements into their designs. This raises questions about the feasibility of expecting CYP to co-design functional, contextually relevant, applied games without extensive guidance.

By critically examining the expectations of CYP’s design contributions, this research contributes to more pragmatic co-design methodologies that consider the limitations of young participants while valuing their creativity and lived experiences.

### 1.4.3 CYP Preference for Digital over Paper Interaction

This thesis identifies a gap between CYP’s game literacy (i.e., their familiarity with playing games) and their game design comprehension (i.e., their ability to deconstruct familiar games and create new games). The findings demonstrate that while CYP are highly literate in playing games, they often struggle to articulate the mechanics, interactions, and design choices that shape the game’s design. This aligns with prior research suggesting game design knowledge is not widely understood outside of the game development community (Engström, 2020; Khaled and Vasalou, 2014). Additionally, Chapter 6 details how accessible game

creation tools (e.g., level editors, modding tools, creative games such as *Roblox* (Roblox Corporation, 2006) and *Minecraft* (Mojang Studios, 2009) may create conceptions about the complexity of game development, leading to unrealistic expectations about the game-making process during CYPs' involvement in the co-design of applied games.

#### 1.4.4 Evaluating the Effectiveness of Co-Design in Improving Comprehension

Another contribution of this thesis is its evaluation of whether co-design methods effectively improve comprehension of game design, anxiety disorders, or design thinking in young participants. Children's comprehension and understanding of key topic areas have been scarcely discussed in relation to their influence on participant engagement, adherence, and ability to contribute. If children are unaware of the steps involved in designing a game, their involvement in co-designing it is significantly more challenging. I found that while participatory design can engage CYP in the game development, it does not necessarily improve their understanding of game design or mental health concepts. Different approaches to informing comprehension (flashcards, facilitator-led discussions, and self-guided learning etc.) were tested, yet they yielded limited success in enhancing comprehension. This could be seen as a limitation of the research. However, interactive, hands-on engagement with games and digital tools led to higher levels of interest and ideation <sup>2</sup>

Furthermore, this research suggests that learning fatigue, where children have a threshold on how much learning they are open to, may play a role in limiting comprehension gains, as CYP were expected to engage with multiple domains simultaneously (game design, mental health, and collaborative co-design). Participant comprehension of design and a target domain, e.g. mental health, is considered a key success factor in participatory design, and the literature widely suggests that any form of co-design facilitates comprehension. In contrast, I found that co-design enhances engagement, but not necessarily understanding. This can be achieved through a more 'breadcrumb' approach (see Chapter 4) and structuring onboarding and sensitisation techniques (Bossavit and Parsons, 2016a; Bossen et al., 2016; Hourcade, 2015).

#### 1.4.5 Identifying Key Factors That Influence Co-Design Facilitation

This thesis makes a significant contribution by examining the impact of facilitation strategies on the effectiveness of co-designing applied games. The thesis finds that behaviour challenges, shifting interaction preferences, and inclusive participation spaces are crucial in shaping participation outcomes. Yet, these factors are under-explored in human-computer interaction (HCI) and co-design literature.

Key insights include:

- Behavioural challenges – Disruptions and disengagement by participants can impact

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<sup>2</sup>The formation of ideas or concepts. Not to be mistaken with the mental health connotation of paranoid ideation, suggesting that alternative methods may be needed to support knowledge acquisition in participatory contexts.

overall workshop success, yet this issue is rarely discussed in participatory design literature.

- Shifting interaction preferences – CYP increasingly prefer digital interaction methods over traditional paper-based prototyping, suggesting the need for revised methodologies.
- Creating inclusive participation spaces – Effective co-design requires facilitation approaches that actively support CYP’s comfort, confidence, and quality of contribution.

### 1.4.6 Recommendations for Designers, Researchers and Young People

This thesis provides a series of practical recommendations for designers, researchers, and young people engaged in the co-design of applied games. Drawing on empirical findings from workshops, interviews, and a systematic review, this study highlights strategies to make co-design processes more inclusive, meaningful, and developmentally appropriate. For designers, the findings advocate for small team formats, familiar environments, accessible tools, and more thoughtful onboarding and feedback processes to improve engagement and communication. For researchers, the recommendations call for greater methodological transparency, reflection on the role and purpose of CYP involvement, and the development of innovative, age-appropriate approaches to data collection. For CYP, the thesis underscores the value of co-design as a novel and empowering experience, especially for underserved groups, and emphasises the importance of playful, appropriate participation through familiar digital tools. Together, these insights aim to inform more ethical, effective, and child-centred practices in the design of applied games.

This thesis extends prior work by spotlighting that co-design facilitation is about structuring engagement and managing social and behavioural dynamics to create meaningful and productive participation experiences. Engagement in co-designing games is often assumed due to the ‘engaging potential’ of games, but the assumption does not extend to the involvement of CYP. I found that engagement depends not only on structure but also on considerations of children’s developmental age, their expectations of game design, comprehension of game design, and mental health. Disciplines such as education may have already addressed the social and behavioural dynamics of involving CYP. Still, within the context of applied games, there are too few considerations for mitigating these behavioural dynamics. I present how structured activities, digital interaction methods, inclusive participation spaces and careful facilitation can overcome challenges to participant experience. Overall, this thesis challenges simplistic assumptions about the effectiveness of co-design in improving comprehension and generating high-quality outcomes. Instead, it draws attention to the interplay between participation depth, educational impact, and facilitation strategies.

## 1.5 Summary

This introduction presents the core objectives of this thesis and outlines the primary motivation for this research. The research aims to elevate questions around how applied games have been designed and how children and young people have been involved. The case study of this research considers how applied games for mental health are designed. I discuss the

prevalent challenge of growing mental health needs, the support games can offer and the areas where games have been trying to move towards cohesive experiences. However, with unclear approaches to designing applied games with and for CYP, this thesis will explore how to involve CYP in the design process. The next chapter discusses the broader literature on designing applied games.

## Chapter 2

# Laying the Foundation: Definitions and Background Literature Review

### 2.1 Introduction

The following chapter discusses the broader literature surrounding the design of applied games, participatory design, game design, and design processes with CYP. As the design of applied games is a widely discussed field, it's essential to understand what applied games mean within the context of this thesis before discussing their design and development. Therefore, the first step is establishing what 'applied game design' is and what it constitutes. Establishing the goal of an applied game helps us understand why we design applied games. The next step is exploring the design approaches to applied games, specifically those considering young people within the design process. Finally, the literature review discusses integrating these areas, how children and young people are involved in applied game design, designing with them, and what 'good' participation looks like. The chapter contains the following sections:

- **2.2 What is Applied Game Design?** Building on the introduction, this section defines an applied game for the thesis and summarises the goals of applied game design.
- **2.3 Design process of Applied Game Design.** After establishing the goal of applied games, this section discusses the key aspects of designing applied games and wider design philosophy.
- **2.4 Designing with end-users.** This section describes the involvement of end-users in the design of games, encompassing role, purpose and impact of involving end-users in design.
- **2.5 Methodological approaches to involving users.** This section describes the varying disciplines of user involvement. It discusses methods involving users, such as participatory design, design-based research, human-computer interaction approaches, and, more specifically, child-computer interaction.
- **2.6 Benefits and Challenges of Involving Young People.** Describes the current

benefits and challenges of involving children and young people in design and the key differences from adults.

- **2.7 Ensuring ‘successful’ or ‘good’ participation.** Cumulative discussion regarding engagement and participation across design processes. What does participation mean when designing applied games with young people?
- **2.9 Summary.** The closing section restates the goals of an applied game and the challenges of involving young people in design, reinforcing the motivation for my research.

## 2.2 What is Applied Game Design?

A game is a system of rules where players strive to achieve a specific outcome through a series of decisions (Tekinbas and Zimmerman, 2003; Juul et al., 2003). Game design is the process of creating mechanics, systems, and rules to create a game (Tekinbas and Zimmerman, 2003). It involves conceptualising an idea and defining players’ intended experiences and interactions. Where applied game design differs is in the purpose and goal. Applied game design focuses on transferring game design concepts to non-game contexts (Hrehovcsik et al., 2014). In addition, applied games (or serious games) often aim to achieve two goals: maintaining the entertainment aspects while supporting the ‘applied’ context. The discussion around defining applied games design has multiple views including, creating an educational purpose (Abt, 1987; Gee, 2003), aiming to solve existing challenges (Deterding et al., 2011; Fleming et al., 2017), exploiting new opportunities in industries outside entertainment (Pensak et al., 2020; Kangas, 2010; Kelley et al., 2017), developing a product further (Arnab et al., 2015; Zelenko et al., 2014), or more frequent in academia, creating new experiences by building in user experience skills and knowledge (Khaled and Vasalou, 2014; Deterding, 2012; Jessen et al., 2018). With the varied definitions of applied game design, it is perhaps easier to look at the goals of applied game design.

The goals of applied game design can be multifaceted and extend beyond entertainment. Applied games can focus on learning and skills development, whereas applied game *design* aims to facilitate knowledge or skill acquisition (Stafford and Vaci, 2022; Kalyn et al., 2015). These games are experiences that develop cognitive, emotional, or physical development. Educational and mental health games often focus on supporting learning through applied game design (Starks, 2014; Gee, 2003; Whitton, 2009). Though games for education and digital games for education can impact skills development, it is not the focus here. Here I am concerned with the design approach in creating applied games for mental health, examining the systematic steps to creating an applied game.

There are problem-solving and persuasive games where the goals focus on teaching players how to solve problems through the gameplay experience, often within the thematic context of the game or the narrative (Whitton, 2009; Bogost, 2007). Their approach is more delicate by promoting reflection through gameplay (Iacovides et al., 2022; Khaled et al., 2007) or challenging player perspectives, often through narrative storytelling (Whitby et al., 2019). Applied games can focus on supporting processes that help users structure, restructure, and facilitate or provide feedback to players to support their growth (Schmidt et al., 2015;



Figure 2.1: *Alba: A Wildlife Adventure* promoting the awareness of mankind’s impact on animals (Ustwo, 2020)

Tsvyatkova and Storni, 2019). Applied games like *Alba: A Wildlife Adventure* (Ustwo, 2020) (see Figure 2.1) promote awareness of a topic to inform players through play. Informing players to support behaviour change is a predominant goal in applied games designed via academia to change players’ behaviour through gameplay, whether actively changing attitude or promoting reflection (Klasnja et al., 2011; Whitby et al., 2019).

By far, the most predominant challenge of applied games is merging and balancing the goal of entertainment with the goal of an applied context. A challenge for designers is how games can present varied outcomes (Juul et al., 2003), bearing in mind that players can experience games differently, often beyond the designer’s control (Hunicke et al., 2004). This can also be an advantage of games, providing players with multiple paths and opportunities towards a goal that other methods can’t offer (Brathwaite and Schreiber, 2011). On the other hand, games can be more significant time investments to players, requiring a balancing of short-term and long-term goals (Bycer, 2016; Tekinbas and Zimmerman, 2003). Bycer (2016) described how a game like *The Binding of Isaac* (Edmund McMillen and Florian Himsl, 2011) “has multiple achievements of various lengths and challenges to go after, making sure the player is always finding new stuff and rewards”. Players need to be given feedback, regardless of whether the feedback is about success or failure. The literature has not broadly discussed how an applied game achieves a goal. What is the measure of success if an applied game takes 10 hours to reach a learning outcome, but a player gives up in 2 hours?

When considering the design of commercial games, there are often numerous short-term goals the player can pursue for quick rewards or a sense of achievement, rather than the overarching long-term goal. Taking *Minecraft* (Mojang Studios, 2009) as an example, there are many short-term goals the player can achieve: creating a safe home, crafting better

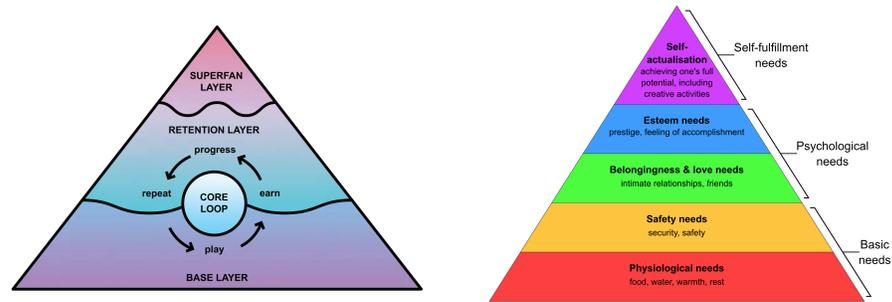


Figure 2.2: Left: Lovell’s Pyramid towards designing games (Lovell, 2018). Right: Maslow’s hierarchy of needs (Maslow, 1943)

tools, discovering diamonds, and reaching the nether <sup>1</sup>. The long-term goal would be to defeat the Ender Dragon <sup>2</sup>, but the player experiences many smaller goals and content to engage them (Bycer, 2016; Tekinbas and Zimmerman, 2003; Fullerton, 2008). Content within commercial games often reflects the ludic narrative of the game (Katona, 2013), where this is communicated via the environment and the player’s actions in the game world. Using another example, *Star Wars Fallen Order: Jedi Survivor* (Entertainment, 2023) has a lot of content for a player to focus on, with a variety of quests, exploration and upgrades presented as short-term goals. As the player progresses through *Jedi Survivor*, their options and decisions are often constrained and drawn towards a linear narrative. This is usually the case, given that only 10-15% of players will reach the end of a game (Tregonning, 2021). The design of commercial games typically has a lot more content to ‘hook’ the player into playing. For example, Lovell proposed a pyramid design structure towards commercial game development (see Figure 2.2) where the majority of players experience the base layer of content and some of the core loop of the game, but only a few may reach the higher retention or completion (Tregonning, 2021; Lovell, 2018). This is similar to Maslow (1943) hierarchy of needs and Lovell (2018) design pyramid of game design, see Figure 2.2, where base needs are required before users can progress to more complex needs and goals.

But why are these considerations important to applied game design? There are few discussions regarding the entertainment and engaging value of applied games. Where applied games have been used to engage users, evidence suggests that applied games are more motivating compared to other strategies (Vella et al., 2018; Laine and Lindberg, 2020), particularly concerning health and education. Sometimes, the content of applied games can result in unsuccessful user experiences (Vella et al., 2018). However, independent game developers are designing experiences such as *Alba* (Ustwo, 2020), *Spiritfarer* (Thunder Lotus Games, 2020) and *Rime* (Tequila Works, 2017) which touch on addressing education, awareness and mental health, but too few games are explicitly designed to support these areas and achieve wider reach (Fleming et al., 2019). Considering the growing interest in games, there is a question of whether the design process of applied games needs to adapt and change to design games that cater to the target audience. Careful design processes must consider both the entertainment and applied goals to provide an engaging experience, wherein the challenge to designers lies.

<sup>1</sup>A new area of the game to progress the game

<sup>2</sup>An end game boss which results in the game’s credits, though does not end play.

## 2.3 Design Process of Applied Game Design

Like the various goals of applied games, there are different approaches to the design process. The term ‘applied games’ is often used synonymously with ‘serious’ games, ‘edutainment’, games for health, ‘exergames’, etc., but there are specific differences often relating to the context and purpose. Thus, there are different approaches to designing applied games. Frameworks such as the mechanics’ dynamics aesthetics (MDA) (Hunicke et al., 2004), design play experience (DPA) (Winn, 2009), and transformational framework process (Culyba, 2018) present stages of design that culminate in the design of a desired experience. The latter example consists of eight topics for a design team to consider in the development of a game to fundamentally change players’ perceptions towards a specific context (Culyba, 2018). This differs from the MDA, which presents a framework for understanding the perspectives of design and consumption of games (Hunicke et al., 2004). The DPA framework builds upon the MDA to present a formal approach for designing serious games and its key components, such as learning, storytelling and user experience (Winn, 2009). Though these present a lens to design games, they lack key staples in ‘how’ to design them.

Researchers have proposed other approaches and techniques to address specific mental health areas, such as the Dual-Loop model, which helps designers balance therapeutic content with game design elements (Siriaraya et al., 2021); or the cognitive behavioural game design model for designing serious games around cognitive processes (Starks, 2014). These frameworks guide and structure the design and development of applied games. Still, there are too few reflective accounts of processes to validate whether these frameworks are A) effective at designing and developing applied games, and B) afford playful characteristic experiences expected of a game (Deterding, 2015; Bogost, 2015). Not to mention the additional challenges to consider when designing applied games.

### 2.3.1 Design Challenges

The design of applied games may encounter challenges such as engagement (Davies and Bergin, 2021), adherence (Bevan Jones et al., 2022; Fleming et al., 2019; Donkin et al., 2011) and acceptability (Bevan Jones et al., 2022; Carrasco, 2016; Bobier et al., 2013). Engagement<sup>3</sup> is regularly referenced as a supporting argument for using games in applied contexts such as mental health (Bijkerk et al., 2023; Hill et al., 2018). However, there is uncertainty as to what specific components result in perceived engagement from users (Halldorsson et al., 2021a; Mohr et al., 2013).

Furthermore, it is not understood what game design principles improve engagement with digital health technologies and to what extent they are informed by therapy techniques (Mader et al., 2012; Malinverni et al., 2017; Halldorsson et al., 2021a). Adherence to therapy techniques and acceptability by users (patients and therapists) in applied games is controversial. Where some report that games to support increased adherence to therapy (Haaranen et al., 2014; Carrasco, 2016; Hill et al., 2018), others report that digital methods require a blended approach to maintain adherence and acceptance through a balanced relationship between the applied context and the engagement of the game (Stawarz et al., 2020a,b). This again

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<sup>3</sup>where players/participants are curious, motivated and interested to interact

resurfaces the challenge faced by applied games, where game elements and therapeutic techniques are juxtaposed and not integrated into a coherent experience (Malinverni et al., 2017).

Risks of poorly applied game design principles can result in reduced appeal and reduced effectiveness of the game's purpose (Griffiths et al., 2017). Similarly, broader research (Zayeni et al., 2020) reported challenges where some games were designed as 'trial and error' learning, creating a disconnect in delivering meaningful change. In response to these challenges, designers have used prototyping, playtesting and iterative experimentation within the design process of applied games (Chen, 2019; Eladhari and Ollila, 2012).

With the challenge of balancing multiple goals and a mix of challenges such as engagement and adherence, the design process of applied games often involves an iterative process (Flanagan, 2009; Jiang et al., 2017; Council, 2019). Iterative design within applied game development commonly describes testing games to achieve the intended goals or to determine whether they provide the intended experience (Bromley, 2021; Drachen et al., 2018). Iterations in design are not exclusive to game design either, with design-based research (Armstrong et al., 2018; Easterday et al., 2014) and participatory design (Simonsen and Robertson, 2013) often employing iterations at different stages of the process. Stages such as prototyping, playtesting and design experimentation are a few examples of how designers explore design solutions to a problem (Abbas et al., 2018; Lee et al., 2019; Eladhari and Ollila, 2012).

Prototyping in the applied game design process can involve the use of paper prototypes or low-fidelity prototypes to test whether a solution achieves the goals before more extensive time and financial investment (Köhler et al., 2012; Abidin et al., 2019). Game developers such as Biome Collective employ toolkits to design paper prototypes with stakeholders, upskilling users and testing solutions before further development (Abbas and deMajo, 2025). Playtesting is more widespread in commercial development, where developers invite players to try out a game before release and garner feedback on the engagement, adherence and experience of a game (Game Maker's Toolkit, 2015). In applied game contexts, playtesting rarely occurs with stakeholders outside of testing the developed game with the target audience after development (Jiang et al., 2017; Saiger et al., 2023). Iterative experimentation of different ideas or solutions is rarely detailed in academic texts of applied games, with studies often focusing on outcome results over the development process (Maheu-Cadotte et al., 2021).

Within design research, playtesting and prototyping are crucial steps to save time and money and develop applied games adhering to the target goals. Refined solutions have been attributed to the use of iterative design steps (Alves and Hostins, 2019a; Cheng et al., 2018), exploring different opportunities (Aufegger et al., 2020) and considering end-user experience (Martens et al., 2018). The design process of developing a suitable idea is often omitted in the design of applied games, except for research involving users in the design process.

## 2.4 Designing with End-users

Designing with end-users, specifically in the design of applied games has resulted in; improved engagement (Malinverni et al., 2017; Merry et al., 2012), where end-users can provide feedback on the games intended experience; reduced risk on outcome product(Watkins et al., 2024),

where the result is more suitable for the target goals; provided cost-effective solutions (Abeles et al., 2009; Hill et al., 2018); improved stakeholder knowledge (Zhu et al., 2019), where designers are more informed on various stakeholders perceptions and experiences, and in some cases the generation of novel ideas (Vallentin-Holbech et al., 2020). The involvement of end-users can range from playtesting as previously discussed (Muñoz et al., 2019), to more collaborative roles as a designer (Ward et al., 2022). For this thesis, involvement refers to any end-user taking part in the design process, whatever the capacity.

Commonly in research, end-users are involved as interviewees or users, where end-users are interviewed for their perceptions and experiences around a specific area, which can inform the requirements and preferences of an applied game (Maheu-Cadotte et al., 2021). Alternatively, end-users may be used in a form of contextual observation or co-operative inquiry (Martens et al., 2018; Foss et al., 2013; Druin, 2002), where end-users may be observed in an environment to gather insights about their needs and behaviours. For example, Martens and colleagues' study conducted a mixture of contextual observation and ethnographic research to observe how end-users currently interact with a game to inform the design of their game (Martens et al., 2018).

End-users can be involved as informants or consultants who are brought into the design process at specific points in the design process (Kim et al., 2011), providing crucial feedback or insight when needed. Kim and colleagues suggest end-users are experts in what works for them and how they like to learn, providing benefits for designers and users. Co-designers or design partners (Simonsen and Robertson, 2013) are terms for when end-users are involved in more depth, often actively collaborating with designers and contributing design suggestions. More recent research has called for this deeper level of involvement when considering applied game design.

Involving end-users in the design of applied games is a growing area of interest. Reviews of research suggest that there has been an increase in the number of end-users involved in the design of applied games (Halldorsson et al., 2021a; Thabrew et al., 2018b; Maheu-Cadotte et al., 2018). More specifically, there is a shift from involving end-users in an informant or consultant role towards them being seen as co-designers and design partners (Halldorsson et al., 2021a; Maheu-Cadotte et al., 2021). The suggestion from wider research is that a *deeper* level of end-user involvement is necessary and *better* (Halldorsson et al., 2021a; Durl et al., 2017). The argument suggests that involving end-users in more collaborative roles provides designers with crucial insight into end-user requirements, particularly in the design of mental health interventions (Orlowski et al., 2015; Thabrew et al., 2018a).

The debate about whether users should act as informants or co-designers is an area of uncertainty in end-users' involvement in the design of applied games. DeSmet et al. (2016) and colleagues reviewed 61 studies, finding greater support for informant roles and that participatory design was more effective when applied to the game design elements rather than the health application. They analysed when user involvement occurred with specific game design elements, finding that end-users helped contribute to how the game design would be affected. However, out of all the studies, only 41% of game studies involved users as informants or co-designers, with user involvement at early stages surprisingly low (DeSmet et al., 2016).

Another study reported similar involvement with serious games developed through user-

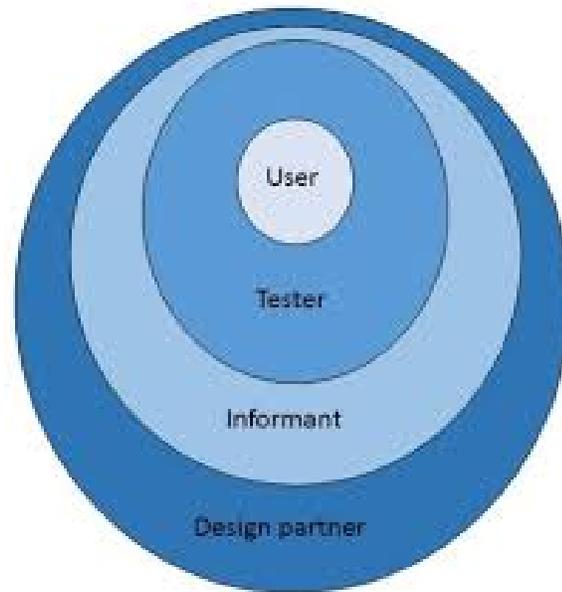


Figure 2.3: Druin’s Framework of Participation (Druin, 2002)

centred participatory design (Dekker and Williams, 2017). Dekker and Williams (2017) reported that of 20 serious games identified, 50% were developed with input from end-users, of which 70% acted as informants and the rest as co-designers. The hypothesis was that users in the studies needed sufficient subject-domain knowledge (e.g. knowledge of mental health in designing a mental health game) or design expertise to create a successful partnership with designers (DeSmet et al., 2016; Dekker and Williams, 2017). In addition, techniques such as storyboarding and paper prototyping may need to be adjusted to the level of user design experience that participants are capable of. These hypotheses are supported by similar evidence that suggests technology specifically for children and young people needs to be tailored to capabilities (Bevan Jones et al., 2020; Dekker and Williams, 2017).

### 2.4.1 Designing with Children and Young People

In the wider literature, user involvement methods have been used to involve CYP in the design process, though their role can differ. Druin (2002) detailed four levels of the role CYP can play: users, testers, informants, and design partners (see 2.3). Users in research are often asked to give ratings on a technology or prototype, whereas testers tend to interact with technology. The role of informants, or informant design, involves CYP in specific stages of a design process, where they may give feedback to help shape the outcome. Finally, a design partner sees CYP acting as a ‘co-designer’ and being involved in the design process as a whole (Simonsen and Robertson, 2013).

These roles can helpfully articulate the level of involvement CYP plays in user involvement methods for the design of games. However, it is unclear how CYP is involved and what occurs

during the user involvement process (Larsson et al., 2018; Maheu-Cadotte et al., 2021; Saiger et al., 2023). Due to differences in terminology and practice between disciplines, a common or best practice approach is not clear from the literature (Preston et al., 2023). Studies have discussed the lack of detail regarding co-design (Bevan Jones et al., 2020), consideration of developmental preferences (Malinverni et al., 2017), variety in practice (Halldorsson et al., 2021a; Preston et al., 2023), and evaluation of the engagement of CYP involved (Hill et al., 2018; Preston et al., 2023).

In most cases, it seems research has been focused on the outcome quality (i.e. the game prototype produced), and little reflection has gone into the process itself (Saiger et al., 2023). With various approaches to designing mental health games with CYP, it would not be feasible to propose a one-fits-all method, nor would it be respectful of Simonsen and Robertson (2013) philosophy where participatory design (PD) doesn't need to follow a rigid structure. They outline that PD enables every participant to have a voice in technology design (Simonsen and Robertson, 2013). However, this presents a methodological challenge to research.

## 2.5 Methodological Approaches to Involving Users

Exploring the wider literature around involving users, these 'user involvement methods' tended to include users in some parts of the design process. User involvement methods are an umbrella term to encompass methods that involve users in designing a solution (Larsson et al., 2018; Saiger et al., 2023). In the context of this research, involvement describes the level of depth a participant can be involved, whether passive (e.g. being informed) or active (e.g. giving feedback). The roles outlined by Druin (2002) give an example of how involvement may be presented. Examples of these methods differ between disciplines and include participatory design (PD), co-design, co-production, user research, collaborative design, and patient-person involvement (PPI/PPIE).

Participatory design, known initially as cooperative design, emerged in Scandinavia during the 1960s and 1970s as a response to traditional top-down design approaches (Simonsen and Robertson, 2013). The methodology aimed to actively involve all stakeholders, including end-users, in the design process to create products and systems that better meet their needs. Initially focused on workplace democracy and empowering workers in the design of their tools and environments, participatory design has since evolved to encompass a wide range of industries, including digital interventions (Halldorsson et al., 2021a), urban planning (Bagley and Shaffer, 2009), and growing use in healthcare (Brett et al., 2014b; Stawarz et al., 2020a; Thabrew et al., 2018b).

Research suggests that designers working in co-design environments generate more innovative concepts and ideas compared to those working individually (Vallentin-Holbech et al., 2020; Brett et al., 2014b). However, there are also challenges to participatory design; time and resource constraints often pose difficulties, as the process can be lengthy and resource-intensive due to the involvement of multiple stakeholders and iterative collaboration (Thabrew et al., 2018b; Aufegger et al., 2020). This may conflict with tight project timelines or budget limitations, particularly in academic and game development. Managing diverse opinions and expectations from various participants can also be challenging, potentially leading to frustration if not handled effectively (Thabrew et al., 2018b). Ensuring meaningful

participation is another hurdle, especially when participants lack familiarity with design processes or tools (see 2.7).

Additionally, balancing professional expertise with user input can be challenging, as it's essential to value user contributions while maintaining design direction (Waddington et al., 2015). Achieving diverse representation among participants is crucial but often tricky, as some groups may be inadvertently excluded, leading to a biased or incomplete understanding of user needs. For example, (Khaled and Vasalou, 2014) discussed how young girls involved in the co-design of games often became shy and quiet when boys were speaking.

In design research, there are varied approaches to designing a product or service. Design-based research (DBR) addresses complex learning environments and produces both practical and theoretical outcomes in research. It combines design, research, and practice elements to create and study interventions in real-world educational settings (Collins et al., 2004). Proposed initially as 'design experiments' in the early 90's it has grown to address challenges in engineering (Anderson and Algozzine, 2007), physics (Ullah et al., 2022) and learning (Collins et al., 2004). Today, DBR is used more widely as an iterative process to develop and test a product or service, critically analysing, exploring, designing and reflecting (Armstrong et al., 2018; Easterday et al., 2014; Macklin and Sharp, 2016).

Some games for health have implemented user involvement methods to deliver solutions to problems (Larsson et al., 2018; Rouncefield-Swales et al., 2021; Halldorsson et al., 2021a; Bevan Jones et al., 2020). These methods give end-users a 'voice' in the design of products or services (Bossavit and Parsons, 2016a; Muller and Druin, 2002; Vallentin-Holbech et al., 2020). However, there is very little guidance on how to successfully involve young people in the design and development of applied games (Bevan Jones et al., 2020; Halldorsson et al., 2021a; Thabrew et al., 2018b). Evidence has reported varied approaches in methods and a lack of documenting what was done during user involvement methods (Fleming et al., 2021; Halldorsson et al., 2021a; Vandekerckhove et al., 2020). Furthermore, previous research has observed a lack of transparency regarding how user involvement methods are conducted, what activities are performed, and how engaging the design process is to participants (Bergin et al., 2020; Fleming et al., 2021; Halldorsson et al., 2021a).

Studies have also discussed the lack of detail regarding co-design (Bevan Jones et al., 2020), considering developmental preferences, variety in practice (Halldorsson et al., 2021a), and evaluating the engagement of CYP involved (Hill et al., 2018). Too often, research has focused on the outcome quality (i.e., the game prototype produced), and little reflection has been given to the process. But co-design is tricky to discern; there are still widespread concerns of co-design, co-production, or co-creation being tokenistic, lacking value and meaningful participation of end-users (Ward et al., 2022; Singh et al., 2023; Grindell et al., 2022; Perikangas, 2024). This scepticism arises from concerns that co-design approaches often fail to incorporate genuine power-sharing between stakeholders, leading to superficial involvement rather than a substantive influence on outcomes (Slattery et al., 2020; Singh et al., 2023).

Existing hierarchies can also undermine co-design efforts, where professionals retain decision-making authority while merely consulting end-users in a limited capacity (Greenhalgh et al., 2016; Wherton et al., 2015). Moreover, challenges such as time constraints, resource limitations, and misalignment of expectations can further hinder meaningful engagement,

reducing co-design to a performative exercise rather than an inclusive and transformative process (Palmer et al., 2019; Perikangas, 2024). Addressing these issues requires a shift toward a more equitable power balance, where user involvement is detailed more transparently and the involvement process is clear to all stakeholders.

In summary, there is a lack of transparency on how to conduct methods with users, with challenges around balancing viewpoints of each stakeholder and ensuring diverse representation. Further, there is uncertainty in understanding user contributions, whether feedback is seen as a contribution or whether ‘deeper’ co-development is more appropriate. Power-sharing and meaningful engagement also present areas to consider when involving users which by their own right, present different tangents of research. Altogether, this culminates towards the question of “what happens in user involvement methods?”

### 2.5.1 Human-Computer Interaction (HCI) and Child-Computer Interaction (CCI)

Within Human-Computer Interaction (HCI) and Child-Computer Interaction (CCI), participatory methods have aimed to ensure users, particularly young people, are meaningfully engaged in technology design (Druin, 2002; Hourcade, 2015). Participatory Design (PD) is particularly significant in this field, particularly Druin’s work on cooperative inquiry (Druin, 2002; Guha et al., 2013). Druin’s “*onion model*” remains an influential framework for categorising children’s roles in PD, assisting designers and researchers in labelling roles between users, testers, informants, and design partners (Druin, 2002; Iversen et al., 2017). These roles define the different levels of participation children may take in the design process, from passive users to active contributors shaping technology.

More recent studies have expanded and diversified PD approaches, refining methods for including children in design processes. Read and colleagues (Read et al., 2013b) argue that PD has evolved beyond a technique into a philosophy that prioritises the active involvement of end-users (Hourcade, 2015). Similarly, Simonsen and Robertson (2013)’s “pragmatic PD” concept described the importance of mutual learning between developers and users, ensuring children are participants and informed decision-makers in design processes.

On the other hand, user-centred design approaches take a step back from involving users and examining users via ethnographic methods. These methods align with commercial design approaches to observe and report on users’ needs and experiences (Marti et al., 2016). Alongside user-centred design, we can also consider participants’ user experience, how their experience is shaped by their involvement or interaction with a product or service (Bromley, 2021). User experience methods closely examine whether goals are met and desired experiences are achieved. For example, this could be to examine how user motivation affects learning in digital games (Alexiou and Schippers, 2018).

PD research has also explored specific methodologies for engaging children with diverse needs. Iversen and colleagues (Iversen and Brodersen, 2008) emphasise the increasing sophistication of PD techniques, including frameworks designed to assess children’s group dynamics and values (Van Mechelen et al., 2019), as well as methods such as Rapid Analysis of Design Ideas to facilitate ethical and inclusive evaluation of children’s contributions (Read et al.,

2016). Beyond traditional PD, more inclusive co-design methods have emerged, focusing on young people’s agency and expertise (Fitton et al., 2016; Walsh et al., 2016; Malinverni et al., 2017). For example, Walsh and colleagues demonstrated how remote and flexible co-design approaches enable children to participate when they might otherwise be excluded due to accessibility barriers (Walsh et al., 2016).

### 2.5.2 Participatory Design in Health Research: Patient and Public Involvement (PPI)

Beyond HCI and CCI, health research has also embraced participatory methodologies, mainly through Patient and Public Involvement (PPI). In this context, frameworks such as Arnstein’s ladder of participation (Arnstein, 1969) and the INVOLVE guidelines focus on the importance of moving beyond tokenistic engagement to co-production models where patients shape research questions, study design, and knowledge translation (Greenhalgh et al., 2016; Staniszewska et al., 2018; Authority, 2025).

Participatory Action Research (PAR) is a widely adopted approach that prioritises co-learning between researchers and participants, ensuring those with lived experiences actively contribute to shaping the research agenda (Pratt, 2022; Heard, 2023; Kang et al., 2021). However, power imbalances, representational diversity, and sustaining engagement remain significant barriers in PPI (Brett et al., 2014a,b). Brett et al. (2014b) suggested that a lack of preparation and training can make participants unable to contribute meaningfully. However, researchers often struggle to integrate PPI effectively due to time and funding constraints.

A study by Preston et al. (2023) and colleagues investigated the reported involvement of CYP in patient-person involvement methods and raised many concerns. The study signified the importance of PPI in aligning research more with public needs and examined who is involved, how they participate and the impact of their involvement. They reported that most studies under-report the participation of CYP and that broader reporting of *how* CYP are involved remains poor. In addition, many of the studies they sampled failed to document who was involved, the outcomes of participation and the impact of CYP participation. In digital health and similar fields, these findings are becoming more common. Hill et al. (2018) describes a growing need to evaluate interventions and establish formal evaluation of methodological approaches and their efficacy.

Across participatory design, co-design, Human-Computer Interaction (HCI), Child-Computer Interaction (CCI), and patient and public involvement (PPI) in health research, a common advantage is the emphasis on participatory and inclusive methodologies that prioritise end-user voices, ensuring that research and design outcomes are more relevant, user-centred, and impactful (Druin, 2002; Iversen et al., 2017; Hourcade, 2015). Though these methods stress the importance of incorporating the user’s voice into the design/service, there are varied challenges. For example, participatory design and design research are concerned with meaningful involvement or participation (Slattery et al., 2020; Iversen and Brodersen, 2008), whereas more exhaustive co-design studies have faced challenges of tokenistic involvement (Ward et al., 2022; Petrie et al., 2006).

In summary, there are a combination of barriers including poor or under-reporting of partici-

patory methods, scarce discussion on the engagement of users, the evaluation of interventions or proposed interventions, and understanding what was undertaken. These challenges in health research mirror issues found in PD and co-design with young people, where ensuring meaningful, non-tokenistic participation requires structured approaches that align with participant expectations and capabilities (Iversen et al., 2017; Slattery et al., 2020). Across each methodological approach, there appear to be these concerns of avoiding tokenistic participation, power imbalances, and difficulties sustaining long-term engagement (Brett et al., 2014a; Barendregt et al., 2016b). Structural barriers such as resource constraints and misalignment between researcher goals and participant expectations can further hinder meaningful involvement (Palmer et al., 2019; Cargo and Mercer, 2008).

## 2.6 Benefits and Challenges of Involving Young People

The previous section described varied methodological approaches towards involving users in the design of games and touched on some potential benefits and challenges of involving young people. In the introduction (Chapter 1), prior literature described how more and more young people are accessing and using technology, particularly games. However, few children experience the design process behind something like a game. The research questions concern the wider involvement of young people in the design process; therefore, the wider benefits and challenges of involving CYP in a design process should be considered.

A frequent advantage of involving children and young people (CYP) in a design process is the potential for skill development, self-growth, and increased agency (Mansilla et al., 2017; Kang et al., 2021; McAra, 2017). Participatory approaches provide CYP with opportunities to engage in creative problem-solving, critical thinking, and collaboration, essential competencies for academic and personal development (Fitton et al., 2016; Iversen et al., 2017). Designers and researchers, in turn, gain a deeper insight into the target audience and a more nuanced understanding of the problem space, leading to more user-centred and effective solutions (Durl et al., 2017; Thabrew et al., 2018b). Moreover, exposure to multidisciplinary collaboration in game design has fostered self-reflection and re-evaluation of future aspirations among young participants as they engage with roles and ideas they may not have previously considered (Reid, 2025).

Beyond cognitive and technical skills, CYP involvement in co-design can contribute to mental well-being and personal empowerment. Participation in decision-making can foster a sense of autonomy, agency, and ownership, reinforcing that their voices and ideas have tangible value (Barendregt et al., 2016b; Schepers et al., 2018a; Fitton et al., 2016). Studies have also highlighted how co-design experiences can enhance self-confidence, communication skills, and resilience as young people navigate challenges, provide feedback, and refine ideas in collaboration with adults and peers (Thabrew et al., 2018b; Leitão et al., 2019). Additionally, learning about game development, design thinking, and digital tools not only equips CYP with technical and digital literacy skills but also fosters a sense of curiosity and motivation to engage in STEM-related fields (Fitton et al., 2016; Tare and Guha, 2023).

Although prior research notes the challenges to engaging CYP with applied games, the involvement of CYP in the design of games can present enthusiasm, motivation and investment in the process, which can lead to sustained participation (Leitão et al., 2019; Bossavit and

Parsons, 2016a; Bonsignore et al., 2016). When CYPs are actively involved in the decision-making process, they can feel a stronger sense of ownership and responsibility, which enhances their engagement and commitment to the project (Thabrew et al., 2018b; Raman and French, 2021; Larsson et al., 2018). Additionally, the design process, such as incorporating interactive workshops, playful ideation sessions, and creative prototyping, can make participation more immersive and rewarding, further reinforcing motivation (Tare and Guha, 2023; Marti et al., 2016).

Through embedding elements of challenge, storytelling, and feedback, the co-design process can mirror aspects of game mechanics that naturally engage young people, increasing their enjoyment and willingness to contribute (Thabrew et al., 2018b; Khaled and Vasalou, 2014). Moreover, studies have shown that when CYP are actively involved in co-design, the resulting products tend to be more engaging, relevant, and appealing to their peers, as they better reflect users' preferences, needs, and lived experiences (Thabrew et al., 2018b; Benz et al., 2024; Bevan Jones et al., 2022). In some instances, studies have asserted the involvement of CYP have provided novel ideas that designers would not have conceived without expertise from end-users (Hourcade, 2015; Thang et al., 2008). On the other hand, there are those who position CYP do not have the necessary skills to participate in the co-design of games meaningfully, given that game design is so complex and the applied context presents an additional hurdle (Bevan Jones et al., 2020; DeSmet et al., 2016; Dekker and Williams, 2017).

The challenges in working with CYP are often under-reported within wider literature (Hill et al., 2018; Halldorsson et al., 2021a). Instead, high-level factors are suggested for designers and facilitators to be aware of. A recurring example is being aware of developmental age and preferences in young people (Halldorsson et al., 2021a). Sampling an age range of 10-11 does not necessarily mean activities and content that would be suitable for 10-year-olds will necessarily work. Children often have varied developmental ages and preferences, and there are growing calls for more transparency on how studies cater for diverse preferences (Orlowski et al., 2015; Halldorsson et al., 2021a). Studies involving CYP with learning or physical difficulties often include methods and strategies to accommodate participants (Anthony et al., 2012; Zhu et al., 2019). Still, in broader studies, there is scarce reporting of how designers and facilitators address developmental age (Halldorsson et al., 2021a). Menestrina et al. (2021) described how developmental age factored into CYP abilities to co-design, given their preferences for focusing on 'action' and 'fun' activities compared to the more technical dynamics of player interaction. In addition, there is the consideration of *learning fatigue*, where children may become tired or disengaged from wanting to upskill or learn more when involved in a design process (Durl et al., 2017).

Another challenge in facilitating user methods with CYP is the variable range of interventions (Bevan Jones et al., 2022; Halldorsson et al., 2021a). Broader literature reports that various interventions are often employed when working with CYP, mainly when designing applied games for health (Halldorsson et al., 2021a; Kendall, 2006). Numerous methods and interventions are usually trialled with little reporting on their effectiveness (Kendall, 2006; Durl et al., 2017; Green et al., 2020). On the other hand, there is a lack of variability regarding how game mechanisms are co-designed. Frequently, the outcome of co-designed applied games focuses on raising awareness of anxiety, but it is often unclear how the designs and input of children relate to the health outcome (Halldorsson et al., 2021a). Though there are benefits and challenges to involving CYP in the design of applied games (and broader interventions),

there is a lack of clarity when it comes to understanding the weight these factors carry. In addition, uncertainty about how to involve CYP meaningfully, in that their participation is not tokenistic, is rarely reported, and there is little reflection on how the design process is reflected upon.

## 2.7 Ensuring ‘Successful’ or ‘Good’ Participation

Exploring how to define *successful* participation in the design of applied games presents various interpretations but with no clear consensus across disciplines. Simonsen and Robertson (2013)’s Handbook on Participatory Design defines participation as a process of mutual learning, where participants engage in ”collective ‘reflection-in-action’” throughout the design process. However, what constitutes ‘good’ participation remains less clearly defined. Bowler and colleagues, for instance, examined participation in the context of co-designing with children, focusing on levels of engagement rather than on what makes participation truly effective (Bowler et al., 2021). Grey literature often suggests that ‘good’ participation means involving users in the design process to create solutions that meet their needs (Foundation, 2025b; Council, 2019). Yet, rather than offering a concrete definition, research frequently emphasises strategic steps to ensure meaningful participation. Several scholars have attempted to refine the concept of effective participation, building upon Simonsen and Robertson’s definition (Simonsen and Robertson, 2013).

Barendregt et al. (2016b) and colleagues suggest that meaningful participation is characterised by clear learning goals, ensuring that CYP contributes to a design they find personally significant. Alternatively, genuine participation has been framed as a condition for maximising user involvement, though definitions of what this entails remain inconsistent (Hawke et al., 2018; Zahlsen et al., 2022). Iivari and Kinnula (2016) discussed how power imbalances and adult-driven agendas often limit how children can meaningfully influence design outcomes. This aligns with broader concerns in HCI and CCI regarding tokenistic involvement and the difficulty of sustaining engagement over time (Ward et al., 2022; Petrie et al., 2006).

Vallentin-Holbech et al. (2020) and colleagues attempted to assess genuine participation but relied on existing participation models rather than proposing a distinct framework. Similarly, Raman and French (2021) defines genuine participation as transforming users from ”mere informants” to legitimate contributors in the design process (Iversen and Brodersen, 2008). In addition, Scaife and Yvonne (2023) proposes informant design as a model that involves children only at key points where their input is most valuable, offering a compromise between full co-design and more structured, researcher-led methodologies. Despite these discussions, the literature provides few explicit assertions on how to define ‘successful,’ ‘good,’ or ‘genuine’ participation.

Successful participation has been characterised by inclusivity, reciprocity, and shared decision-making, ensuring that those involved have a *genuine* impact on the process and outcomes (Hawke et al., 2018; Raman and French, 2021). Inclusivity is suggested to engage diverse perspectives, particularly those from marginalised or under-represented groups, ensuring that a broad range of experiences inform design and research (Malinverni et al., 2017; Walsh et al., 2016). Reciprocity focuses on mutual learning and benefit, meaning that both participants and designers gain from the process, whether in terms of skill development, knowledge exchange,

or personal development (Lundy, 2018; Bossavit and Parsons, 2016a). Additionally, flexibility is often referenced as a key characteristic for successful participation, requiring methods to suit the evolving needs, interests, and constraints of the participants (Iivari and Kinnula, 2016). Furthermore, trust and transparency are essential for ensuring that participants feel valued and respected throughout the process (Armstrong et al., 2023; Read and Horton, 2023).

Studies have demonstrated that participatory projects often fail when engagement is perceived as tokenistic, extractive, or lacking follow-through on participant input (Lundy, 2018; Halldorsson et al., 2021b). To avoid this, Lundy (2018) described a process of de-tokenization through four ‘F’s of feedback: 1) *Full* responses where adults engage with the substance and explain their response, 2) *Friendly* responses that consider the language and constructiveness given, 3) *Followed-up* where children should not be used in one-off experiences and should have tangible meaning to their participation, and 4) *Fast* where children ‘grow up’ fast, their contributions should have some immediate value to them or else they are in danger of ‘aging out’ of the product/service they were included in. The literature suggests that successful or good participation is not just about inviting people into the process, but also about ensuring they have agency, influence, and a meaningful stake in the outcomes (Shier, 2001; Lundy, 2018).

Researchers have positioned theoretical frameworks to conceptualise and evaluate participation to ensure participants have agency and a meaningful impact. One widely used model is Hart’s Ladder of Participation, which categorises involvement into eight levels, ranging from tokenistic participation (e.g., manipulation and decoration) to genuine empowerment (e.g., child-initiated and directed projects) (Hart et al., 2020). Hart’s model outlines the need for shared decision-making to achieve authentic engagement. Shier’s Pathways to Participation extends this approach by making it more adaptable for real-world implementation (Shier, 2001). Shier’s model differs from Hart’s by emphasising not just levels of engagement but also the structural mechanisms necessary for participation to be sustained such as; organisational commitment where participation is embedded at policy level (e.g. WHO expectation of users involved in design of new services (Organization, 2021)); and training for staff and facilitators to support youth participation.

In contrast, the prior mentioned Druin’s (2002) roles of children in technology design provide a more specific framework for child-computer interaction (CCI), outlining four roles: user, tester, informant, and design partner (Druin, 2002). This model is particularly relevant in co-design and applied game development, as it clarifies the nature and depth of children’s involvement at different stages. Unlike Hart and Shier, who focus on broader participatory structures, Druin’s model is more pragmatic, guiding designers in determining the most appropriate role for CYP within design processes. This model has been extended, where Iversen and colleagues comment on the position of CYP as protagonists, focusing less on design and more on how children can be empowered to shape technological developments (Iversen et al., 2017).

The success of participatory approaches depends on several key factors, including stakeholder selection, engagement strategies, methodological approach, communication methods, and resource allocation. Prior research has suggested how stakeholder selection is essential, as engaging the right mix of participants, such as young people, researchers, designers, and healthcare professionals, ensures that diverse perspectives are represented (Thabrew

et al., 2018b; Durl et al., 2017). However, stakeholder engagement requires trust to ensure participants feel valued and motivated to contribute meaningfully (Hawke et al., 2018). As previously discussed in this chapter, the methodological approach plays a fundamental role, with research suggesting that well-structured and flexible participatory methods lead to greater engagement and more meaningful contributions (Zahlsen et al., 2022). Additionally, clear and adaptive communication strategies are essential, ensuring that all stakeholders, particularly young participants, understand their role, expectations, and the impact of their involvement (Vallentin-Holbech et al., 2020; Druin, 2002; Hourcade, 2015). Resource allocation can be a significant barrier, as frameworks for participation suggest successful participation requires time, funding, and institutional support to sustain engagement throughout the design process (Shier, 2001; Strategies; Barcellini et al., 2015).

In summary, this section suggests the importance of carefully designed participation processes, emphasising stakeholder inclusion, communication, and resource investment as key success factors (Thabrew et al., 2018b; Durl et al., 2017). However, challenges in defining and evaluating participation effectiveness persist, with existing frameworks offering practical but incomplete measures of success (Hart et al., 2020; Shier, 2001). One notable gap is the lack of studies examining the impact of participation on young people, particularly regarding skill development, self-efficacy, and long-term engagement in design or research studies (Raman and French, 2021). There are too few considerations on how participatory experiences influence young people beyond the immediate project, as well as investigating how institutions can better embed participatory methods into practice and reduce the *unfamiliarity* of involving children and young people in research.

## 2.8 Contribution to the Literature

Exploring the literature on co-designing applied games with children and young people covers a range of topics, from the design of games themselves, defining applied games, design processes, designing with users, considerations for involving CYP and ensuring participation. Because of the breadth of this research, it could be confusing to know where this thesis positions itself. On one hand, we have design research discussing participatory design, whereas health research prescribes PPIE methods. We see areas of overlap, but we don't see many considerations for co-designing with CYP within the literature of applied games.

If we position involvement as the depth of how participants are involved, participation as the interactions, actions and dynamics during involvement, and experience as the emotional, reflective evaluation. We can begin to map out how we examine each in kind. Figure 2.4 details a hierarchical interpretation of how I view the literature on involvement, presenting a lens to view involvement and participation, which may help us understand 'successful' participation.

Building upon Figure 2.4, this position places the thesis in an interesting place, as the thesis is not focused on examining how user involvement theory, but more on the impact of co-design on designing applied games. Therefore, based on the discussions of this chapter, this thesis focuses on participation, involvement, and the design of applied games. I have tried to illustrate this with Figure 2.5, signalling the methods and theories surrounding each domain.

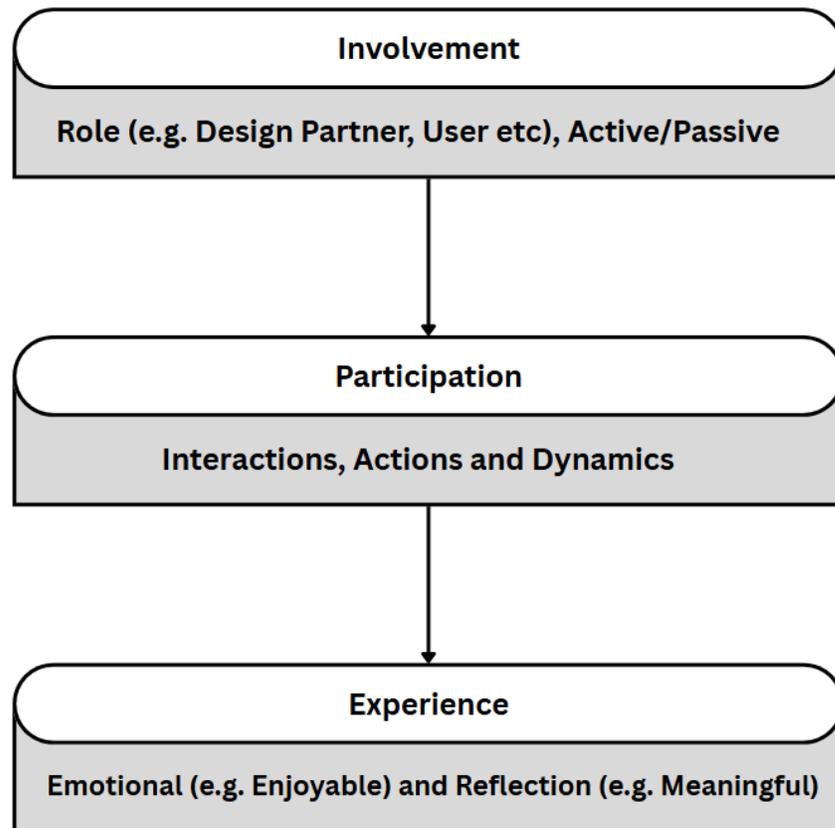


Figure 2.4: Hierarchical illustration of involvement, participation and experience as a lens for designing with end-users (Own Image)

Applied games can be rooted in HCI, but they can equally be associated with design (McAra, 2017) or HCI Arnab et al. (2015). Given the various inputs on applied games, I believe the contribution of this thesis will focus on two areas: 1) applied games with an HCI/CCI perspective and 2) using co-design with CYP for applied games. This provides two contributions to different domains: methodological approaches to designing applied games and a reflection of whether co-design is a valid approach to designing applied games with CYP.

## 2.9 Summary

This chapter reviewed the background literature surrounding the design of applied games, particularly around the design of applied games for mental health and the challenges they raise. It underlines the opportunities and challenges associated with balancing design goals, ensuring meaningful participation, and addressing methodological gaps. Below is a summary of the key insights:

- Defining Applied Games: Applied games must balance educational, therapeutic, and

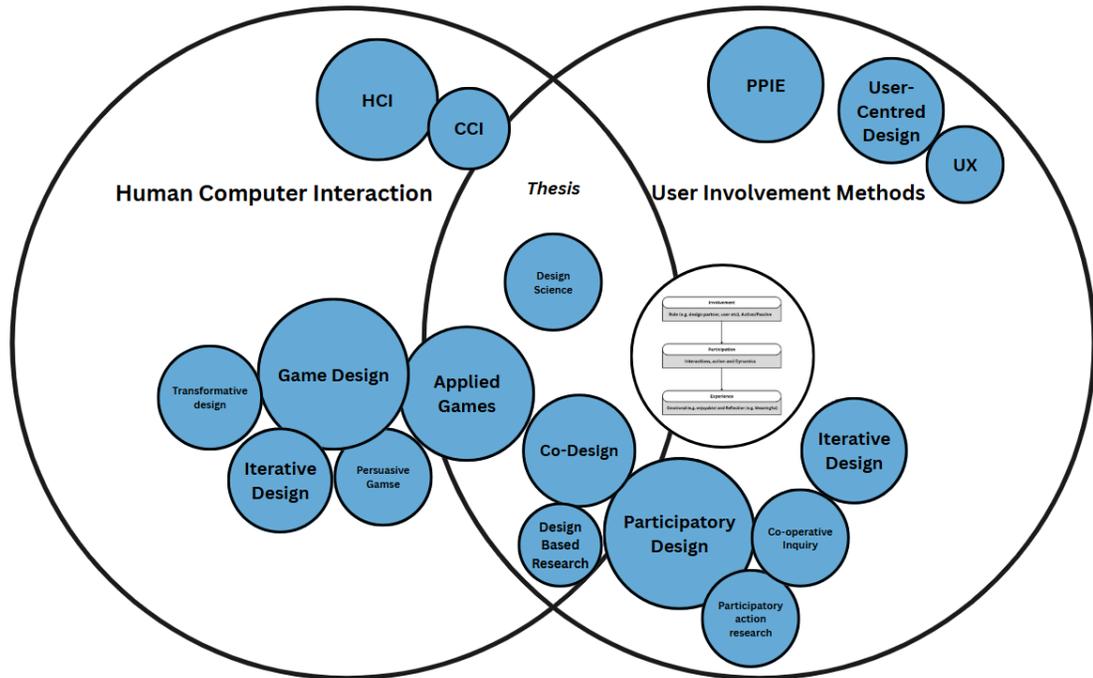


Figure 2.5: Positioning of Thesis.

entertainment goals, but often lack clear short-term objectives and sufficient player feedback mechanisms.

- **Design Process:** While various design methods exist, there is limited evidence on best practices for structuring applied game development efficiently. Engagement, adherence, and iterative playtesting remain crucial yet underreported in research.
- **User Involvement:** Co-design with users enhances engagement, cost-effectiveness, and knowledge growth, but participation is often limited to informant roles rather than deeper collaboration. A lack of methodological clarity exists in defining how young people contribute to game design.
- **Methodological Approaches:** Despite the growing use of participatory methods in health research, there is a lack of transparency in methodologies for applied game design. Concerns remain about tokenistic participation, power imbalances, and resource constraints.
- **Benefits of Participation:** Engaging young people fosters skill development, critical thinking, and increased agency, leading to more user-centred and effective game solutions. However, developmental differences and unclear links to health outcomes pose challenges.
- **Defining and Ensuring Participation:** There is no clear consensus on defining ‘good’ or ‘successful’ participation, though inclusivity, reciprocity, and shared decision-making are essential. Trust-building and resource-intensive commitments are necessary but often overlooked.

In addition to these insights, the background literature suggests challenges towards the design

and development of applied games with young people:

- Balancing multiple objectives in applied game design while ensuring engagement.
- Limited methodological clarity on best co-design and participatory game development practices.
- Tokenistic involvement, with end-users often contributing in superficial or limited ways.
- Resource constraints, power hierarchies, and misaligned expectations affecting participation.
- Scarce reporting on developmental differences in participation and how they are addressed.
- Lack of systematic evaluation methods to measure the effectiveness and impact of participation.

These challenges present opportunities to explore methodological approaches to co-designing games with young people and to provide transparency in what methods or techniques are effective at promoting goals of participation. Furthermore, exploring factors and strategies for participation may clarify what components influence ‘good’ participation. Given the lack of uncertainty regarding what methods measure effectiveness, how to involve CYP, and how CYP contributes, the next step of this research is to examine the wider literature more deeply.

## Chapter 3

# Mapping the Gaps: A Systematic Review of CYP Involvement in Applied Game Design

### 3.1 Introduction

As discussed in the previous chapter, the design of applied games offers multiple theories (Deterding et al., 2022), frameworks (Hunicke et al., 2004), and models (Starks, 2014) to approach development. As with traditional game development, applied game development must be tailored to the specific abilities, requirements, preferences, and contexts of their often unique target audiences. This is especially challenging when creating games for children and young people (CYP), as their general capabilities, gaming preferences, and environments vastly differ from those of adults. As discussed in Chapter 2, children can have various preferences and needs, largely dependent on their stage of development. The key challenge is finding game mechanics and content that are engaging and ‘fun’ for children and young people while also effectively delivering the ‘active ingredients’ that produce the desired outcomes, in the case of this thesis, a game to support their mental health.

#### 3.1.1 User Involvement

In Chapter 2, I discussed methods to involve end-users in the design of applied games. As discussed, these ‘User involvement methods’ such as co-design have been suggested to improve user engagement (Hollis et al., 2017), improve self-efficacy (Bergin et al., 2020), user adherence (Hill et al., 2018), usability (Mohr et al., 2013), and adoption and adherence to new systems or content across stakeholders (Maguire, 2001; Kujala, 2003; Vandekerckhove et al., 2020). For this study, user involvement methods refer to the involvement of relevant stakeholders in designing, implementing, and evaluating a product (Bevan Jones et al., 2022; Giacomini, 2014). Chapter 2 detailed how there is a growing call for user involvement methods, particularly co-design, to design applied games for mental health and well-being (Malinverni et al., 2017; Paracha et al., 2019; Simonsen and Robertson, 2013).

However, there are different user involvement methods, some with overlapping definitions. For example, co-design is commonly understood as directly involving people (stakeholders) in the design of an artefact, process and environment that impacts their life (Bevan Jones et al., 2020). Co-production has been defined as bringing people with lived experience of a problem and experts together as equal partners to improve a service (Raitio et al., 2020). This is further complicated by the fact that different research and practice communities have developed parallel traditions with often similar practices and methods that are nevertheless different in name, underlying values and aims, and/or details of implementation. For example, in design research, participatory design is often referenced as a method for involving users. In contrast, in health research, similar methods are frequently described as patient and public involvement (PPI) or participatory action research.

Chapter 2 discussed varied approaches regarding participation, involvement, and methods, summarising a lack of documentation on how user involvement methods are conducted (Malinverni et al., 2017; Simonsen and Robertson, 2013). Prior research has highlighted a lack of guidance on when and how to best involve stakeholders in the design process of applied games for mental health (Fleming et al., 2017; Kujala, 2003; Kelley et al., 2017). Another unanswered question in user involvement with children and young people is what workshops, activities, techniques or tools help engage and maintain participation (Maguire, 2001). Few studies have explored or evaluated what factors or strategies impact children and young people’s participation. Or how the use and the particular implementation of such methods would affect the actual adoption, adherence to, and efficacy of developed interventions. Bergin et al. (2020) and colleagues observed that few studies reported any user experience of co-production or co-design methods, including a lack of consensus on how this user experience of study participation should be captured or involvement reported.

### 3.1.2 Aims of the Review

Therefore, to address how to do effective user involvement when designing applied games for children, this systematic review set out to address the first sub-research question “*How have CYP been involved in the design of applied games for mental health?*”. The review focused on studies that evaluated their chosen user involvement method and the factors and strategies implemented for successful co-design with young people. The following four aims were proposed to address the first research question:

- What user involvement methods are used for what purpose?
- In what capacity are CYP involved?
- How are user involvement methods implemented?
- What factors impact CYP involvement in user involvement methods?

### 3.1.3 Publication Reference

The systematic review described in the following chapter has been published under **JMIR Serious Games**. The full published article can be found under “*Children and Young People’s*

*Involvement in Designing Applied Games: Scoping Review*” (Saiger et al., 2023).

## 3.2 Method

### 3.2.1 Study Design

The study involves a combined systematic literature review (Page et al., 2021) with an inductive qualitative content analysis (Miles et al., 2014; Vears and Gillam, 2022). Inductive qualitative content analysis was used to systematically break down the textual data into categories to identify and categorise factors that impact CYP involvement. In addition, inductive qualitative content analysis allows for more quantitative measures of occurrences or frequency of themes, which was deemed appropriate for searching textual data in a systematic review. The method is reported following the revised 2020 PRIMSA guidelines (Page et al., 2021). The review adopts a descriptive and exploratory nature to better understand how children and young people have been involved in designing applied games.

### 3.2.2 Eligibility Criteria

“*User involvement methods*” is an umbrella term to capture any approach involving end-users in a game’s design, such as participatory design, co-design, iterative design, or user-centred design. Similarly, I did not limit “applied games” to a particular application context or purpose. As there are no strongly established standard terms for the search focus, the key aspects of the review follow similar reviews (Malinverni et al., 2017; Paracha et al., 2019; Kalogiannakis et al., 2021); the search string intentionally combined a wider range of keywords relating to children, games, applied contexts, and user involvement methods. Table 3.1 illustrates the terms used in the search strings.

This review focused on how to design games with children and young people. Therefore, papers focused on adult populations were excluded, as prior research has suggested that young people present additional considerations when involved in user involvement methods (Rouncefield-Swales et al., 2021; Halldorsson et al., 2021b). As games were the intended outcome of designing with children and young people, papers that did not contribute to creating or developing games (or interactive media) were excluded from eligibility. However, a broader search of applied contexts was permitted to capture how different domains involve children and young people in the design of games.

A range of the last ten years was captured (01/01/2010-07/12/2021) to observe any changes over time and the growth of the research area. Full texts were only considered, specifically those that had reflected or evaluated their labelled method. Work-in-progress papers were excluded as they would lack the evaluation and reflection of conducting a user-involvement method. The eligibility criteria are below in 3.2.

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#### **Inclusion criteria**

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Article features user involvement methods

Article reports on the design of game-based software

Game-based software targets audience of children or young people
User involvement methods are evaluated or reflected on
Full paper
<b>Exclusion criteria</b>
No user involvement method
No reflection or evaluation of user involvement method
Not related to game-based software
Not published in English
Not a full or original paper (eg, work in progress, conference summary, or workshop)
No children and young people involved
Not retrievable

Table 3.2: Inclusion and Exclusion Criteria

### 3.2.3 Information Sources

A total of four databases were searched:

- Association for Computing Machinery Digital Library (ACM DL);
- Institute of Electrical and Electronics Engineers Xplore digital library (IEEE Xplore);
- Scopus;
- Web of Science

These databases were selected to capture various disciplines using user involvement methods to develop applied games with children. ACM DL and IEEE Xplore cover human-computer interaction, game design, and augmented or virtual reality disciplines. Web of Science and Scopus captured disciplines such as medical, psychology, and education contexts. The software used for the scoping review, *State of the Art through Systematic Review* (StART), collated and managed numerous citations and full texts. StART provided a framework for tagging and detailing information on identified papers in steps similar to PRISMA guidelines. In addition, studies were identified through the snowballing of references. These were added to the screening selection. In addition, fourteen studies were manually added at the selection stage to undergo screening against the same set of eligibility criteria. The first search was conducted on 07/05/2021. Each database required a different input for search strings, so each had to be tested first (see Appendix 1). Searches were continued throughout the rest of the year, with alerts set up for new records. The search concluded on 07/12/2021.

### 3.2.4 Study Selection

Studies retrieved from the databases were managed using StART (v3.3 Beta 03). First, duplicate studies were removed. Then, I independently screened titles, keywords, and abstracts against the eligibility criteria. The full texts of the resulting studies were then

Children	Games	Applied Contexts	User Involvement Methods
Young People	Game	Mental Health	Co-Creation
Young Adults	Video Game	Mental Disorders	Co-Design
Students	Computer Game	Anxiety / Depression	Co-Production
Kids	Gamified	Therapy	Participatory Design
Child	Game Based	Cognitive Behavioural Therapy	Patient Centred Design
Adolescent		Human-Computer Interaction / Child-Computer Interaction	Patient Partner Involvement
		Education	User-Centred Design
		Learning	Collaborative
		Behaviour Change	Iterative Design
			Cooperative

Table 3.1: Terms for Search Strings

sourced before the second full-text screening for eligibility. Records that reported the same study were merged to avoid repetitions in frequencies.

### 3.2.5 Data Items and Collection Process

Each study of the resulting screening process was evaluated independently, where the metadata was extracted (e.g. title, date, author, abstract, year) and a range of descriptive data.

To describe our sample and study characteristics, I coded papers by

1. *discipline*: Disciplines were coded first verbatim by the title and self-description of the publication venue and then inductively aggregated, e.g., a paper published in ACM CHI was coded as “human-computer interaction, as it describes itself as “The ACM CHI Conference on Human Factors in Computing Systems is the premier international conference of Human-Computer Interaction (HCI)”;
2. *date of publication*: extracted from the paper metadata;
3. *the country where the study was conducted*: extracted verbatim from the method section;
4. *the number of CYP involved*: extracted from the method sections of the paper;
5. *the age and age range of CYP involved*: extracted from the method sections of the paper;
6. *the kind and number of participant groups involved*: participant groups (e.g., children, parents, clinicians) were first extracted verbatim from the method sections, then the number of different groups was counted.

To describe user involvement methods and roles, I coded papers for:

7. *the self-labelled user involvement methods used*: extracted verbatim from how the authors labelled their study in the title or method section. This resulted in multiple labels for some studies where terms had been used interchangeably;
8. *the authors' stated aims of user involvement*: first extracted verbatim from the 'goal' or 'aim' statements of each paper, then inductively coded into higher-level categories such as 'determine features and functionality' or 'explore methodology'; one paper could entail multiple aims;
9. *in what capacity CYP were involved*: first extracted as verbatim labels given to their roles in the paper (given in Appendix B). Where roles were not explicitly labelled in the paper, I noted them as "not stated". Based on the entire paper description of children's involvement, I mapped each study inductively on Druin's (Druin, 2002) four-fold typology of children's roles in developing new technologies.

Finally, to describe how user involvement was implemented and identify emerging factors impacting it, I imported the extracted data fields and full-text PDFs into NVivo for inductive qualitative content analysis (Miles et al., 2014; Vears and Gillam, 2022). I inductively coded papers' method, discussion, and conclusion sections for related emerging themes in a first initial and second focused coding cycle (Watt and Richardson, 2012). Descriptively, study structure, activities, media and tools emerged as high-level categories. Activities were clear and distinct enough to conduct a follow-on frequency count. In terms of factors impacting user involvement, five themes emerged:

1. Comprehension
2. Cohesion
3. Confidence
4. Accessibility and Inclusivity
5. Time and Space

### 3.3 Results

The following section presents the results of the systematic review. It details the total number of studies selected,

#### 3.3.1 Study Selection

A total of 1,085 records were returned from the search. Title and abstract screening removed 81 duplicate records and excluded a further 885 records: 199 did not incorporate user involvement methods; 664 lacked explicit reflection of user involvement methods; 60 were unrelated to game-based software; and 32 were not full papers. At the full-text stage, of the remaining 117 records, a further 67 were excluded where: 22 were not full papers; 12 lacked

user involvement methods; 22 lacked detailed reflection of them; 2 had no CYP involvement, one was not games-related, and I could not obtain access for seven records; and one was not published in English. Three pairs of papers of the 50 remaining papers were merged, reporting the same study, resulting in 47 final studies in the analysis. Figure 3.1 presents the PRISMA flow diagram.

### 3.3.2 Study Characteristics

The majority of studies (22, 46%) identified came from computer science and human-computer interaction (HCI), 9 (19%) were from education, 8 (17%) from serious games or game design, 5 (11%) from health and 3 (6%) from psychology (Figure 2). There was no clear up- or downward trend in publications over time. 85% of studies (40 of 47) were conducted in the Global North, led by EU countries (15), then UK (13), Australia and New Zealand (7) and USA (4), followed by Brazil (3) in the Global South.

The sample sizes of children and young people ranged from 2 to 109, with an average of 23 and a median of 13. Most studies (26%) involved 6-10 participants, followed by 11-25 (23%), 26-50 (19%), 1-5 (17%), and 51+ (15%) (see Figure 3.2). Small sample sizes were standard, likely due to challenges in recruiting intersectional groups such as children with learning difficulties and qualitative methods prioritising ‘thick data’ over large-scale sampling. Nevertheless, many studies noted the small sample size as a limitation. The ages sampled spanned from 3 to 25 years, with a median age of 11.5. Most studies (30 of 47) focused on children aged 0-3 years, with “young people” studies covering ages 16-25.

While my review focused on the involvement of children, I was also interested in identifying which participant groups were involved overall. A plurality of studies (23 out of 47) included three participant groups. As expected, children and young people (CYP) were the predominant group (47 studies) due to the inclusion criteria requiring CYP involvement. These studies variously referred to CYP as patients, learners, or the target audience. Subject matter experts (39 studies), such as health professionals (11), teachers (18), and other experts (10), formed the second most frequent group.

The “other experts” category included film, photography, art, and music professionals. Researchers facilitating or conducting the studies were the third most frequently involved group (36 studies). This category encompassed both the researchers carrying out the research and the scientists who played a role in the design process. Some studies also involved designers and developers (17), including game design companies (Raynes-Goldie and Allen, 2014), master’s students in human-computer interaction (Romero et al., 2019), game designers, or graphic designers, as well as artists (Bonsignore et al., 2016), to assist in creating games or interactive technologies. Finally, support groups (5 studies), such as learning assistants, pastoral care staff, and special education coordinators, supported CYP participation.

The length of studies varied greatly, and in 8 cases (17%), it was not possible to determine the duration from the sampled records. The most common study duration was between 2 and 3 months (21%), followed by studies conducted in a day or less (17%). These shorter studies typically involved workshops or brief sessions lasting 1–2 hours. Studies conducted over 1–7 days (10%) were the next most frequent, followed by studies lasting 4–6 months (9%) or

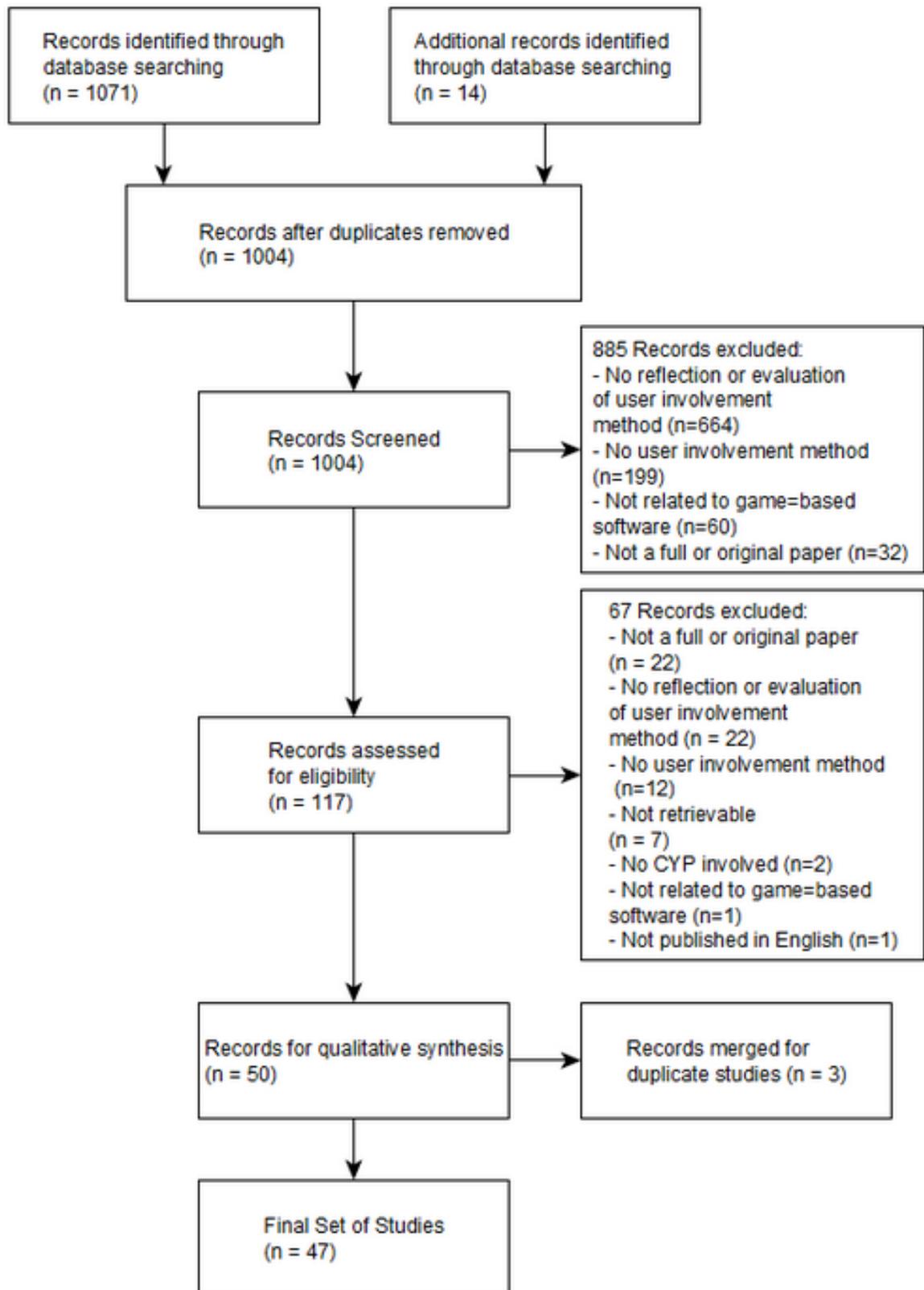


Figure 3.1: PRISMA Flow Diagram

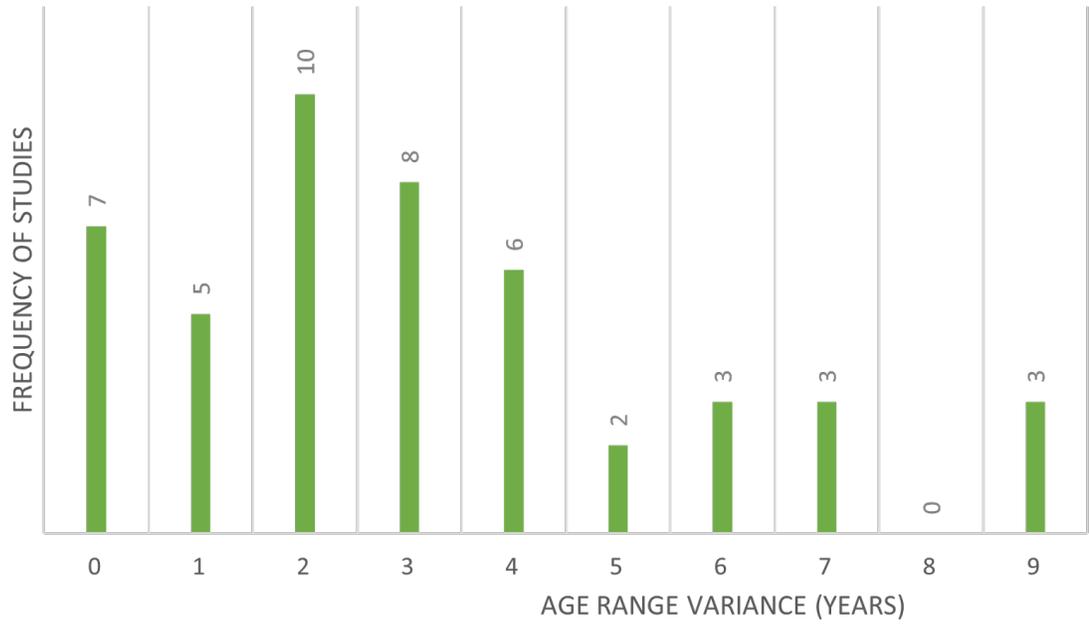


Figure 3.2: Age range variance in years across included studies; a range of 0 means a single target year of age.

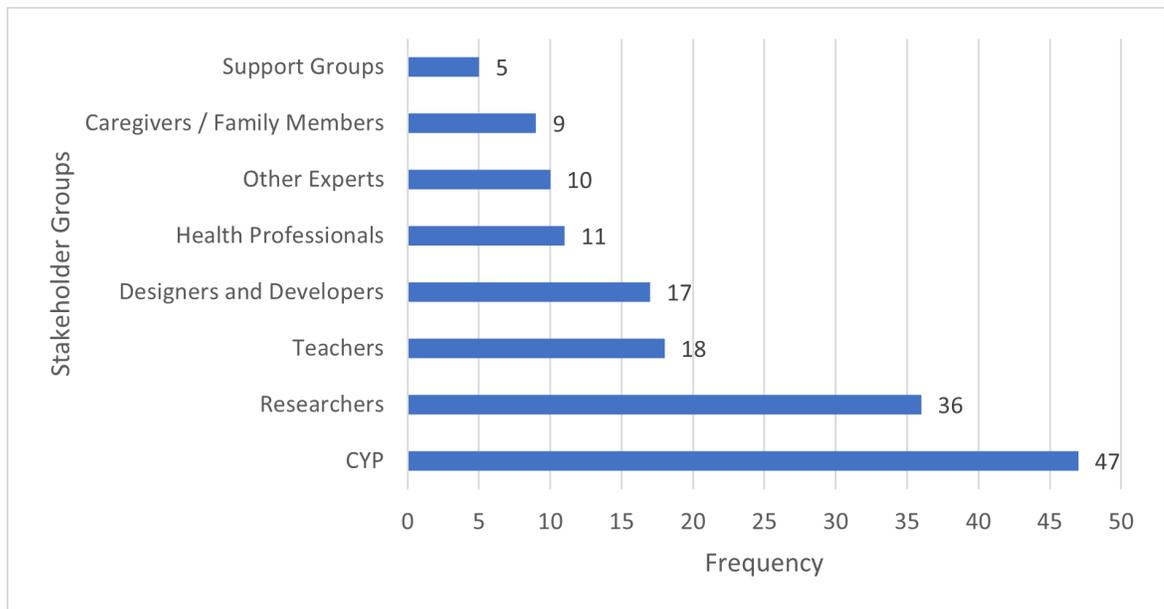


Figure 3.3: Frequency of Stakeholder Groups amongst sampled studies

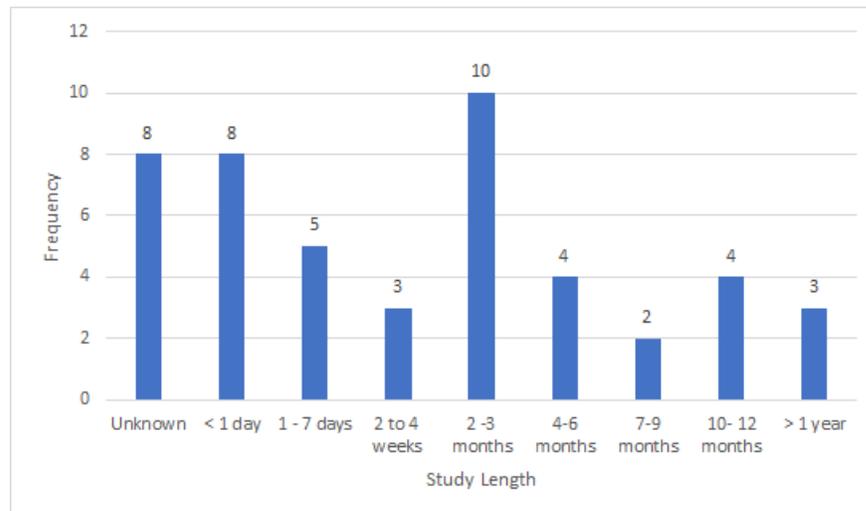


Figure 3.4: Study duration of sampled records

10–12 months (9%). Less frequent were studies lasting 2–4 weeks (6%) or 7–9 months (6%), with the lowest frequency observed for studies spanning 7–9 months (4%). It is important to note that some studies did not clearly distinguish between the total study duration, including recruitment, procedures, and analysis, and the specific duration of participants’ involvement. This made it hard to determine the accurate duration of CYP involvement when co-designing games.

### 3.3.3 Self-Labelled User Involvement Method

The included studies employed various user involvement methods to design or develop a game or game-based application. Appendix A contains details of studies, including the method labelled, a definition of the labelled method and a short description of what was conducted. Among the characteristics described in Appendix B, 20 (43%) were labelled as participatory design, 16 (37%) as co-design, 2 (4%) as co-creation/co-creativity, 2 (4%) as design-based research, 2 (4%) as user-centred design and the remaining four (8%) as other different approaches (realist evaluation, iterative design, participatory action research & person-centred approach) which can be seen in Figure 3.5. What was challenging was how some studies considered participatory design as the overall research goal and co-design as the method (Gennari et al., 2017; Khaled and Vasalou, 2014; Ståhl and Rusk, 2022). In contrast, others defined them as two separate methods (Lee et al., 2019; Marti et al., 2016). More frequently, studies defined participatory design as ‘involving end users in the design process’ (Anthony et al., 2012; Benton and Johnson, 2014; Bossavit and Parsons, 2018), where participation greatly varied. Some interpreted this as ‘deeper’ participation with end users involved equally throughout the design process (Pavarini et al., 2020; Nouwen et al., 2016). On the other hand, other studies described involvement as weakly inviting users to contribute ideas (Pollio et al., 2021). When it came to defining co-design, there was little consensus regarding the meaning and use, considering the interchangeable use of co-production, co-creation, and co-design. ign.

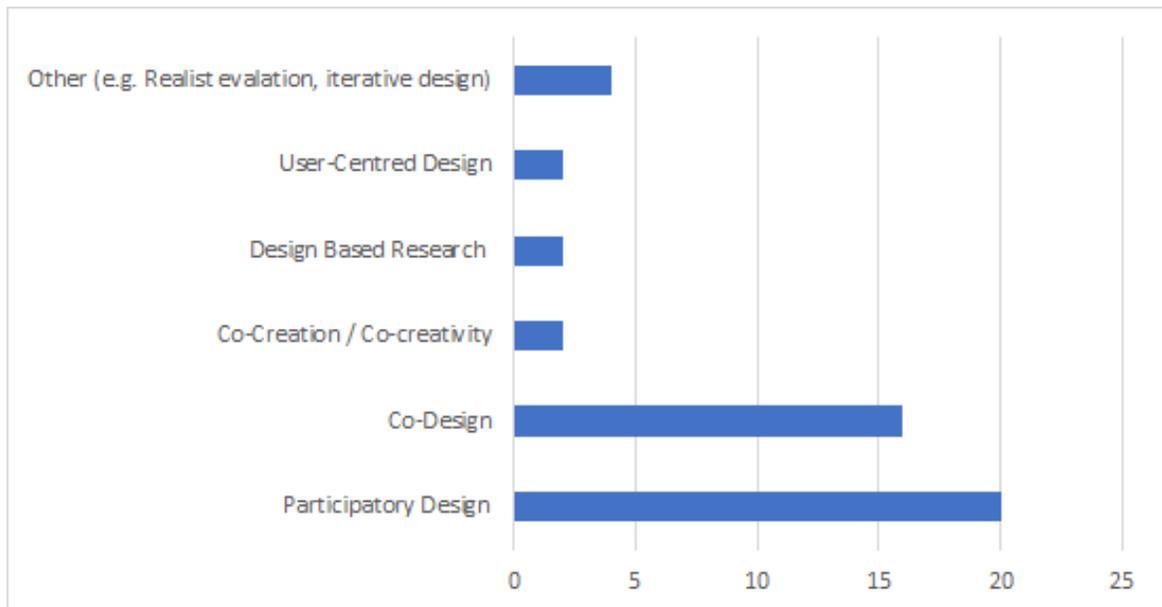


Figure 3.5: Frequency of Self-labelled user involvement methods used

Regarding the interchangeable definitions, All et al. (2012) and colleagues stated that co-design is a subcategory of co-creation, which they define as collective creativity shared by at least two individuals. In contrast, Nouwen et al. (2016) described participatory design as the meeting of designers and untrained stakeholders creatively working together. Where some studies define co-design as a method for researchers to understand user preferences and requirements of need (All et al., 2012; Aufegger et al., 2020), there is also the possibility that *co-designer* has been used as a term for anyone involved in a participatory process but not explicit on what capacity they were involved. For example, Aufegger et al. (2020) detailed a user-centred design approach with a 2-hour workshop for children to learn about hospitals, where they then co-design alongside a graphic designer to ‘re-design’ their hospital visit. No straightforward definition of co-design was given, but the children appeared to help inform and improve the usability of technology. Consequently, a co-design process may not equal children and young people acting as co-designers.

### 3.4 Goal of Studies

The most frequent goal across studies was to “design a game with participants” (22 studies). This label encompassed the goal of directly developing a prototype, game, or app with young people. Second, 18 studies aimed to “determine features and functionality,” which aligned with end-users’ role as informants. Additionally, 12 studies were meta-studies concerned with “Examining Involvement”, where the goal was to understand the involvement of young people in user involvement methods and how it would impact design processes. Ten studies explored a specific user methodology, concerned with either testing a novel approach or different techniques with their target audience. For example, Benton and Johnson (2014) explored using a PD approach to meet the needs of young people with an autism spectrum disorder. Notably, studies that focused on exploring methodology as a goal demonstrated

evaluation and reflection of their chosen method in great detail (Benton and Johnson, 2014; De Jans et al., 2017; Kangas, 2010; Kostenius et al., 2018; Leitão et al., 2019).

A further nine studies' goals were to "develop skills", where they were interested in developing young people's skills during the process or contributing towards a learning outcome. 6 studies aimed to "understand the preferences" of young people. Similarly, five studies focused on understanding perceptions and concerns around the context or technology of a study. Six further studies specifically focused on obtaining feedback from young people on an existing prototype or idea. "Feedback on end-product" was another goal in 6 studies, and three studies focused on the goal of "determine features and functionality" (Cheng et al., 2018; Christie et al., 2019; Patchen et al., 2020).

Focusing on the meta-methodological goals, a few novel insights into those studies focus on understanding needs and preferences, facilitating discussions, and understanding experience. Few studies focused on "Understanding the needs of end-users", which was seen in 3 studies. These studies featured children with mental health challenges or learning difficulties (Gonsalves et al., 2019; Anthony et al., 2012; Durl et al., 2017). Gonsalves et al. (2019) and colleagues focused on designing technology for adolescent mental health by conducting iterative processes concerned with the access and appropriateness of digital interventions. Similarly, Anthony and colleagues describe empowering users to understand their needs and preferences (Anthony et al., 2012). Lee et al. (2022) and Waddington et al. (2015) had a goal of "facilitate context discussion", where they wanted the user involvement process to help discuss the specific context that was a challenge for young people.

Sutton et al. (2020) and Zhu et al. (2019) had a goal of "improved user experience", where Sutton et al. (2020) set out to 'develop a systematic understanding of the technology, how it is delivered and how it is supposed to improve sleep'. Powell et al. (2019) and Vasalou et al. (2012) were the only two studies to "Create guidelines" or inform future research; though other studies did produce recommendations or guidelines, it was not the intended goal (Benton et al., 2012; Lee et al., 2019; Malinverni et al., 2014). Finally, Martens et al. (2018) had a goal of producing a high-quality end product through "understanding preferences" and "feedback on end-product".

Though there appears to be a precedent of focusing on designing games with young people or determining features and functionality, user involvement methods explore a wide range of goals. Furthermore, the goals that have not been frequently studied, such as creating guidelines, understanding preferences, and improving user experience, present alternative approaches to how we approach user involvement and conduct these methods. It could be suggested that the predominant goal of user involvement research has been focused on outputs rather than processes. Studies focusing on "determining features and functionality" and "developing a game with participants" are most likely driven to produce a game or product to address a specific problem area. Goals like "examine involvement" and "improved user experience" are more likely to focus on the design process and its benefits.

## 3.5 Types of Methods

Inductive coding of the studies' method descriptions yielded three high-level categories of how user involvement was implemented in detail:

1. Session Structure, describe recurring stages and overarching facilitation organisation.
2. Activities and Interactions capture the specific tasks conducted with stakeholders.
3. Information media and tools, describe the range of media and existing games used in activities.

### 3.5.1 Session Structure

Eight studies involved an initial onboarding or sensitising stage to create familiarity with the project topic and team, communicate its goal, and/or help understand the upcoming process (Durl et al., 2017; Bossavit and Parsons, 2016a; De Jans et al., 2017; Nouwen et al., 2016; Rötönen et al., 2021; Regal et al., 2020; Sutton et al., 2020; Vallentin-Holbech et al., 2020). This was suggested to build participant trust, foster user engagement, and make an effective co-design process more likely (Vallentin-Holbech et al., 2020; Durl et al., 2017). In two studies, the onboarding explored an existing solution to familiarise participants with the technology and underlying concepts of the research area (Benton and Johnson, 2014; Vallentin-Holbech et al., 2020). Durl et al. (2017) and colleagues also described sensitisation steps where users were introduced to the topic through challenges and competitions, which also helped build trust with facilitators.

Ten studies described an ideation or brainstorming stage to help frame user needs and give users a starting place. Notably, brainstorming could generate game ideas (Alves and Hostins, 2019a) or understand existing user practices and areas for technology-based support (Anacleto et al., 2012). This was often supported by starting exemplars and/or paper templates, (All et al., 2012; Benton et al., 2012; Kangas, 2010; Leitão et al., 2019; Malinverni et al., 2014) such as empty scenario storyboards or empty mobile phone screens, or a homework task and prepared video seeding material for ideas (Bossavit and Parsons, 2016b).

Seventeen studies reported a prototyping stage. These prototyping stages included sessions where CYP were involved in the design and development of game ideas (Cheng et al., 2018; Kang et al., 2021; Regal et al., 2020), game characters or narrative (Pollio et al., 2021; Cassidy et al., 2015; Lee et al., 2019), and generated alternative ideas to an existing idea (Leitão et al., 2019; Stålberg et al., 2016). As described in the Chapter 2, prototyping is a standard method utilised in different ways to test an idea or interaction. Prototyping was seen to afford a sense of ownership in the resulting designs for CYP (Lee et al., 2019) often challenged researchers' assumptions on end-users and usually led to in-depth reflection from participants (Eriksson et al., 2019; Pavarini et al., 2020; Pollio et al., 2021).

Reflection was two-fold: some studies designed sessions of reflection, and other studies had reflection surface unexpectedly. For example, two studies designed reflection meetings to iterate and improve on future design sessions (Rötönen et al., 2021; Anthony et al., 2012).

Whereas, another study found the design process led to participants reflecting on their gameplay experiences compared to other participants (Eriksson et al., 2019). One study deliberately scheduled reflection meetings after prototyping as a basis for future iterations (Rötkönen et al., 2021). Two observed challenges in this phase were the limitations of prototyping tools and what CYP wanted to portray, for example, paper prototyping was challenging for CYP to articulate the actions they expected from a digital prototype (De Jans et al., 2017).

An evaluation stage was rarely mentioned across studies, where the design process was discussed with participants on its engagement, effectiveness, and efficacy as a user involvement method. Outside of reflection meetings, four studies scheduled an evaluation stage to gather feedback on the user involvement process (Anthony et al., 2012; Benton et al., 2012; Triantafyllakos et al., 2011; Vallentin-Holbech et al., 2020). These studies discussed how to make the interaction during the design process more engaging (Anthony et al., 2012), how they found the process as a whole (Triantafyllakos et al., 2011), how they could be more involved (Benton et al., 2012), and how did they find cooperating with others (Vallentin-Holbech et al., 2020). Notably, only seven studies considered evaluating the prototype(s) developed at the end of the study (Cheng et al., 2018; Al-Wabil et al., 2010; Anthony et al., 2012; Benton et al., 2012; Christie et al., 2019; Triantafyllakos et al., 2011; Vallentin-Holbech et al., 2020).

### 3.5.2 Activities and Interactions

The coding resulted in 45 different activities, of which 19 only appeared in a single study (omitted in 3.6). Paper prototyping was the most frequently conducted activity, mentioned in 20 studies with labels like “paper play activity” (Anacleto et al., 2012) or “sketchbook prototyping” (Cheng et al., 2018). This was coded separately from low-fidelity prototyping (used in a further seven studies), even though the boundaries between the two are unclear as some low-fidelity prototyping would involve paper storyboards and sketches. Regardless, both were reported as affording a positive experience to end users (Kang et al., 2021; Nouwen et al., 2016; Triantafyllakos et al., 2011). For example, Anthony et al. (2012) and colleagues gave every participant some hands-on experience during prototyping. The hands-on experience affected participants’ agency, where hands-on experience was a method to assess games with users and understand outcomes (Martens et al., 2018; Marti et al., 2016), and participants’ learning, where hands-on experience served as a method of learning technology or understanding context (Kangas, 2010; Anthony et al., 2012; Raynes-Goldie and Allen, 2014).

Prepared templates were repeatedly mentioned to facilitate prototyping (Leitão et al., 2019; Bossavit and Parsons, 2018). Paper prototyping was also reported to be inclusive (Anthony et al., 2012), low-cost (Cassidy et al., 2015; Martens et al., 2018), and using only easily accessible materials (Cassidy et al., 2015). Observed challenges in prototyping included struggling to represent the intended playful interaction with digital technology (Cassidy et al., 2015), and that it was less suited to older teens due to the hypothetical or “blue-sky” situations when they are at a developmental point of building their own opinions distinct from others (Bonsignore et al., 2016).

Mapping between activities and design stages was complex as activities were used across

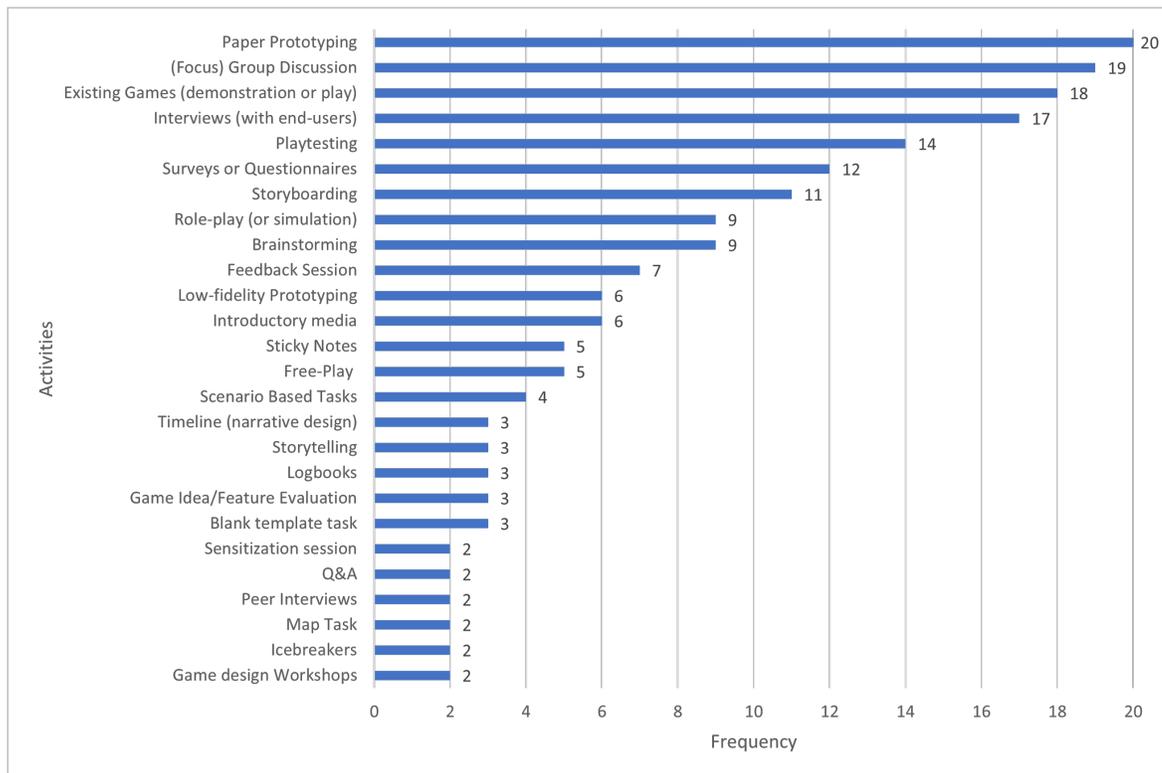


Figure 3.6: frequency of activities and interaction across studies that were used in more than one instance

different design stages, and in some cases, it was not transparent when and why activities were employed. For example, (focus) group discussions, the second most prevalent activity (19 studies) were used as icebreakers (Gennari et al., 2017; Anthony et al., 2012), to generate ideas (Aufegger et al., 2020; Bossavit and Parsons, 2016b; Leitão et al., 2019), and reflecting on the end-product (Eriksson et al., 2019; Gonsalves et al., 2019; Durl et al., 2017; Kostenius et al., 2018).

In another instance, the fourth most prevalent activity interviews (used in 17 studies) were used equally formatively to discover and define the problem space (All et al., 2012; Kangas, 2010; Vasalou et al., 2012) and to evaluate prototypes or concepts (Cheng et al., 2018; Christie et al., 2019). Presumably, because the study sample overall leaned towards ‘earlier’ sensitising, ideation, and prototyping stages, the majority of activities were used in these stages; only feedback sessions, some instances of game-play evaluation, and one timeline activity (Nouwen et al., 2016) (asking CYP players to chart their gameplay likes and dislikes and experiences of a challenge) occurred during an evaluation phase.

The studies detailed little explicit reflection or evidence on how practical the conducted activities were, with a few exceptions. Nouwen et al. (2016) and colleagues outlined which activities generated user insights and related design impacts. Pavarini et al. (2020) and colleagues organised feedback sessions where CYP could suggest features and processes for better future user involvement. However, even these observations remain unvalidated and can disagree with each other. At the same time, several studies recommended ‘free play’ to give CYP creative freedom of expression, (Eriksson et al., 2019; Bossavit and Parsons, 2018)

while Nouwen et al. (2016) and colleagues found that this had little design impact as the media created during free play were unsuitable for the design brief.

### 3.5.3 Information Media and Tools

Following (Brandt et al., 2008) and colleagues' guidance, participatory design tools and media can be classified by whether they support making, telling, and enacting. In one study, Bossavit and Parsons (2016b) observed that 2D mapping<sup>1</sup> (making tool) and videos (telling tool) helped understand concepts, while playing games (enacting) supported idea generation. The choice of media or tools used was a point of contention. Some suggested CYP struggled to express themselves, speaking while simultaneously preferring to talk or write (Anthony et al., 2012; Benton and Johnson, 2014).

In comparison, visual approaches and working with visual aids proved more engaging and effective, especially with younger age groups, potentially due to their less developed reading and writing abilities (Bonsignore et al., 2016; Bossavit and Parsons, 2016b; Lee et al., 2019; Marti et al., 2016). An exception to the method of media was seen in two studies with visually impaired children, where interactive robot toys and physical building blocks were used to facilitate creativity through touch and sound (Metatla et al., 2020; Regal et al., 2020). Three studies suggested that preferences for spoken, written, or visual media were related to the age of the participants (Anthony et al., 2012; Bonsignore et al., 2016; Lee et al., 2019). Therefore, this suggests the choice of media and tools used should be determined by understanding participant preferences before activities occur.

Fourteen studies utilised existing games as an activity. Existing games varied between existing prototypes developed before the study and existing commercial games (Pollio et al., 2021; Romero et al., 2019; Soysa et al., 2018). Existing games were used as a tool for narrowing the scope of the research and 'managing expectations' of the young participants, but also as an icebreaker activity (Soysa et al., 2018; Romero et al., 2019). The existing prototypes were sometimes used as a starting point for prototyping or introduced to users for feedback (Benton et al., 2012; Romero et al., 2019). That said, several studies found that CYP's concepts and proposed features were usually informed by the commercial games they were familiar with (Bossavit and Parsons, 2016b; Khaled and Vasalou, 2014; Vasalou et al., 2012; Zhu et al., 2019).

## 3.6 Role of participants

The dominant verbatim labels for CYP involvement roles were "informant" (26 of 47 studies, 62%) and "co-designer" (20, 42%), followed by "play-tester/tester," "validation," and "co-creator" (4 each, 9%), "end user" (2, 4%), and "co-researcher" (1, 2%). Five studies (11%) did not specify an involvement role. (A single study could identify multiple roles, leading to percentages exceeding 100%.)

These role labels often reflect varying degrees and types of involvement. To standardise,

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<sup>1</sup>Drawing maps or pathways of how a tool works

studies were coded using Druin (2002)'s taxonomy of four roles for children in technology design, arranged by increasing agency:

- **Users:** CYP observed using technology to assess effects and develop usage theory.
- **Testers:** CYP usability-test prototypes, providing direct feedback to inform design and usability.
- **Informants:** CYP participate in formative and evaluative user-centred methods, offering dialogue and elaboration.
- **Design partners:** CYP act as equal stakeholders, engaging in all prior activities and contributing to user research, brainstorming, or prototyping.

### 3.6.1 Role of CYP in the design of games

The role of children and young people was mapped onto Druin (2002) role of children in design processes. Simplifications were made regarding the roles of co-designer and co-creation falling under the design partners. Children and young people's predominant role in user involvement methods was as an informant (35) where they were involved at various stages to inform the design process. Design partners, which included co-design or co-creation roles, were the second most frequent role (24). The roles of user (5) and tester (5) were less frequent. In addition, the constraints of this review most likely omitted studies involving children and young people solely as users and testers. Finally, it is worth noting that two studies adopted Druin (2002) roles of children and involved children in each different role (Al-Wabil et al., 2010; Regal et al., 2020). Appendix A presents children and young people's roles during user involvement methods.

As noted in Appendix A, the selected studies involved children and young people differently. The differences in definitions are potentially related to how these studies defined participation. The studies evaluated discussed participation in PD differently, where Benton et al. (2012) described successful participation as when "children feel involved and comfortable when contributing, requiring time to build up". Further, Kostenius et al. (2018) describes participation as a central component to empower individuals or groups. Some crossovers did occur regarding children and young people's participation in participatory design, falling into co-design. Two studies described PD as a collaborative research process where users/participants are viewed as equal partners (Anthony et al., 2012; Sutton et al., 2020). PD and co-design are often referenced together, but it is unclear in some studies how these are defined, whether as separate methods, a hierarchy where co-design is a form of PD, or whether co-design is a role with PD.

### 3.6.2 Role of Other Stakeholders

Three studies discussed how they involved parents and carers (Benton and Johnson, 2014; Zhu et al., 2019; Regal et al., 2020). One study suggested parents and carers played an essential role despite not being directly involved in the workshops, as they provided care and advice to

the participants (Zhu et al., 2019). Similarly, other studies reported that the involvement of teachers was very beneficial as they not only know the particularities of children but can help facilitate the design process (Regal et al., 2020; Benton et al., 2012). When it came to facilitating user involvement methods, studies described delivering a design process during school times presented a challenge to teachers' plans and required the teacher to adopt a variety of roles such as facilitator, instructor and learner (Kangas, 2010). Overall, the role of parents, carers, and teachers in user involvement methods relates to facilitation, where their involvement can help support young people through design processes. Still, there are scarce examples of reflection on their involvement.

Understanding when, who, and why to involve experts was infrequently discussed across the captured studies. Stakeholder expert groups such as developers (Christie et al., 2019), psychologists (Anacleto et al., 2012), and health practitioners (Vallentin-Holbech et al., 2020) were involved in context-specific studies to help guide and inform the design process. Two studies regarded expert involvement as crucial to communicating context in their evaluations (Vallentin-Holbech et al., 2020; Waddington et al., 2015). When it came to addressing the question of when to involve experts, (Marti et al., 2016) expressed that experts are fundamental in the early design stages, whereas (Ståhl and Rusk, 2022) recommended that expert guidance and support from health professionals throughout the process would improve participation. Involving game design experts can range from external developers and designers to context experts in other disciplines, such as health and education, who can provide contextual understanding. However, understanding when their role is most beneficial to a design process appears to be an area of contention amongst the sampled studies.

## 3.7 Factors that affect participation and involvement

There were a total of five prominent themes that studies repeatedly touched on to impact user involvement: **comprehension, cohesion, confidence, accessibility, and time & space**. I did not intentionally tie these themes to one concept or standard of 'good' involvement. Instead, I took the study authors' interpretations at face value. If a study articulated something as problematic or positive, I took it as such, but also to reflect the variety of goals studies articulated for user involvement.

### 3.7.1 Comprehension

This theme captured the fact that CYP regularly struggled to understand the design process and context in which they were participating. CYP repeatedly reported that they did not fully comprehend or remember the benefits or outcomes of the project and how it would impact their daily life (Anacleto et al., 2012), nor the aim or purpose of the task assigned to them (Ståhlberg et al., 2016; Vallentin-Holbech et al., 2020). A usability evaluation of one involvement method revealed that tasks were either challenging to identify and understand or hard to perform (Ståhlberg et al., 2016). This problem could be even more common, as CYP did not mention when they struggled with an activity or prototype in their study, so long as they could engage with it; they, therefore, found it often necessary to gather additional external stakeholder feedback, since CYP did not complain (Waddington et al., 2015; Romero

et al., 2019).

Relatedly, how well-informed CYPs were about a subject matter impacted the efficacy and efficiency of user involvement: Participants who were familiar with a given context proved to be more productive and gave much more concise feedback than those who were unfamiliar with it (Christie et al., 2019). Similarly, studies found it hard to define problems and identify designs in areas where participants were ill-informed (De Jans et al., 2017; Vallentin-Holbech et al., 2020). This should not be taken as a one-way street. For example, Durl et al. (2017) suggested that involving vulnerable adolescents in a co-design study on alcohol abuse not only resulted in better design results but also made the adolescent participants more informed about alcohol abuse.

A final challenge to comprehension was a lack of familiarity with used technologies and methods: this could be the use of basic technology like microphones (Rötkönen et al., 2021) or the fact that participatory methods differ strongly from what CYP may be used to doing in adult-guided activities in school. CYP expected asymmetry in power with adults dictating the direction of the study, but experienced more symmetry in power and decision-making due to their suggestions being acknowledged (Vallentin-Holbech et al., 2020). Khaled and Vasalou (2014) suggested this be addressed with additional introductory training and warm-up activities, but this could consume additional money and time.

### 3.7.2 Cohesion

Most studies involved three or more different groups of stakeholders. Therefore, it was unsurprising that many studies reflected on different groups working together effectively as a united team as a significant factor of effective user involvement, which we here will call cohesion.

First, several studies reported struggling to achieve agreement on a concept, solution, or decision, likely due to the control each stakeholder group was given (Alves and Hostins, 2019a; Romero et al., 2019; Rötkönen et al., 2021). Control in decision-making and contributing to the design process could be achieved by expecting CYP to come to a natural agreement without explicit constraints or guidance from adults. Two studies presented open questions to young people, which then present ‘no right answer,’ which could cause friction between young people (Rötkönen et al., 2021; Romero et al., 2019). Common approaches to this issue were discussion (for understanding different points of view) and voting mechanisms (for integrating disagreeing points of view into a decision) (Romero et al., 2019). A connected challenge was ensuring that different end-user groups contributed more or less equally to decisions and results (Malinverni et al., 2014; Martens et al., 2018; Bossavit and Parsons, 2016b). Several authors observed that cohesion required trust between participants, though no particular approaches were suggested to build trust (Alves and Hostins, 2019a; Romero et al., 2019).

Another key factor for cohesion was a cooperative and collaborative mindset and atmosphere. Seven studies noted that these allowed CYP to express their views, support each other, and share ideas (Giacomin, 2014; Raynes-Goldie and Allen, 2014; Alves and Hostins, 2019a; Eriksson et al., 2019; Kangas, 2010; Vallentin-Holbech et al., 2020). In contrast, a competitive

dynamic resulted in less open idea sharing (Romero et al., 2019). Triantafyllakos et al. (2011) was one of the only studies to reference incentives, where they utilised competition and challenge amongst participants to generate more ideas.

Communication breakdown could lead to frustration and disappointment. So, how do you support functioning communication? One study found that a ‘natural’ flow of communication between CYP where each would have a chance to speak required dedicated facilitation (Rötkönen et al., 2021), while another found that CYP were much more direct and unfiltered in criticism compared to adults, suggesting adult stakeholders should capitalise on this and not be guarded or protective of their ideas (Benton et al., 2012). Finally, using existing examples of games as explicit tools and conceptual frameworks was found to facilitate discussion (Anthony et al., 2012).

### 3.7.3 Confidence

Confidence describes CYP’s belief in their ability to effectively participate in user involvement, akin to the psychological construct of self-efficacy (Bandura et al., 1999), and influences their participation in several ways (Al-Wabil et al., 2010; Nouwen et al., 2016). CYP would participate more and more deeply if they felt more confident, which was seen mainly as grounded in their experience; e.g., CYP’s experience with film production or game-making (Vallentin-Holbech et al., 2020), using existing technology CYP are familiar with (Anacleto et al., 2012; Zhu et al., 2019), immediate experience of progress in particular workshop activities (Nouwen et al., 2016) or simply longer participation over time (Benton et al., 2012) would all increase CYP confidence, with positive effects.

That said, studies differed in their view whether CYP are generally confident to voice their opinion (Al-Wabil et al., 2010; Waddington et al., 2015). Some studies found that CYP had no apparent issue voicing their views directly (Benton et al., 2012; Christie et al., 2019). In contrast, others suggested using behaviourally ‘honest signals’ like eye tracking because CYP aged 5-12 may say what adults like to hear (Al-Wabil et al., 2010). Others observed parental interference as an obstacle to CYP sharing unfiltered feedback around sensitive topics like sexual health (Lee et al., 2019). Flexibly adjusting group sizes and session lengths to fit CYP needs made them more comfortable overall and share their views more openly as a result (Bossavit and Parsons, 2018).

Empowerment was also discussed in studies where young people were given control to make decisions or choices; facilitated by participating in activities, ownership of end-products and the innate challenge of designing a game all contributed to a sense of empowerment (Anthony et al., 2012; Kostenius et al., 2018; Vallentin-Holbech et al., 2020). While giving CYP power to make decisions over the end-product increased a sense of empowerment (Stålberg et al., 2016; Bossavit and Parsons, 2018), multiple and/or repetitive user involvement activities were reported to diminish it over time (Malinverni et al., 2014). In addition, there were concerns around the misuse of empowerment as a method of manipulating participants to support the findings desired (Kostenius et al., 2018). In addition, ‘empowerment tokenism’ was described where the control CYP have over things lacks importance and others (e.g. designers and researchers) make the critical decisions (Kostenius et al., 2018). Treating CYPs as true design partners in game design made it easier for adult participants to connect with CYPs’ concerns

and, in turn, foster creativity (Raynes-Goldie and Allen, 2014).

#### 3.7.4 Accessibility and inclusivity

The last broader theme that potentially impacted participation was accessibility and inclusivity. Studies that focused on helping a population with specific needs or targeted a health outcome had to consider how to adopt their design process to suit the needs of the end-user (Rötkönen et al., 2021; Waddington et al., 2015). Rötkönen et al. (2021) reported that interactions need to be facilitated accordingly to promote inclusion, where co-design activities should consider language competency, communication between groups, suitability of tools and technologies, and what decision-making strategies to use. In addition, Metatla et al. (2020) and colleagues suggested that future studies consider the needs, concerns and perspectives of children and young people by involving experts such as teachers and carers associated with young people's disabilities. Terlouw et al. (2021) and colleagues acknowledged the challenges involving children with disabilities but adopted Malinverni et al. (2014) inclusive design approach. This facilitated mutually enjoyable activities between children, researchers and experts to promote equality and inclusion.

Raynes-Goldie and Allen (2014) observed that by treating their child participants as partners in the game design process, adult participants found it easier to connect with young people's concerns, which in turn fostered creative development. In addition, Waddington et al. (2015) and colleagues suggested steps to understand end-users' strengths and weaknesses to deliver accessible workshops and activities. A challenge to Waddington et al. (2015) and colleagues was developing game mechanics through accessible workshops to all users but still challenging to those with more developed abilities. Their research suggested a simplistic prototype game but ensured accessibility to different players. Though few studies discussed accessibility, there was the suggestion of tailoring tools to young people's needs, except this may contradict the confidence theme in providing technology that children and young people are familiar with (Bossavit and Parsons, 2016b).

#### 3.7.5 Time and space

Time constraints emerged as a consideration in structuring user involvement. Co-designing games is time-consuming (Martens et al., 2018) to the point where De Jans et al. (2017) and colleagues suggested that the months required for adults and CYP to learn how to collaborate do not fit industry game development timelines. Several studies found that practical time constraints resulted in the insufficient discussion of all ideas (Powell et al., 2019), inadequate preparation, and insufficient time for producing deliverables (Romero et al., 2019). Three studies reported breaking the design process into separate phases across different days or sessions to maintain interest, attention, and energy as another important time-related constraint (Cassidy et al., 2015; Regal et al., 2020; Romero et al., 2019).

## 3.8 Discussion

The systematic review indicated many observations for future research regarding the variety of methods to involve young people, how we involve young people in design processes, the activities we involve them in and what factors impact participation. Primarily, the various methods employed across different disciplines have led to varied suggestions and recommendations for future work with young people. Specifically, there are areas of contention regarding how we involve young people, what role young people play in user involvement methods, what other stakeholders we involve, what activities do we use, what tools and techniques are preferable with young people, and how these concerns impact young people's engagement during user involvement methods.

### 3.8.1 Towards a Taxonomy on Involvement Role

The majority of studies captured were labelled as either participatory design or co-design. Though there were different research disciplines, studies rarely employed user involvement methods of co-creation, co-production, iterative design or design-based research. One observation was the interchangeable use of co-creation and co-design in two studies (Regal et al., 2020; Vallentin-Holbech et al., 2020). This was similarly reported by Thabrew et al. (2018b), who stated that co-design differs from co-creation, defined as any act of collective creativity. That co-design involves participants saying, doing and making solutions. Consequently, how we define user involvement methods across disciplines is a challenge for future research.

Although there was some coherence between studies, other studies defined participatory design as end-users acting as full participants throughout the design and development process. This definition may seem the same, but end-users' involvement varies between vague 'involvement' and precise acting as full participants throughout the design process. Furthermore, the variation in co-design practice, terminology and definition was observed in Slattery et al. (2020) and colleagues' review, where they reported insufficient detail to establish what was involved during co-design studies. Previous research has also reported issues regarding concept clarity on how 'applied games' are defined alongside creating uncertainty in how both the process and output are defined (Schoneveld et al., 2016; Halldorsson et al., 2021b).

The results of this study suggest that there are shared and diverse understandings of methods to involve CYP in the design of an applied game. More specifically, co-design, co-production, co-creation/creativity, and co-research are areas where a more concrete understanding can be proposed for clarity across disciplines, as Druin (2002) demonstrated with assigning roles to young people, a classification or taxonomy for what specific role an end-user may play in the design process. For example, co-design speaks more to the 'full' design partner (Druin, 2002; Simonsen and Robertson, 2013), but co-creation could address the more concise involvement of CYP in specific phases of ideation or brainstorming.

CYP often creates artefacts in these phases to support or guide the design or development. They aren't necessarily contributing to the design of the applied game but are actively co-creating content to support the design process. Following this thread, co-research has been described as 'building connections across sectors' or 'enhancing research authenticity' (Collier, 2019). Adopting this, co-research may better describe interdisciplinary research where, for

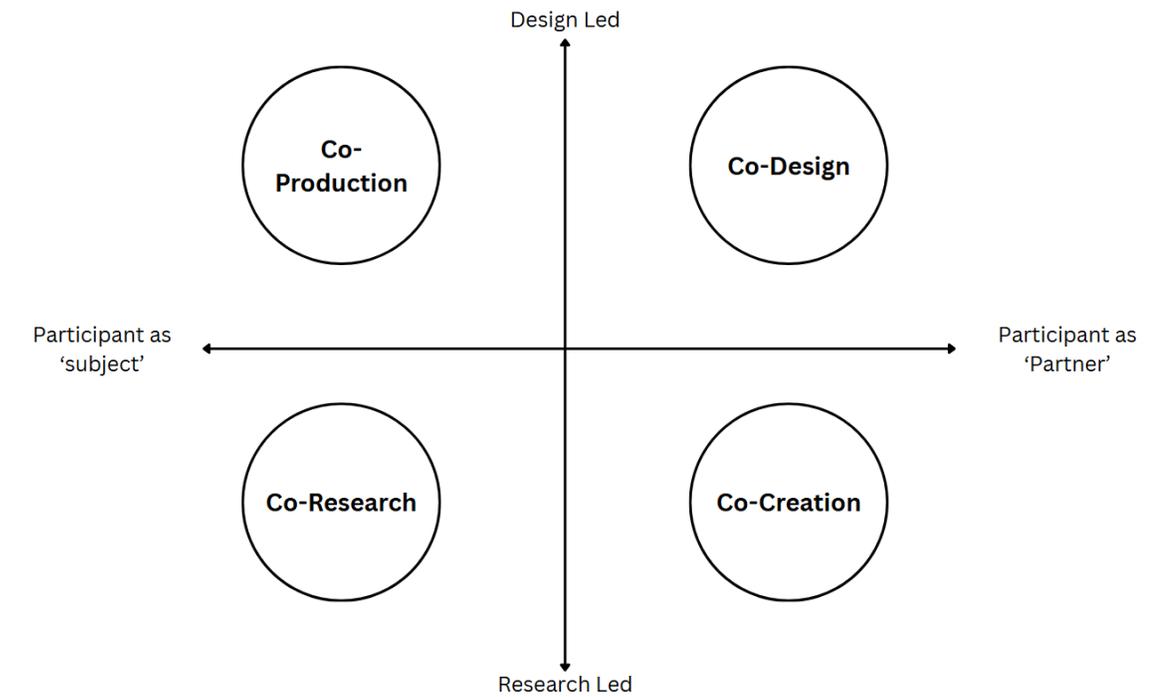


Figure 3.7: Suggested Taxonomy of Involvement

example, health researchers and game designers work together and then involve children at a later stage. Figure 3.7 summarises a suggested taxonomy framework for redefining the definitions of 'co-' methods.

To summarise Figure 3.7, my suggested interpretation of defining co-methods focuses on two axes. Firstly, whether the participant acts as a subject or partner, and how much a child contributes, can determine the label of involvement. Secondly, whether the process is led by design or more led by the foundational research. For example, I position co-production as a role where children would provide feedback on the achieved goals, potentially leading to further iterations of refinement. In comparison, co-creation is more about exploring potential solutions and potentially creating solutions around the initial goals.

### 3.8.2 Conducting User Involvement Methods

Study characteristics and content analysis illustrated 49 different activities conducted in the sample of studies. The breadth of activities suggests studies employ activities that seem appropriate for the population involved, but it is not always clear what was done. Similarly, Tsyatkova and Storni (2019) reviewed methods, techniques and tools in child-computer interaction (CCI) and reported a variety of methods and techniques employed for a wide range of purposes. Studies involving children with learning or health difficulties make great efforts to deliver activities that are inclusive and accessible, such as Metatla et al. (2020) and colleagues' use of toy robots. However, studies in this sample weren't clear on when these activities took place and, in some cases, were incoherent on their purpose.

Specific activities, such as paper prototyping and interviews, were the most common in most studies. Still, it was challenging to understand when these activities took place and the reasoning for why these specific activities were chosen. In addition, activities such as interviews and surveys/questionnaires were more predominant in studies involving young people as informants. Larsson et al. (2018) and colleagues' review of young people's involvement in developing interventions also reported that interviews (focus group and individual) were the most common method for data collection. However, feasibility and usability activities such as workshops and think-aloud were only sometimes used in their sample. It could be suggested that academic research methods of interviews and surveys are tailored to involve users as informants, which may be why they are so frequent compared to design partner involvement. Studies that involved young people as design partners conducted more interactive and open-ended activities such as prototyping, storyboarding, roleplaying, and game design workshops.

Previous research by Vandekerckhove et al. (2020) mapped phases and activities where they reported tools/activities used across different phases. For example, they noted that storyboarding occurs across pre-design, early design, and post-prototype as tools used by participatory design studies. However, mapping activities in this way requires studies to be more transparent about when and why these activities occur during a design process. Regarding reproducibility and transparency of methods, there does not appear to be a uniform method to report what activities were conducted, why, and when they were performed.

### 3.8.3 Reflecting and Evaluating Methods

A focal point of this review was capturing when methods were critiqued or evaluated by studies. A recurring rationale for using participatory methods with young people was the affordance of offering young people input on the end-product and incorporating their experience (Anacleto et al., 2012; Benton et al., 2012; Bossavit and Parsons, 2016b). Additionally, Alves and Hostins (2019b) utilised design-based research because it combined research in education and issues experienced by users to produce knowledge; it was more focused on bridging the disciplines. However, there was no more significant discussion as to why studies chose these methods, except for De Jans et al. (2017) and Aufegger et al. (2020), who discussed the merits of either informant design or cooperative inquiry.

A part of the inclusion criteria was whether studies evaluated their process. In future, I could have applied this more rigorously, as across the 49 sampled studies, there was a lack of empirical evaluation of what worked and didn't within a user involvement method. As mentioned in the results, there were speculative suggestions as to what activities and tools are preferred by young people, but an empirical evaluation of the chosen design process was missing. This may be related to the overall goals of these studies, where most studies focused on determining features and functionality or creating a game, which are more outcome-focused than process.

Studies such as Cosma et al. (2015) utilised focus groups to generate feedback on the end product but not on the activities that young people took part in. Durl et al. (2017) tested user involvement activities and, as a result, compared conventional and vulnerable user involvement processes in a six-step framework on what sessions to use and why. Though there

were rationales behind the method used, studies don't critically evaluate the effectiveness or appropriateness of the user involvement method with children and young people.

### 3.8.4 Involving Children and Young People

The findings of this review suggest agreement with existing evidence, with the precedent of children and young people involved as informants. Existing evidence suggests user involvement methods provide a convenient platform for determining features and testing iterations of products (Tsvyatкова and Storni, 2019; Maheu-Cadotte et al., 2021). Results indicated that children and young people were mainly involved as informants rather than co-designers. Maheu-Cadotte et al. (2021) reported similar findings, where end-users were rarely involved as co-designers or consultants. However, there is contention towards how we involve young people in user involvement methods.

The results not only observed a variety of different user involvement methods but also a variety of definitions or interpretations of user involvement methods. The difference in definitions regarding participation could be due to how studies in the sample involved young people differently. Differentiation in definitions led to how young people were involved. Where two studies were labelled co-design, it did not necessarily mean both studies involved young people similarly. In addition, the goals of these studies varied; a study focused on the end product rather than examining involvement may approach involvement very differently. Though a few of our samples referenced Druin (2002)'s labels for young people's involvement, no other evidence was given for how young people were involved. With a lack of clarity on how young people were involved, or even a shared language or set of labels, this raises the following questions;

1. How do we involve young people (their role)?
2. How do we define their involvement?

The review identifies an uncertainty about young people's role during user involvement methods. Further, there were observations regarding factors that may impact a young person's involvement or engagement within a design process. In particular, none of the studies in the sample discussed the engagement of young people in their specified role. Instead, discussions regarding engagement were focused on activities and tools. Engagement has been addressed in previous research as a key motivation for user involvement methods, but there is uncertainty in how engaging different participation roles are (Halldorsson et al., 2021b; Hill et al., 2018; Hollis et al., 2017). Therefore, future research should consider how the role of young people in user involvement methods impacts engagement during the design process of games.

Another principal finding of the review is how we involve and define young people's participation in user involvement methods. Simonsen and Robertson (2013) stated that informant design is not active participation, which could suggest that children and young people involved in studies as informants are not actively participating and collaborating in the design of applied games (Orlowski et al., 2015). On the other hand, studies from the review highlighted a preference for children and young people to act as informant roles over co-design roles due to

a) difficulty of designing game elements for an applied context, and b) children as informants had more difficulty in verbalising their thoughts regarding game mechanics (Romero et al., 2019; Leitão et al., 2019).

Regarding children as design partners or co-designers, Khaled and Vasalou (2014) raised an interesting point regarding the challenges of bridging serious games and PD, wherein serious game designers must be fluent in game design and the domain context. Additionally, users (i.e. children) may lack one or both forms of knowledge, though PD approaches could strengthen domain knowledge, which results in active contributions. This suggests a general tension in user involvement methods, particularly around co-design and children’s roles. The suggestion reviewed literature is that careful onboarding and introductions of concepts can help up-skill users and better inform them of the contexts they are taking part in.

### 3.8.5 Limitations

Limitations included the omission of reports published in languages other than English and the sample captured by the review. In addition, the simplification of labels could be interpreted differently by different researchers, but therein lies a question for wider literature: How to interpret involvement? Or participation? The reason for sharing details of simplifications is an effort to improve the transparency on what was conducted so that further research exploring the involvement of CYP can consider what role best suits their goal. Some of the studies captured sampled young people greater than 18 years of age; this occurred in studies focusing on ‘young people’, ‘students’ or ‘adolescents’ where the upper age limit of their study was around 22 years of age. However, this could be a cultural difference or a soft constraint on sampling adolescents and teenagers.

## 3.9 Summary

This chapter reports the findings of the first study in the thesis, systematically exploring and reviewing the literature to examine how children and young people are involved in the design of applied games. The systematic review identified:

- Significant variability in how studies understood and applied key terms like “co-design,” with activities labelled as “co-design” or “focus group” differing drastically in practice.
- Inconsistency in how studies reported and implemented methods: with many providing insufficient detail to document their involvement processes adequately. Despite focusing on studies that explicitly reflected user involvement, the review found a lack of detailed reporting, making it impossible to map activities onto specific stages of the design process, as suggested by prior work (Vandekerckhove et al., 2020)

These findings align with broader findings in co-design research, where methods are often poorly documented and lack reproducible standards or consensus terminology (Slattery et al., 2020). Such deficiencies hinder replication and knowledge transfer beyond tacit, in-person exchanges within research teams. Building a systematic body of evidence on which approaches

work better or worse for specific participant groups, contexts, or aims is challenging without clear standards for identifying and reporting user roles and involvement methods. This lack of clarity may explain why only four of the 47 sampled studies conducted qualitative evaluations of their methods, even though 22 studies claimed meta-methodological objectives, such as assessing involvement methods.

Consequently, most reflections and recommendations on user involvement remained speculative, preventing definitive conclusions about the effectiveness of different roles or methods. While participatory design often advocates for the most profound possible user involvement, several studies indicated that CYP faced challenges acting as meaningful co-designers in applied game design (Romero et al., 2019), finding it easier to contribute as playtesters rather than sketching concepts (Leitão et al., 2019). This may be due to the specialised domain and game design expertise required, which CYP typically lacks and could be addressed through better onboarding or the involvement of complementary stakeholder groups (Khaled and Vasalou, 2014). Although involving CYP is essential for realising game prototypes, their expertise and availability for consistent collaboration remain challenges for future research (Balli, 2018). Ultimately, the inability to answer questions about what works best reflects poor reporting standards across studies.

This chapter addressed the first research question of this thesis, “How have CYP been involved in the design of applied games?”. By employing a systematic approach, I have explored the relevant literature on how CYP were involved in designing applied games across various disciplines and contexts. The results suggest that research is more concerned with the game-based outputs during the involvement of CYP, despite many meta-methodological goals researchers set out to achieve. In addition, though I tried to map the phases of development to existing design processes, it is unclear how, what, when and why CYP were involved during the design process of applied games. Though there were some suggestions regarding the type of activities that may be used, there is uncertainty about when and why these activities are favoured. When examining studies for factors affecting successful participation, there were five suggestions deducted from the sample:

1. **Comprehension** – The more CYP are familiar with the context, subject matter, design process, and the tools and methods used, the more engaged and effective their participation tends to be.
2. **Cohesion** – Successful and meaningful CYP involvement relies on different stakeholder groups working together as a cohesive team. Reaching consensus can be challenging, and fostering a cooperative rather than competitive mindset is crucial.
3. **Confidence** – CYP who feel confident in their abilities, have a sense of agency, and are granted meaningful participation opportunities tend to engage more deeply in the process.
4. **Accessibility and Inclusivity** – Ensuring participation is accessible to all CYP, including those with disabilities or special needs, is essential for meaningful engagement.
5. **Time and Space** – Allowing adequate time and space for creative exploration fosters deeper discussions, sustains interest, and enhances engagement throughout the participation process.

In addition, few steps were taken to question CYP's participation or involvement during the process to ascertain whether participants were engaged or successfully participating. With a lack of clarity regarding how to facilitate the design of applied games for and with CYP, the next logical step is to learn from those who have conducted participatory methods with CYP, exploring what key factors afford 'good' participation.

## Chapter 4

# Understanding Co-Design in Practice with CYP

### 4.1 Introduction

The results of the systematic review left a few unanswered questions towards what factors may impact CYP’s participation or engagement. Though the review identified potential factors to impact CYP’s participation, it did not offer guidance or solutions on mitigating disruptions to participation or how to ensure ‘good’ participation. Therefore, the following chapter details the results of a qualitative semi-structured interview study with researchers and designers who had facilitated participatory methods with CYP. The chapter describes the aim, how it was conducted, and the key findings after reflexive thematic analysis Braun and Clarke (2021).

As discussed in Chapter 2, ‘good’ CYP participation is framed in terms of CYP’s role or level of involvement in the design or research process (Maheu-Cadotte et al., 2018; Saiger et al., 2023; Leitão et al., 2019). A widely shared belief, or value, is that ‘good’ or ‘genuine’ participation only occurs when CYP transcend less-involved roles (like ‘informant’) toward becoming full ‘design partners’ that actively contribute and communicate as part of a design team (Simonsen and Robertson, 2013). In the design of games, game-based interventions, and digital interventions, prior research suggests more ‘involved’ roles benefit the outcome and participants most (Maheu-Cadotte et al., 2018; Saiger et al., 2023). In contrast, others caution CYP struggle to act in more involved roles and prefer less involved ones (Romero et al., 2019; Leitão et al., 2019).

Roles or levels of involvement articulate relatively high-level qualities of participation that arguably depend on many implementation details of a participatory process. However, reporting of these ‘nitty-gritty’ practical details is poor (Preston et al., 2023), leading to numerous calls for more robust documentation of user involvement methods to improve reproducibility, applicability, and effectiveness (Preston et al., 2023; Saiger et al., 2023; Halldorsson et al., 2021a). This poor documentation outlined in Chapter 3 feeds into the comparative lack of studies on how implementation detail impacts CYP participation quality and outcomes (Bates et al., 2011; Saiger et al., 2023).

## 4.2 Aims of the Study

Therefore, to investigate how practitioners, those who co-design with CYP, ensure ‘good’ or ‘genuine’ participation of CYP in design processes, the aim was to address the following research questions:

1. How have CYP been involved in the design of applied games?
2. What factors impact CYP’s participation and engagement?
3. What constitutes ‘successful’ participation in designing applied games?
4. How to consider CYP participation within co-designing games?

However, a more focused aim was to explore how practitioners engaged young people and ensured their participation.

## 4.3 Method

A set of semi-structured interviews and subsequent reflexive thematic analysis (RTA) (Braun and Clarke, 2021) was conducted. The design of the semi-structured interviews were based on (Cote and Raz, 2015) structure, developing an interview guide and questions which could be distributed prior to interview. The questions provide a gentle introduction to the purpose of the interviews by utilising icebreaker and demographic questions before moving into more substantive questions. (Cote and Raz, 2015) suggest interviews should maintain a semi-structured flow so that participants can lead the discussions, with the researcher(s) providing probing or guiding questions. The interviews were all conducted over Zoom and audibly recorded. Transcripts were then reviewed and coded before coding was conducted via NVivo and Microsoft Excel. The following sections detail the recruitment, procedure and reflexive thematic analysis process.

### 4.3.1 Recruitment

practitioners who had facilitated user involvement methods were recruited through a digital poster distributed via email groups, social media, and Discord servers. The poster asked for practitioners who had worked alongside CYP to deliver a product, ideally in developing a game or interactive technology (see Appendix F). A total of ten practitioners fitting these criteria were recruited, including researchers, social workers, project managers, and designers/developers. Each had conducted at least one participatory workshop, session, or process with CYP. All participants expressed the value of involving CYP at some point in the development process.

Identifier	Title	Gender	Discipline
A	User Researcher	Female	Game Development
B	Researcher	Female	Social Work
C	Game Developer	Male	Game Development
D	Producer/ Designer	Male	Game Development
E	Researcher	Female	Health Sciences
F	Project Manager	Male	Health Sciences
G	Academic/ Designer	Female	Computer Arts
H	Researcher	Female	Mental Health
I	Practitioner	Female	Mental Health
J	Researcher	Female	Game Development

Table 4.1: Demographic of participants sampled in interviews

### 4.3.2 Procedure

Participants were interviewed over Zoom video communication software. The semi-structured interviews followed Cote and Raz (2015) approach. Participants were first asked about their role and experience before following up on how they have facilitated and engaged CYP in user involvement methods (see topic guide in Appendix C). Before the interview, all participants were given a participant information sheet and were required to provide informed consent via email.

### 4.3.3 Data Analysis

A reflexive thematic analysis approach was used for data analysis (Braun and Clarke, 2021). Reflexive thematic analysis provides a highly flexible approach to analysis, allowing for my interpretations and reflections upon the data. After each interview, transcripts were reviewed individually, noting initial codes and identifying connections to previously identified codes. These codes were then refined through discussions with the supervisory team. The codes were then organised into themes, noting connections and hierarchical connections between the codes. Before finalising the themes, the transcripts were revisited and reviewed to identify any other excerpts.

### 4.3.4 Positionality Statement

As established in Chapter 1, I have a background in design and development of games both in and out of academia. In addition, in my epistemological positioning as a pragmatist, I am likely to be drawn to more constructive questions rather than theoretical discussions. With an interest in exploring how user-centred design and participatory design, it is likely my questions were focused more on process rather than approaching the interviews more holistically. As a fan of games most of my life, and with a passion for design, I have worked in both the digital and game design industries. These experiences have given me a different perspective on designing compared to participatory design approaches. Digital design frequently considers user experience and formative evaluation throughout development, but this is not often the

case in game design and development. I chose reflexive thematic analysis to analyse the semi-structured interview data as it offered a method for contextual understanding from my perspective, promoting a more contextually sensitive interpretation. It also empowers the participants sampled, ensuring their voices are accurately represented when one participant describes a particular experience.

## 4.4 Results

A total of ten participants took part in the study. There were various backgrounds and experiences in co-designing interactive technology with young people. However, throughout the interviews, participants struggled to articulate why certain things were done and how they were measured. Participants could describe in great detail how they designed their co-design workshops/activities and discuss the outcomes of their design process. However, discussions revolving around how they measured engagement or participation were a struggle. The transcripts produced a lot of rich data and insights into recruitment, ethics, and the involvement of CYP in the design of games or similar technology. However, the analysis focused on four key themes impacting participation or participant engagement. The interviews generated broader findings than the questions proposed. The complete codebook with lists of codes and wider themes can be found in Appendix D reference. That said, four key themes were evaluated from data analysis to impact the successful participation of children and young people during a participatory design process.

- (1) Informing CYP through onboarding, briefing, and training improves comprehension;
- (2) Driving CYP engagement through familiar tools and affording agency in activities;
- (3) Managing expectations through clear goals sustains and directs attention;
- (4) Social communication facilitates cohesion.

The following section details these themes with examples. These themes were not exhaustive and represented a predominantly UK sample.

### 4.4.1 Informing CYP Through Onboarding, Briefing, and Training Improves Comprehension

Informing CYP in the context of the design process was a strategy discussed by the sample to influence participation. They described how informing CYP of key concepts was essential to avoid “*non-stupid ideas*” [G.73] or participants suggesting existing solutions. For example, participant G referenced designing a conflict resolution video game, which required informing CYP about both conflict resolution and game design so that “*they could be thinking simultaneously*” [G.74] about both concepts. In addition, Participant H described how “*it’s important not to make assumptions*” [H.3] regarding their comprehension and knowledge of the topics involved. Participants discussed how anxiety can “*be talking about two different things*” [H.4], suggesting it’s important to make sure all stakeholders have a shared understanding.

The sample discussed the importance of informing CYP when CYP participated as decision makers and ran the co-design workshops. CYP needed to “*know the materials and what we have developed so far*” [I.1] so they could provide helpful feedback. Setting up steering committees or groups was referenced by two of the participants, B & H, as a strategy for sampling CYP who may be involved. These groups would “*go through making sure they, they know what they’re signing up to*” (B.9) and make sure potential CYPs understand their role, why it’s essential, and what it will entail. Similarly, onboarding was discussed by participants B, D, H, I, and J. Participant I described how “*we introduced kind of why we were doing the research. . . [and]...looked through each module quite clearly*” [I.26] in each of their participatory workshops, where modules described training materials related to the research context. Both Participant B and I made use of introductory sessions, which helped drive “*discussion and debate best*” [I.27]. Participants I and J also described the use of videos and film in onboarding as an alternative method of interaction. Overall, participants suggested onboarding can help improve CYP comprehension by providing introductory sessions and utilising multiple forms of interaction to stimulate informing.

Where practitioners were involved with an established CYP group, they described how giving a “*general presentation on the research*” [F.68], “*starting with the basics [of concepts]*” [B.24] and providing “*a very short training course around what the research was on*” [H.21] were methodological steps to informing CYP for genuine participation. Alternatively, Participant F suggested sending materials in advance that included “*some information about the sort of questions that we might be asking. . . and alert them to the aspects that we particularly interested to have their views on*” [F.29], where this gave CYP time to digest information. When it came to informing CYP on games and applications, Participant D discussed how “*setting up a machine with the latest prototype*” [D.23] provided a ‘kind of context’ to what the goal of the project was.

#### 4.4.2 Driving CYP Engagement Through Familiar Tools and Affording Agency in Activities

practitioners who developed age-appropriate health or education materials to pilot with CYP ensured that these materials matched the target age range or developmental stage. This approach positioned CYP as decision-makers, giving them a sense of responsibility while allowing, for instance, participant F to evaluate whether “*the look and design of it [the intervention] is appropriate and engaging to their age group*” [F.71]. practitioners also noted that imagination and creative thinking could be challenging, mainly when designing from abstract prototypes.

Participants mentioned how choosing tools and technologies that CYP already know can facilitate their involvement. For example, using “Facebook Groups” [H.11], “Instagram” [H.15], “videos” [I.2], and “established programming languages” [J.8] enabled CYP to engage through familiar methods. Participant J described working with CYP, who had learning difficulties and initially struggled with “*slightly complicated editing tools. . . quite a steep learning curve*” [J.2]. Instead, they opted for more straightforward software and familiar tools such as Microsoft Office, which children would likely have used in school. Participants C and D also discussed how interacting with prototype materials or interventions required a “*leap in imagination*” that was not always intuitive for CYP.

The sample discussed how giving individuals a sense of agency and ownership influenced their engagement. Participant A described how they “*wanted to give them the space to explore and interact with the software and have it be about their agency*” [A.59] but wished they had asked for more design-based recommendations to “*shape more of the early decisions*” [A.61] rather than relying solely on feedback. Participant H emphasised the importance of acknowledging feedback to show that “*their idea has been taken on board*” [H.9]. Using digital tools, it is possible to provide visual records of what was done and evidence of contributions. Participants G and H noted that seeing their work reflected to them not only offers feedback on their input but also reinforces the control they have during participation, with Participant G stating, “*a child from that group would hopefully be able to see themselves reflected on that contribution okay*” [G.30].

Participant J described the value of tailoring involvement when asked about ensuring suitable activities. At the same time, Participant I noted the importance of getting “*to know something about them on a personal level, just something that’s not too deep*” [I.54]. Participant F suggested that informal communication and activities helped create a “*more comfortable*” environment [F.44]. Specific activities were described as effective in promoting engagement. Participant G explained that for every individual, “*there are a combination of things that they find difficult (which) is going to be very, very specific to them*” [G.4], advocating for testing a range of activities. They also suggested using physical constraints, such as a large piece of paper shared between participants, to establish shared boundaries.

practitioners were asked how they engaged individuals or evaluated engagement and why it was significant. They described methods like keeping participants engaged with “*your audience excited. . . through paper prototyping and interesting art*” [D.22] and providing *breaks to maintain focus* [B.76]. However, participants couldn’t provide clear examples when asked why engagement was important or how it was assessed. Participant D admitted it was challenging to gauge motivation or engagement, stating, “*I think it can be very hard to say. I think there were, there was one, maybe two sessions where I was like, okay, yeah, you’re into this. Um, but it could be because we were dealing with like quite polite, like young children*” [D.28]. Participant H observed that individuals are “*willing to be engaged at different levels*” [H.17], noting variations in engagement which could be related to developmental preferences. Participants G, I, and J encouraged diverse activities, such as role play, shared posters, and digital tasks, to foster engagement. While the effectiveness of these activities was uncertain, participants suggested that flexibility in facilitation methods could influence meaningful participation.

#### 4.4.3 Managing Expectations Through Clear Goals Sustains and Directs Attention

Regarding expectation management, practitioners referenced the capabilities of CYP involved. When Participant J was involved in programming exercises to develop a game, they later realised that the technical challenge was too difficult for some CYP participants, or the time required to educate them was limited for the duration of the research project. There was an exception where participant A discussed how eye-trackers felt “*foreign and alien to the teenagers*” [A.38]. They suggested making use of more familiar technology such as mobile devices or pen and paper, but also giving “*a space that you’re doing this in, appropriate for*

*the kids*” [A.30] so that it doesn’t feel too much like an “*boring laboratory*” [A.29].

When it came to the intervention or game produced, Participant C described how facilitators need to be mindful of CYP expectations when presenting CYP with a work-in-progress prototype as “*it needs to be relatively polished... it has to be pretty*” [C.4]. Participant D described a similar expectation of CYP, where they describe “*showing kids prototypes... didn’t feel like we get good stuff* (feedback)” [D.8]. They explained how prototypes can be ‘misleading expectations’ given CYP consumption of entertainment games. Participant D’s strategy to address expectations was context-specific, suggesting the mention of games may ‘mislead expectations’; they suggested a strategy could be avoiding the mention of games to prevent CYP anchoring on existing knowledge. However, they previously mentioned how the mention of games could help drive participation and engagement; “*If we were to make a video game like that, what would, what would that look like? And then suddenly you’re off to the races*” [D.44]. In comparison, participant C specifically described CYP expectations and how their expectations towards digital tools or games are “*flashy and high quality*” and by “*putting something in front of them that is inferior*” [C.5] is going to not only mislead expectations but disinterest them.

The sample suggested how providing clear aims and goals can help manage CYP’s attention and expectations. Participant I described how they sent CYP “*sort of like a timeline of what was going to be covered in their sessions. So they knew what to expect*” [I.8]. Participant D described that when existing games are given as examples, this can set an expectation that will ultimately let down CYP participants. In addition, participant G discussed how clear goals helped form constraints, where showing them a ‘starter’ or “*skeleton*” of objectives and goals version of an intervention helped ground the expectations [G.13]. Alternatively, participant J suggested a breadcrumb approach, where they focused on small achievable goals that would incrementally move towards the main goal but not overwhelm CYP; “*So I think in terms of development, it was mostly down to what’s the easiest thing that we can do to start off with and then how can we build in it...*” [J.68]. Presenting clear goals regarding the content was also important, as facilitators are asking CYP to “*think deeply about a specific issue*” [B.33] it’s key “*we’re very clear on what we’re asking of them as well as what they will get out of it* [participation]” [B.37].

Concerning what CYP gets out of participation, participants B, F, G, and J described takeaways from their participation. They described how CYP “*develop their own skills*” [B.38], “*emotional rewards*” [F4] referring to senses of accomplishment, and providing tangible things they could take away from their participation [G.48]. Providing these takeaways gives CYP an incentive to participate and something to look forward to, e.g. custom game boxes. Participants B and H also described how CYPs involved in their studies are often incentivised or compensated for their time. In contrast, participant B described participation as “*it’s very much about this as an opportunity*” to CYP [B.36].

Interestingly, we found only a few members of our sample discussed incentivise CYP to manage expectations and behaviour of CYP. They were clear that CYP should be rewarded for their participation and how that contributed to motivating CYP. (Read et al., 2022b) discussed how the ethical involvement of CYP should not only be transparent but also consider the immediate value to CYP. The immediate value of CYP often discusses skill development Christie et al. (2019) and social benefits Durrant et al. (2013), except in this study we found that there were communication benefits to CYP involvement. The practitioners reported the

challenges of communicating with CYP and discussed how participatory design processes promoted social skills development as prior research had found Ward et al. (2022).

#### 4.4.4 Social Communication Facilitates Cohesion

Facilitating communication was a large component of ensuring cohesion with CYP during their participation. Participants described how CYP have varied social skills and could “*have a lot of communication and cognitive problems*” [A.3] depending on the sample involved. Specific methodological approaches may not be suitable where Participant A detailed, “*We developed the prototype and then we came and had them play it. Um, and we didn’t have them do think aloud because they have a lot of communication and cognitive problems, but they were perfectly welcomed to, like yell random things about what they liked or didn’t like while they were playing.*”\* [A.4] Participant B focused more on ‘reading the room’ to best understand how to communicate with CYP. Participant E took a different approach by speaking with parents before CYP involvement; they learned about parental attitudes towards CYP involvement before the participation of CYP[E.21].

These communication challenges then stretch to who you involve. Participants discussed the impact of having CYP work alone, in pairs, or groups. For example, participant A talks about CYP working with siblings “*So we did, we did one at a time, even with siblings, we would put them in other rooms, um, and just have them do it by themselves.*” [A.57] The sample described how external stakeholders such as parents and experts can have a mixed impact on cohesion. Participant G described the barriers between disciplines and how there are “*membranes between the research group and the school, and the pedagogical experts*” [G.54] before the research process considers the involvement of CYP. Similarly, Participant I described how involving experts as additional co-designers or participants can cause friction regarding the solution or outcome, often a result of disagreements: “*I think we would have missed a lot if they [CYP] were in one group and with the practitioners*” [I.25].

The language and grammar surrounding game design and health concepts weren’t familiar to CYP. Participants described how technical or academic language is not widespread across stakeholders, including CYP, where Participant A suggested participatory methods lack the “*building blocks*” [A.39] to establish a common language. Further, the sample suggested “*we underestimate how much children already know about digital design play*” [G.69] but “*how there’s no analogy, picture in child’s mind of how a game gets made*” [D.36] which suggests that children may understand how to play a game, but not necessarily how to design a game. Participant D attributed this to common knowledge, where designing games is not commonly understood or known about which results “*as a consequence [CYP] just kind of don’t know what to expect*” [D.35]. The suggestions from the sample to address language and framing was to utilise “*introductory sessions*” [J.74] to debrief participants and take time to discuss and develop a common language.

#### 4.4.5 Reflection on the Thematic Analysis

A key part of utilising reflexive thematic analysis is asking, “How did I shape what I observed?”. Though this chapter details the positionality of myself as a researcher, the resulting themes

from the analysis are likely interpreted from my prior background. When the research was conducted, I had recently completed the systematic review described in Chapter 3. The study's results emphasise considerations on onboarding, confidence, managing expectations and social communication, which no doubt influenced the interpretation of the interviews. In complete transparency, the original protocol questions were much broader, where I had asked questions regarding the whole design process. I quickly narrowed down to asking questions related to the study's goal, focusing more on how CYP were involved and specific details of participant engagement. Starting broad and narrowing down is a mindset potentially moulded from a previous practitioner background in quality assurance, where wider lenses of analysis are cast before focusing on the problem area.

The result of asking broader questions meant there was rich data on areas unrelated to the study's goals and the research questions. For example, many participants talked about the challenges of recruitment and those from an academic background described in great detail the challenges to ethically involving CYP. Though these were fascinating areas to hear, they did not directly discuss the process when CYP are involved. Questions could have been improved in hindsight, but this was likely a result of inexperience in conducting in-depth interviews compared to conducting user experience interviews that I had conducted professionally.

As a designer, the patterns that caught my attention were rooted in a narrative that wasn't complete. To explain, most participants could detail the importance of keeping children engaged. However, when asked how they evaluated or ensured engagement, this was met with confusion. Participants could describe why an aspect of co-designing with young people was important, but often lacked an explanation of how to facilitate that aspect. This suggested a pattern of 'we must consider CYP perspectives in co-design' and 'co-design is rewarding for CYP', but with little detail on how that occurs. Once this became apparent, I found it hard not to see areas where participation of CYP could be examined further, whether it was through informing CYP, driving engagement, managing expectations or facilitating cohesion.

## 4.5 Discussion

Overall, the results of this study provided a much richer and in-depth insight into how practitioners and facilitators engage CYP in the design of games. Though the literature review in Chapter 2 and the systematic review in Chapter 3 describe the concrete methods for involvement, there was less of a concern on assigning specific methods or terminology to involving CYP. In fact, across the different disciplines of the participants sampled, there were nuanced differences in how they defined participant involvement. Participants from a social and health background mentioned 'Patient and Person Involvement (PPI) or co-production, whereas designers used terms such as co-design. Those these seem like high level terminology differences, there were complex differences in execution of involving CYP. For example, language differences were observed when referencing methods, not just with how they communicated with CYP and other stakeholders. The way children were involved differed between the study designs of each participant.

### 4.5.1 How have CYP been Involved in the Design of Applied Games?

Compared to the findings in Chapter 3, participants were less clear on how, when and why CYP were involved in the design of games or interactive technologies. Compared to the previous chapter, participants described involving CYP in a few instances and rarely over a longer duration (only 2 participants met the same CYP). Furthermore, participants described CYP in more of a validation role, where they were primarily taking part to validate design decisions. Compared to wider literature, the participants were more concerned with CYP's ethical involvement and recruitment strategies, which was unusual, given that little detail about ethics and recruitment is often detailed in scientific reporting.

Ethical discussions of CYP participation have suggested presenting a clear and more mature attitude to informing CYP (Read et al., 2022b). Read and colleagues describe how reporting back to CYP can communicate impact and what their contributions mean. Whereas the participants in this study described ethics in terms of permission challenges and 'getting' CYP in the room for research, describing barriers to recruitment and ensuring an unbiased opinion.

### 4.5.2 What Factors Impact CYPs' Participation and Engagement during their Involvement in the Design of Applied Games?

Involving CYP in the design process has two main benefits for a facilitator of participatory methods: the impact on the CYP and the impact on the design process. Where previous research had discussed delivering feelings of ownership (Ward et al., 2022) and confidence (Bossavit and Parsons, 2016a), the sample discussed more on delivering agency and the specific methods of engaging CYP. The theme of appropriate tools and settings to drive engagement suggests that giving CYP the right tools and environment can drive a sense of responsibility, similar to what Ward et al. (2022) and Larsson et al. (2018) discussed in their research. Ward et al. (2022) described how a sense of responsibility during a design process, alongside agency, can result in a stronger reflection on CYP experiences and priorities from their participation.

When it came to managing expectations for CYP attention, the participants discussed how CYP attention was often impacted by how clear the goals were, the expectations of what their participation would produce, and how much they could feasibly contribute. The results suggest breaking down goals and objectives into more digestible formats, whether through a 'skeleton' framework or a 'breadcrumb' approach. The sample discussed how presenting information and goals in more manageable achievements was key to CYP's impact on the design process. This shows some coherence with the findings of Barendregt et al. (2016b), who suggested clear learning goals can make for meaningful participation, although the results indicate that more manageable content is needed to achieve goals and participation.

### 4.5.3 What Constitutes ‘Successful’ Participation in Designing Applied Games?

The main contribution of this study is understanding how facilitators of co-design with CYP are considered ‘successful’ participation. Where Previous research had called for a more robust methodology (Halldorsson et al., 2021b; Saiger et al., 2023) and suggested poor reporting of how CYP are involved (Preston et al., 2023; Saiger et al., 2023). This study found that comprehension was a key factor in enabling successful participation. The main strategy was to *inform CYP to improve comprehension* amongst the sample. To enable novel or feasible solutions, facilitators of participatory methods need to consider priming and informing CYP of the contexts they may face.

Participants observed that CYP can have a misconstrued understanding of concepts like game design, and in terms of definitions, their understanding may differ from that of other stakeholders. Participants described strategies, such as training or establishing a common language among stakeholders, to try improve CYP comprehension of concepts. Hawke et al. (Hawke et al., 2018) described how debriefing and briefing participants to prepare CYP was a key strategy for enabling genuine participation. The study reports detailed strategies for informing and priming CYP through presentations, sharing materials/interventions in advance, or even providing training. When it came to informing CYP on a specific technology, such as games, we found that presenting an existing prototype can help set the context and manage participants’ expectations.

*Managing the expectations for CYP attention* was maybe the second most important contribution of this work. Managing expectations has been discussed concerning defining roles (Mazzone et al., 2010), being transparent (Read et al., 2022b) on the design process, and managing CYP’s engagement (Padilla-Petry and Miño Puigcercós, 2022). We noticed that facilitators should be careful about the information they share, the technology they present, and how clearly defined goals and objectives affect the management of expectations. The findings indicate that facilitators need to be cautious about the information they share with CYP. Particularly in the context of games or game-based interventions, these approaches can inspire and engage CYP, but they also have the potential to create unrealistic expectations regarding the outcomes of their involvement. Read et al. (2023) discussed similar, where they stressed the importance of setting realistic expectations for CYP on what their involvement means.

### 4.5.4 How to consider CYP participation within co-designing games?

Clear goals and aims were the most frequent strategies employed in the results, although practitioners differed in their approach to presenting clear goals. The study found that presenting goals in a ‘breadcrumb’ or ‘skeleton’ approach helped avoid overwhelming CYP and also presented a clear message of what CYP needs to think about. Boundary objects have been discussed in prior research on their value to providing a constrained creative space to generate solutions, and the results support these findings, suggesting that a constrained approach can help communicate what is being asked of CYP (Khaled and Vasalou, 2014; Terlouw et al., 2021).

Only a few practitioners discussed using incentives with CYP to manage expectations and CYP's behaviour. They were clear that CYP should be rewarded for their participation and how that contributed to motivating CYP. Read et al. (2022b) discussed how the ethical involvement of CYP should be transparent and consider the immediate value to CYP. The immediate value of CYP often discusses skill development (Christie et al., 2019) and social benefits (Durrant et al., 2013), except in this study, there were communication benefits to CYP involvement. The participants reported the challenges of communicating with CYP and discussed how participatory design processes promoted social skills development, as prior research has found (Ward et al., 2022).

This study found that specific grammar, or connotations, for how these design processes work are not commonly known to children and young people. In addition to comprehending the concepts involved, such as health, facilitators need to consider the grammar and language surrounding a design process. Although the language and grammar challenges to cohesion were specific to game design and related research, specialists in HCI would likely encounter similar challenges. Where prior research described how breakdowns in communication could lead to frustration (Romero et al., 2018; Saiger et al., 2023), the results share more commonality with the findings in health-related research, where efforts are made to avoid academic and complex language (Preston et al., 2023).

To my knowledge, there has not been a broader discussion on establishing language and grammar within participatory research. The suggestion of this study was to, again, brief participants on the language and grammar of complex concepts that may be involved to ensure cohesion between CYP and other stakeholders. Although more exhaustive research suggests taking time to build rapport (McAra, 2017) between participants to ensure cohesion, both the results and wider research do not offer an answer to how we address language and grammar between stakeholders and disciplines. Creating a common shared language is one solution, but there is the question of what steps would be needed to establish a shared language.

#### 4.5.5 Practitioners' Understanding of Success

What was clear from the analysis was that practitioners could easily show how they engaged CYP via appropriate tools, activities and settings in their retrospective research/design process. Still, they would struggle with describing why the engagement was important. The sample struggled to discuss how they engaged young people with practitioners, suggesting the CYP involved were "*already motivated*" [H.42] or didn't evaluate whether they were engaged during their participation. For example, when asked how they managed engagement during CYP participation, the sample suggested appropriate tools and settings to drive engagement, such as utilising familiar technology and relaxed settings. The setting and environment were also discussed by Nixon et al. (2022), concluding similar results on how unfamiliar settings can disrupt the confidence and comfort of CYP. However, familiar technology is a more complex discussion of user needs. The results advocated for simpler information media such as mobiles and paper-based activities in line with Durrant and colleagues' findings (Durrant et al., 2013). Growing research has argued for bespoke technology to inspire and engage CYP participants (Hirskyj-Douglas et al., 2021; Hunt et al., 2023). The exception in this chapter's findings was how the right technology can be a vehicle for reflection, giving CYP feedback on

their contribution and level of control.

The practitioners stressed the importance of informing CYP to improve comprehension and its impact on their studies. The results suggested that onboarding and briefing participants was core to understanding their views. These findings align closely with (Mannila and Skog, 2023; Read et al., 2023), who discussed how debriefing and briefing participants on their involvement assisted with reflection and iterations for future research. However, the results stress the importance of informing CYP of their role, why it's important, and how they are involved rather than discussing what role it had and the impact it had. Raynes-Goldie and Allen (2014) described similar in their research, attributing that informing participants before research was key to the success of the research more so than comparing the varying roles CYP could be involved. This finding suggests that contrary to the ongoing research of role, e.g. informant vs design partner, facilitators should focus more time on onboarding and informing CYP to ensure success.

#### 4.5.6 Limitations

Reflexive thematic analysis as an analysis method carries the potential for subjectivity. In providing my positionality and epistemological in Chapter 1, as well as my reflections earlier in this Chapter, I have tried to mitigate the subjectivity. However, I have to acknowledge that the analysis was conducted solely, with discussions of themes only occurring with the supervisory team. In practice, the analysis of themes should be done with multiple coders to conduct the analysis separately and then discuss for coherence or conflict. I have attempted to report the reflexivity of the study and this results in the resulting themes based entirely on my interpretation of the dataset. Conducting the initial analysis close to the completion of the systematic review was likely to result in an anchoring effect on specific topics. Finally, the results are drawn from a small sample of practitioners who self-reported facilitating a participatory process with CYP. However, each practitioner described various participatory methods and practices from their discipline. Herein lies another limitation in the variation of backgrounds. Though opportunistic sampling was used, a more focused recruitment could present more concise recommendations on facilitating co-design with CYP. Finally, there were codes and themes outside of the core focus of this research where others may argue they were relevant to include, these interpretations likely mean inconsistencies in reporting compared to approaching a similar dataset.

## 4.6 Summary

This chapter covered the second study of this thesis, which asked *How do facilitators ensure 'good' participation during participatory research for digital system development with CYP?*. This research goal encompasses two objectives: 1) to identify factors that could impact CYPs' participation and 2) to explore and understand potential solutions for ensuring engagement. The results of this study produced four themes that potentially impact the 'good' participation of CYP during the design process.

- (1) Informing CYP through onboarding, briefing, and training improves comprehension;

- (2) Driving CYP engagement through familiar tools and affording agency in activities;
- (3) Managing expectations through clear goals sustains and directs attention;
- (4) Social communication facilitates cohesion.

In addition, this study provided an in-depth exploration of how facilitators engage children and young people (CYP) in the design of applied games, revealing key differences in terminology, participation methods, and factors that influence engagement. While previous research has outlined methods for involving CYP, this study signified a lack of consensus on describing these processes, with terminology varying across disciplines. These findings echo the results of the systematic review in Chapter 3. The study found that CYP were typically involved in short-term validation roles rather than sustained engagements. Compared to the literature, participants in this study placed greater emphasis on ethical considerations and recruitment challenges rather than detailing methods of participation. A contribution of this work was identifying the role of comprehension in ensuring successful participation. Facilitators emphasised the need to inform and prepare CYP by providing context, training, and a common language to enhance their understanding and engagement. However, the reflection on how effective the ‘vehicles’ for comprehension were was missing, as participants had not often considered a reflective step. Additionally, managing CYP’s expectations through structured goals, such as using ‘breadcrumb’ or ‘skeleton’ approaches, was identified as crucial to sustaining engagement and ensuring meaningful contributions.

Successful participation was associated with appropriate tools, settings, and engagement strategies. While facilitators could describe how they involved CYP, they struggled to articulate the significance of engagement. Participants commonly used familiar technologies and relaxed settings to support engagement, aligning with previous research on the impact of the environment on participation (Walsh et al., 2016; Green et al., 2020). However, the findings suggest a stronger emphasis on informing CYP about their roles and contributions rather than focusing solely on defining those roles. The study also outlined the challenges of establishing a shared language among stakeholders, given that most young people are new to game design grammar and understanding.

Overall, there are a few key findings from this study:

- **Terminology Differences:** Varying terms (e.g., co-design vs. co-production) create inconsistencies in describing CYP involvement.
- **Limited Involvement:** CYP are often engaged in short-term validation roles rather than contributing throughout the design process.
- **Ethical and Recruitment Concerns:** Facilitators prioritised ethics and recruitment barriers over participatory methods.
- **Comprehension as Key to Success:** Providing context, training, and a shared language improves CYP engagement.
- **Managing Expectations:** Clear, structured goals (e.g., ‘breadcrumb’ or ‘skeleton’ approaches) help sustain engagement.

- Tools and Environments Impact Engagement: Familiar technologies and comfortable settings enhance participation.
- Need for Standardised Methods: A lack of structured guidance results in inconsistencies in engagement strategies.
- Importance of Reflection and Feedback: Keeping CYP informed about their contributions fosters deeper engagement.

To build on these findings, a follow-up participatory workshop study would provide an opportunity to refine and test the research gaps and strategies outlined above. Given the inconsistencies in terminology and involvement strategies, a participatory workshop could explore best practices for sustained engagement. By incorporating structured goal-setting techniques, such as ‘breadcrumb’ or ‘skeleton’ approaches, CYP may be ‘better’ engaged in their participation. The testing of various tools and settings could further assess the effectiveness of different facilitation strategies. Additionally, workshops would allow for rich, in-depth feedback from CYP, ensuring the key findings and strategies are both practical and meaningful, contributing to the development of applied games.

## Chapter 5

# Design and Delivery of Workshops with CYP

The analysis of interviews in Chapter 4 identified four key factors that may impact the involvement of CYP in participatory methods. Building on these insights, this chapter presents the design, implementation, and high-level overview of a series of design-based research workshops conducted as a single study. These workshops were informed by both prior literature and experiences from previous studies (Chapters 3 and 4, a structured approach to explore further the facilitation and delivery of participatory workshops with CYP.

The findings from these workshops provide a deeper understanding of how participatory methods are applied in practice while also offering a way to examine the factors influencing engagement. This chapter explicitly addresses RQ3 ” *What are the implications of a specific factor (for example, CYP’s comprehension) on games produced?*” by investigating how factors such as comprehension impact both engagement levels and the outcomes of the game design process.

The chapter is structured as follows: First, I introduce the problem and the rationale behind conducting these workshops, followed by an overview of their context. Next, I outline the overarching methodology, including participant recruitment, procedural details, and data collection methods. A brief synopsis of the pilot study is provided in section 5.3, followed by a high-level description of each workshop. Finally, in Chapter 5.6, I reflect on key workshop observations before transitioning to Chapter 6, which presents a detailed empirical analysis of the collected data.

### 5.1 Aim of the Study

Considering that the previous chapters suggested a recurring omission of how CYP are involved in co-design, an exploration into engaging participants would provide a broader contextual understanding. In Chapter 2, I learned there was limited evidence towards best practice of design methods and limited detail on the role of CYP in these processes. In

Chapter 3, I learned that there were varied approaches to participant engagement, but again, few factors or considerations towards explaining how we involve children and young people in the design of games. Finally, Chapter 4 suggested more tangible factors to impact participation and engagement during the design process. With these cumulative findings, a gap remains in understanding the impact of specific factors and strategies on CYP participation. More specifically, the results of the prior studies suggest a lean towards the importance of comprehension, but few studies have examined comprehension in detail.

Therefore, to address research question three, “What constitutes ‘successful’ participation in designing applied games?”, and research question four, “How to consider CYP participation within co-designing games?”, the following aims were set for the workshop.

1. *What factors influence participation during game design?*
2. *What challenges are specific to CYP when they participate in game design?*
3. *How can we maximise opportunities for “successful” CYP participation when co-designing games?*
4. *How can we overcome challenges during CYP participation in games design?*

To address these goals, I needed to consider an approach that included co-designing with young people and permitted a reflective method that could be adapted and changed based on feedback.

## 5.2 Method

Though prior studies had employed a range of methods, such as participatory design (Moore et al., 2019), iterative design (Jiang et al., 2017), or person patient involvement (PPI) (Rouncefield-Swales et al., 2021), Chapter 3 pointed out how few studies had adapted or changed their processes to improve participant engagement. As few studies have previously examined design processes in detail, a more iterative methodology would allow for changes based on feedback and review. For this reason, I used design-based research (Armstrong et al., 2018) and participatory design for these workshops (Simonsen and Robertson, 2013). As outlined in Chapter 2, design-based research is an iterative process to test and refine a service or product (see Figure 5.1). With this in mind, I adopted the design-based research methodology for an overall workshop process.

Design-based research is an iterative process of exploring the research objectives and implementing changes based on feedback. The overall procedure is described in Section 5.2.5; however, iterations produced different procedures with each workshop. These changes can be viewed in more detail in Appendix E. The changes were implemented after analysing and reviewing the data collected from a workshop. Figure 5.1 illustrates the process described by (McKenney and Reeves, 2018). To use their example in 5.1, I had explored the theory, context and problem space through chapters 2, 3, and 4, leading to the analysis and exploration of an appropriate method, design-based research. I then followed the *Design and Construction* phase of the workshops with children and young people. These workshops were then conducted

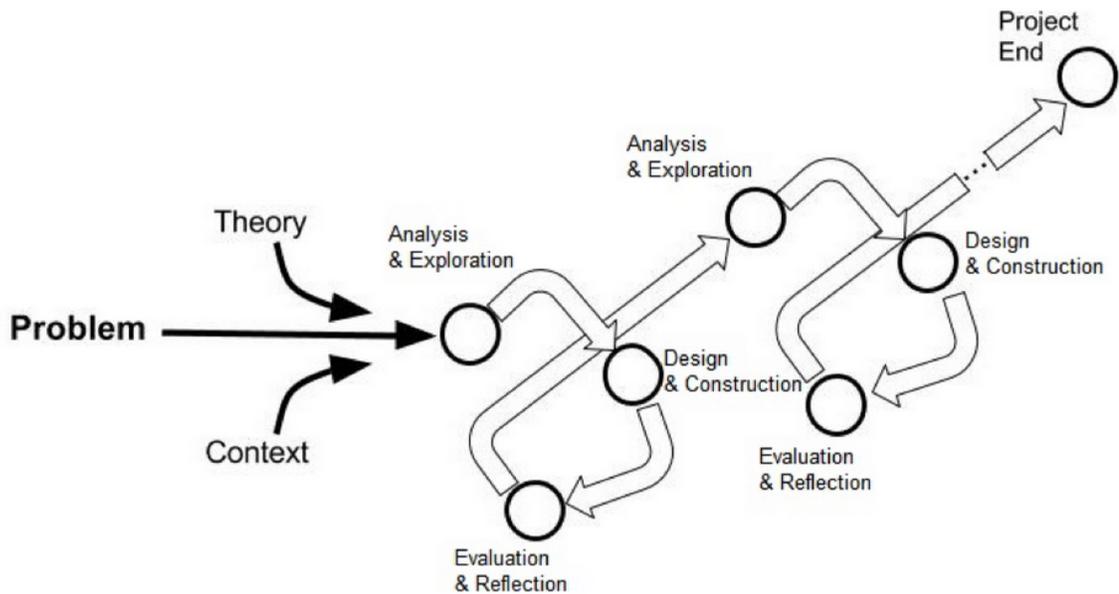


Figure 5.1: Illustration depicting the Design Based Research Process taken from (Armstrong et al., 2018) citing (McKenney and Reeves, 2018)

with young people, focusing on *Evaluation and Reflection* with them. Then, through *Analysis and Exploration*, I was able to understand factors to impact comprehension and participant engagement before the *Design and Construction* of the next workshop, informed by the prior findings (McKenney and Reeves, 2018). These iterations were conducted to enhance the delivery of workshops and facilitate the development of approaches to address the research objectives.

### 5.2.1 Participants

In each workshop, I served as the core facilitator and game design researcher, with additional volunteers assisting in some sessions to help facilitate discussions during the co-design process. The workshops followed a structured recruitment process, which involved establishing relationships with gatekeepers<sup>1</sup> or parents and obtaining ethical consent. Each participant was informed about their role, the duration of their involvement, and the potential outcomes of their participation. The number of CYP participants varied across workshops due to differences in recruitment across groups and backgrounds. Figure 5.2 breaks down the numbers and demographics of participants. To better examine barriers to engagement and participation, involving a diverse range of participants, mainly from low-income demographic backgrounds, was beneficial. I was mainly motivated to explore opportunities for CYP with less frequent access to initiatives like these. Due to challenges of recruitment early on, all workshops were designed as single or double sessions, each lasting approximately four hours. CYP participated as design partners, contributing equally to the design process. As described in Chapter 3, involving CYP as design partners has been increasingly recognised as a practical approach to enhancing participation and improving the quality of design outcomes

<sup>1</sup>Teachers or after school leaders who cold source informed consent

<p><b>Workshop 1</b></p> <p>3 participants (aged 16–17, Male) 1 designer, 1 facilitator 3 Prototypes produced, 1 viable concepts University</p>	<p><b>Workshop 2</b></p> <p>11 Participants (aged 10–13, Male) 2 designers, 2 facilitators 4 Prototypes produced, 2 viable concepts Code Club Low-income area</p>
<p><b>Workshop 3</b></p> <p>4 Participants (aged 10–13, 1 female, 3 male) 1 designer, 2 parents 2 prototypes produced Computer Club Assumed low-income background</p>	<p><b>Workshop 4</b></p> <p>14 Participants (aged 13–14, 2 Female, 12 Male) 1 designer, 1 Teacher, 1 facilitator 8 prototypes produced, 2 viable concepts School (state) – Low-income area</p>

Figure 5.2: Demographics of each workshop and number of participants

Halldorsson et al. (2021b); Hourcade (2015).

### 5.2.2 Ethics

In accordance with the University of York’s ethics guidelines, this study took careful steps to ensure the confidentiality of participant identities, the integrity of data, and the safety of participants. To protect anonymity, video footage was not captured as a data source, favouring audio recording devices to support note-taking. I kept secure materials and notes with identifiable information until they were digitised into the University cloud storage, and physical copies were destroyed. Photography was limited to producing artefacts to protect the anonymity of participants. Additionally, both parents and the child/young person (CYP) were provided with their own participant information sheet and consent form (see Appendix H). CYP’s participant information sheets were designed to be accessible to those of their developmental age and contain the exact details as the parental participant information sheets. Read et al. (2013a) detailed how it is essential to be transparent with CYP’s involvement and role within a research study. A website was also created to provide feedback on the work they produced and the findings, in line with the work of Read et al. (2022b), which visitors could access for information, follow-up questions, and reference for future use (see Appendix G).

### 5.2.3 Materials

Various methods were employed across the workshops to collect CYP’s feedback and evaluation of the workshop. Initially, a worksheet was adopted based on the fun toolkit (Read and MacFarlane, 2006) as well as the use of paper-based surveys adopted from Naibert and Barbera (2022) survey for classroom engagement (see 5.3). Naibert and Barbera (2022) and colleagues’ survey appeared to be the most appropriate method to measure task engagement or satisfaction, having been used to determine whether classroom tasks or activities were

engaging to young people. However, with each iteration, these materials changed based on the success and interaction with CYP, eventually moving towards a booklet-style guide similar to an industry-led workshop (Abbas and deMajo, 2025). Concept maps were utilised to gather a qualitative data source to collect CYP’s comprehension of game design and mental health, which could be examined for depth and breadth of understanding (Novak and Cañas, 2008).

To gather interest, an Expression of Interest form was produced (Appendix F) to collect demographic information and facilitate workshop coordination. This form also helped construct workshops, ensuring there were no significant gaps between age groups and developmental stages, as previous research had identified challenges in engaging different age groups (Hourcade, 2015). During each workshop, I served as the lead researcher, keeping research and ethnographic notes on the interactions between participants and the discussions that arose.

#### 5.2.4 Data Collection Methods

Initially, I narrowed the focus of the workshop on examining CYP’s comprehension of game design and mental health, specifically around anxiety. In adopting this focus, the research would examine whether CYPs comprehension impacted the games produced. To gather the data on comprehension I employed multiple data collection methods to understand participants’ engagement and learning processes. These methods included:

- Concept Maps (Novak and Cañas, 2008) – Used to examine participants’ understanding of key concepts and how these were reflected in their game designs.
- Ethnographic Field Notes – Following Emerson et al. (2011)’s framework, I recorded observations on participant behaviours, interactions, and engagement levels to provide contextual depth and improve data trustworthiness.
- Audio Recordings – Captured participant discussions and interactions to complement observational and self-reported data.

Field notes were valuable in identifying discrepancies between self-reported comprehension and observed behaviours. While concept maps and interviews captured participants’ understanding of game design concepts, field notes sometimes revealed alternative insights. For example, some participants who did not explicitly report comprehension displayed an understanding through informal interactions, an aspect that might have been overlooked without observational data.

By integrating these three methods, I used triangulation to strengthen data validity and mitigate research bias (Guba, 1981). This combination allowed for cross-verification between participant-generated documents, recorded discussions, and observational data, resulting in a “thick” description of the workshop settings, interactions, and behaviours. Using multiple data sources would enrich the analysis by offering a deeper understanding of the factors influencing comprehension and engagement in participatory game design.



Figure 5.3: Screenshot of the engagement survey adopted from Naibert and Barbera (2022) scales

### 5.2.5 Procedure

Having completed the expression of interest form, the participants and their parents ensured ethical consent was obtained before participation. Upon completion, a date was organised to suit the majority of participants and the venue of the workshops. During the workshop, the lead researcher would describe the workshop's goal and provide an overview of the planned sessions and activities. Participants would take part in introductory sessions and icebreakers while completing data collection activities such as the concept maps and surveys. During the workshop, I recorded research notes and observations, as well as verbal discussions, using recording devices. At the end of the workshop, time was allocated to gather participants' feedback on their experience. This feedback was used to help design and iterate upon the workshop structure as a method of improving engagement and participation.

## 5.3 Pilot Study

The design of the pilot workshop was informed by Chapter 3 and 4, mainly the latter, where I learned more about facilitating workshops with young people. I planned distinct phases for the workshop, where I would first have an onboarding phase and a pre-data collection phase, followed by an icebreaker activity, before leading into ideation and prototyping. At the end of the workshop, I would collect post-data on the workshop. The onboarding was a brief session time-boxed to 10-15 minutes to introduce the workshop and its purpose. The icebreaker activities planned were a gentle round of introductions and favourite games, followed by an ideation card game I developed, called "Pitch it" (see Figure 5.4).

Pitch It was a card game designed to help create game ideas but also inform participants of game design comprehension (see Appendix J). Pitch it was designed and playtested with other researchers and colleagues. It was then tested with adults in a workshop for designing playful solutions to research problems. It was then iteratively refined throughout the workshops. However, it was not used in workshop four due to the limited copies available. Changes to Pitch It included aesthetic changes such as colours of cards, simplification of language (e.g. changing mechanics to rules) and additional cards suggested by young people. The systematic review informed the activities I selected for ideation and prototyping, but the data collection methods were the key area to investigate. Thus, I selected using existing games, storyboards and paper prototyping as the main activities for CYP. As advised from the interview study (see Chapter 4), drinks and snacks, adequate breaks, and a familiar environment were provided for comfort.

In total, four paper prototypes were produced. Each participant primarily chose to work alone, and collaborative exercises were not well received. The data collected by the paper-based surveys had mixed responses, though participants were happy to fill them out. They did not give a true insight or explanation into whether they were engaged. Whereas the worksheet produced from Read and MacFarlane (2006) work had some success, participants could articulate their preferred activity and the fun it gave them. The key findings from this workshop indicated that paper prototyping, such as writing and drawing, was chosen by participants over other activities, such as playing existing games and storyboarding.



Figure 5.4: Pitch it, an icebreaker activity designed to onboard game design comprehension and generate ideas

Participant Reference	Age	Gender	Participated in a Design Workshop before?	Favourite Game(s)
A(Pilot)	12	Male	No	Overwatch 2, Pokemon Scarlet
B(Pilot)	14	Male	No	Warhammer 40K, Pokemon Violet
C(Pilot)	10	Female	No	Roblox, Minecraft
D(Pilot)	12	Male	No	Grand Theft Auto, Red Dead Redemption

Table 5.1: Participant Demographics for Pilot Workshop

Furthermore, I observed that without proper scaffolding and direction, CYP struggled to ideate games that involved anxiety disorders in their designs. The worksheets inspired by Read and MacFarlane (2006) indicated what activities were preferred, but participants commented little on why they preferred a specific activity; this also did not answer what impacted comprehension. The pilot study's results further informed the workshop study procedure with CYP.

## 5.4 The Design Workshops

There were four workshop iterations, from the pilot to Workshop 4, each differing in participant numbers, age groups, and specific objectives. Initially, the workshops aimed to develop a co-design approach with young people to create solutions for anxiety disorders. However, as data analysis progressed, additional objectives emerged to enhance meaningful participation. Due to the iterative nature of the study, each workshop evolved in its design, delivery, and evaluation of comprehension, incorporating feedback to refine the approach and improve engagement. To indicate what was conducted across the workshops, the following section details the core components, including:

- **Introductions and Icebreakers** - How I introduced myself and the research goal to young people.
- **Comprehension Phase** - Introduce a method to gather what CYP know, this ranged from workbooks, activity sheets, posters and informal discussion.
- **Concept Mapping** - Introduction of completing concept maps and how they work. How they were implemented.
- **Game design** - What did I reference as game design and the approach to designing a game
- **Anxiety and Mental Health** - Methods to approach the introduction and guidance towards designing games around anxiety disorders
- **Ideation** - Design phase focused on brainstorming and concept creation to address the research question
- **Prototyping** - Design phase focused on developing an idea into a tangible outcome
- **Presentation and Reflection** - Focused on CYP and stakeholders critiquing the design constructively to understand whether an applied game had been achieved.

### 5.4.1 Introductions and Icebreakers

To give a high overview of what was conducted across each iteration, I initially opted for a paper based task where young people would write down their reason for coming along, what games helped them feel less anxious, or enabled them de-stress, to connect their answers to the goals of the research. This was based on the 'Fun toolkit' by Read and MacFarlane

(2006). In addition, though this partly worked with some participants, it became apparent that young people were reluctant to write things with pen or pencil. This resulted in a flexible change to having a brief paper introduction, but this was not necessary to the introductions. By the end of the fourth workshop, the games young people play and asking "*Why do you enjoy them?*" was a sufficient introduction that improved participants' confidence, including additional facilitators.

Regarding icebreakers, Kang et al. (2021) had previously reported how games had been an effective icebreaker in educational settings. Children focused on the game rather than becoming more distracted by each other or other objects in the space Kang et al. (2021). In addition, whiteboards (Rötkönen et al., 2021) and focus group discussions (Anthony et al., 2012) had also been suggested as key tools and methods for icebreakers. Across the workshops, I tried these methods as icebreakers, dependent on availability. The purpose of these icebreakers in the workshops was to build rapport (Ward et al., 2022) and start the creative thinking process towards designing applied games to address anxiety disorders.

### 5.4.2 Concept Mapping

A goal of the workshops was to understand the effect of game design **and** anxiety comprehension on participant engagement across the workshops. Chapter 3 and prior literature had suggested few studies had examined CYP's comprehension in detail. Therefore, I needed to consider a method to give a snapshot of what CYP understands about key concepts and whether it influences their contributions and the resulting game(s) produced. I had opted for interviews and focus groups in the pilot study, but this produced limited findings on what they knew before and after the workshop and took up too much time to conduct with young people. After exploring the wider literature, there were three potential methods to examine comprehension: survey-based methods (Naibert and Barbera, 2022), concept maps (Novak and Cañas, 2008), and ethnographic field notes (Emerson et al., 2011).

In each workshop, I spent time introducing how concept maps work. This was an effort to demystify the task presented and communicate the reason for the activity. Concept maps had previously been used in engineering education with students (17-24) to gauge their level of understanding and tailor content to them. Along the same lines, I wanted to capture their understanding to see if prior experience impacted the results and whether the co-design process imparted learning as previously suggested in literature (Vallentin-Holbech et al., 2020; Arnab et al., 2019). The concept maps were presented on a projector and also in handbooks in later workshops. These were initially blank but then given an existing example to help guide participants.

### 5.4.3 Game Design

Communicating game design to children and young people was a particular challenge of the workshop. Tekinbas and Zimmerman (2003) provides a background on the design of games and the subsequent play that occurs. Tekinbas and Zimmerman (2003) describes *rules* as the formal constraints of a game, defining how the game works. They also describe play in terms of the interactions with the game's rules and the player's experience from interacting with a

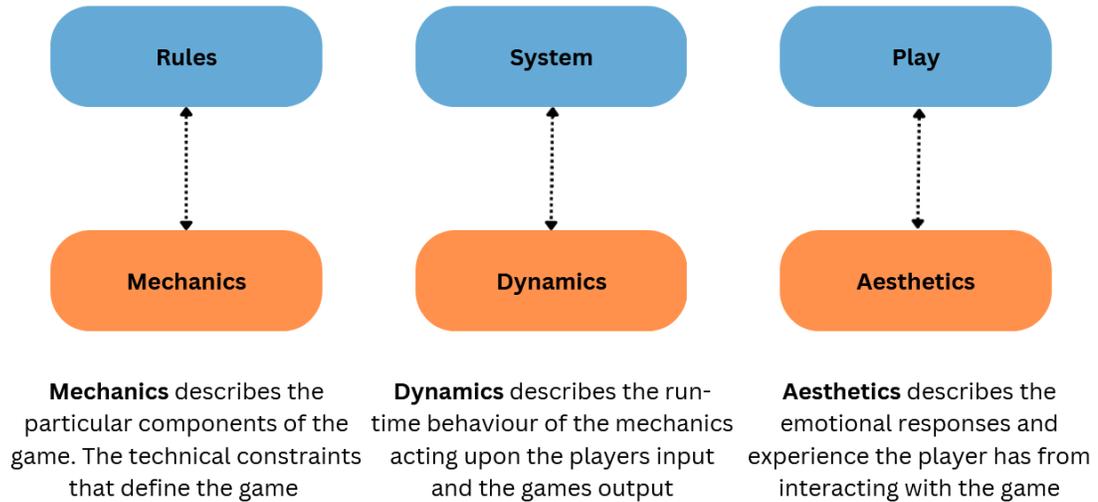


Figure 5.5: An annotated description of the MDA (Hunicke et al., 2004)

game. This was similarly expressed in the mechanics dynamics aesthetics (MDA) framework by Hunicke et al. (2004) (see Figure 5.5)

In Chapter 2 I gave a brief overview of how the MDA provides an overview of how a designer views a game and how the player views the game. The MDA presents three components, the *mechanics* or rules of the game Tekinbas and Zimmerman (2003). Mechanics and rules make up the main structure and systems of a game. The running example I gave through the workshops was Super Mario (Shigeru Miyamoto, 1985). In Super Mario games, there are often specific rules to the game, such as 2D world space where the player can only move via a 2D space, it's a side-scrolling game where the player must move left to right and player must reach the end of the level to progress (see Figure 5.6 for an example from 2D Super Mario Maker).

Dynamics are described as the interactions between the player and the game, the resulting inputs and outputs, e.g. in Super Mario, the movement and jumping are dynamics that result in moving Mario (Hunicke et al., 2004). Finally, aesthetics describe the experiences evoked from playing a game. Hunicke et al. (2004) describes a category of experiences, but Winn (2009) and Starks (2014) describe a range of additional experiences that can occur when playing a game. Though the MDA provides a concise and structured series of steps to analyse a game, it could still be seen as overly complex. Therefore, I simplified the game design to four components for CYP.

Figure 5.7 shows how I proposed a more simplified component list for CYP to consider when it came to the design of games. These components don't consider the technical complexity behind game development but provide a starting point for ideation. Drawing upon Juul et al. (2003), Hunicke et al. (2004), and Tekinbas and Zimmerman (2003), I aimed to provide a simplified approach to game design that could be easily understood not only by CYP but also by other stakeholders unfamiliar with game design. Figure 5.8 illustrates a page from game design booklets developed after Workshop 1, which recommended a need to understand the game design process more thoroughly.



Figure 5.6: Super Mario Maker for Nintendo Switch, a 2D instalment of the Super Mario series (Shigeru Miyamoto, 1985)

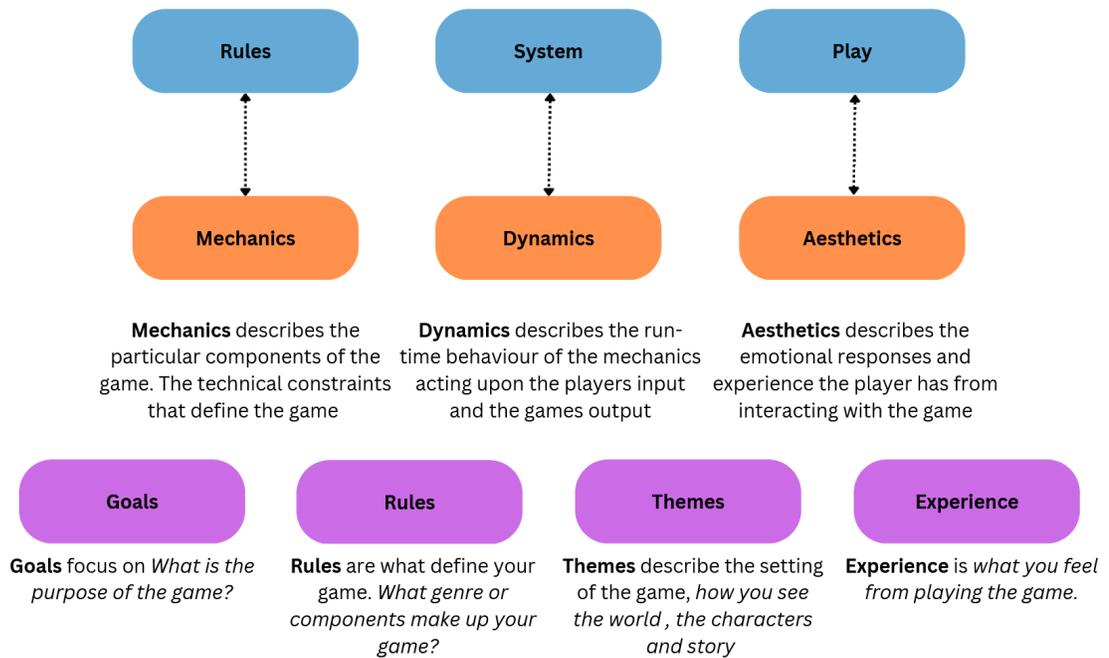


Figure 5.7: Proposed components of game design derived from MDA, Tekinbas and Zimmerman (2003) and Juul et al. (2003)

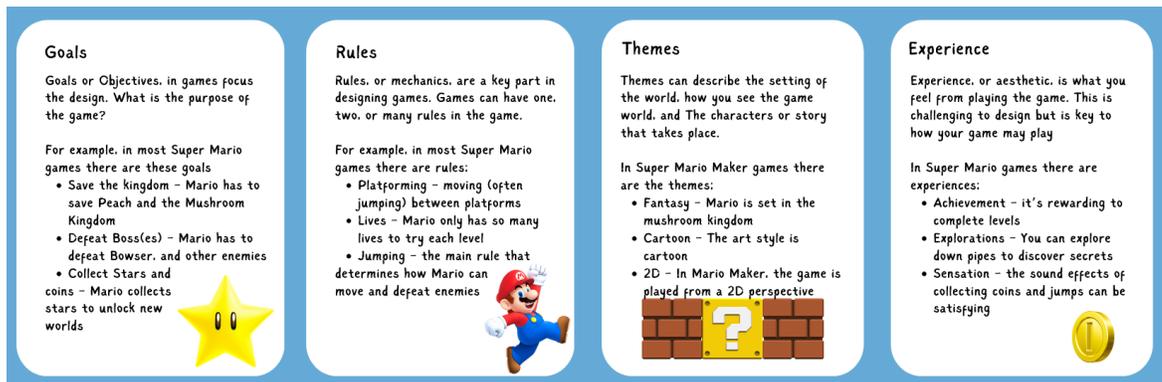


Figure 5.8: Game design components page in the booklet created for workshop 2 onwards.

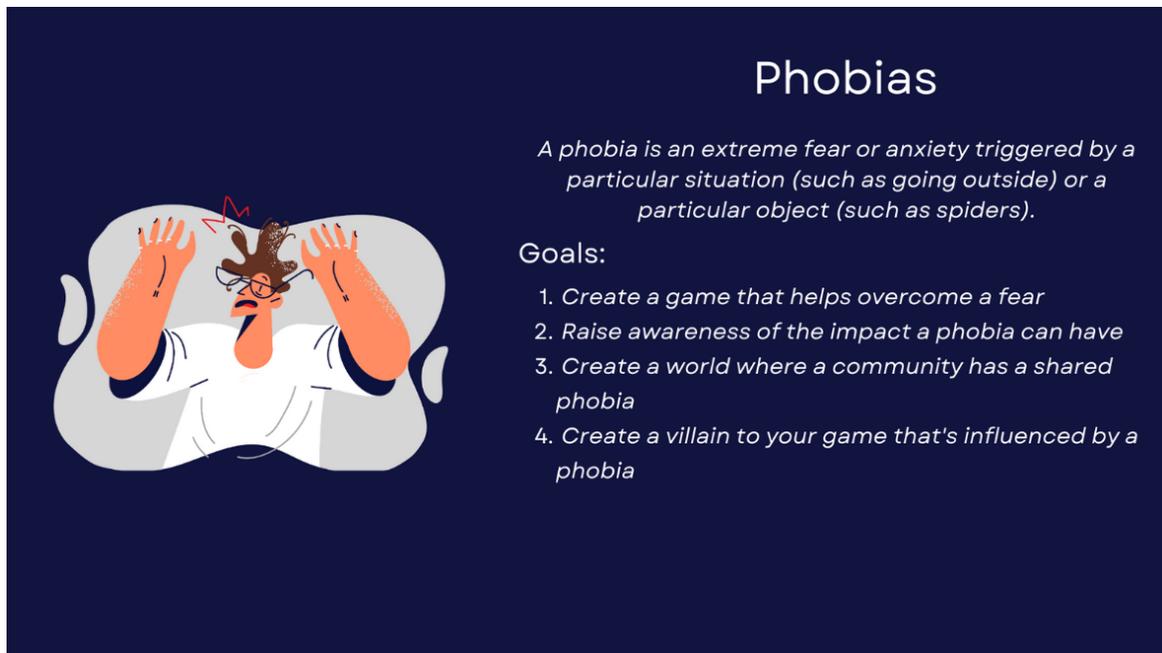


Figure 5.9: Handout for information on Phobias with example Goals for CYP

#### 5.4.4 Anxiety and Mental Health

Addressing how to approach game design was only half the challenge of the workshops. A big part of the workshops was exploring what CYP already knew about anxiety and mental health, and then providing materials and structure to upskill them on the core concept. Though each workshop adopted different methods of communicating anxiety and mental health, the content was simplified. Given the sensitive nature of mental health, particularly with young people aged 10-13, I utilised resources from Mind.org to provide definitions and self-help resources for CYP and facilitators to use as reference. Figure 5.9 shows a handout provided in earlier workshops where example goals were given. The idea behind giving concise descriptions and example goals was to help jump-start ideation.

During each of the workshops, time was dedicated to exploring CYP's understanding of

mental health, gradually moving towards anxiety disorders and methods to help address anxiety. There was a specific time devoted to exploring CYP's comprehension of anxiety and mental health before an exercise in brainstorming solutions with game ideas. Different methods were implemented to help inform CYP, but these had mixed successes, as the rest of the chapter will detail.

### 5.4.5 Ideation

Ideation is a fundamental phase in co-design, bridging initial problem framing and concrete design solutions. Within Participatory Design (PD) and Child-Computer Interaction (CCI), ideation provides young people with a structured yet creative space to generate, share, and refine design ideas. Druin (2002) model of roles and Guha et al. (2013) co-design emphasise that children's contributions to ideation vary depending on their role, whether as informants, testers, or full co-design partners. While some PD approaches treat children as information providers at key moments (Scaife and Yvonne, 2023), more inclusive frameworks advocate for continuous involvement, ensuring that ideation reflects their perspectives and lived experiences (Iversen et al., 2017).

The purpose of ideation in co-design extends beyond simply generating ideas; it fosters collaborative meaning-making, user empowerment, and critical engagement with technology (Read and Horton, 2023; Fitton et al., 2016). Challenges persist regarding power imbalances and facilitation. Iivari and Kinnula (2016) cautions that genuine participation requires careful management to avoid adult-driven agendas overshadowing children's creativity. Similarly, as digital tools become more prevalent, shifting interaction preferences demand new, flexible ideation approaches that align with how young people want to engage Walsh and Richards (2017). Therefore, for the workshops, I initially opted to involve CYP as design partners, giving them continuous involvement, control, and autonomy over their contributions to the game design and affording digital options for children to ideate.

### 5.4.6 Prototyping

Prototyping in co-design is a tangible means of translating ideas into testable concepts, allowing young people to see their contributions take form and evolve through iterative refinement. Within Participatory Design (PD) and Child-Computer Interaction (CCI), prototyping is not merely about producing functional outcomes but also about engaging children in reflective, hands-on learning experiences (Druin, 2002; Fitton et al., 2016). Prototyping presents a playful phase of game design, where experimentation is encouraged to produce solutions to the problems at hand. From the beginning, I had planned to afford co-designers with as much time as possible for prototyping. Giving participants more time for prototyping allowed for the iterative game design process, where participants could try, test or design an idea, discovering something too complex or misaligned from the core goal.

Initially, I gave examples of a paper prototype via the ideation exercise of 'Pitch it', a card game I developed to support the onboarding of game design and serve as an icebreaker. Later, I used the Biome Collective's paper prototype outcome Abbas and deMajo (2025) and some of the prototypes made by prior workshops. The latter presented the most helpful tool for



Figure 5.10: Prototyping page/slide to help guide participants with developing their solution further

CYP to understand what they could make in the time they had. Throughout the workshops, prototyping aimed to develop their idea, or a part of it, to test whether it was enjoyable and how it helped address anxiety. This, in turn, informed the presentations and reflections.

### 5.4.7 Presentation and Reflection

From the pilot study, I was keen to conduct a short part of the workshop for reflection. Chapter 4 concluded how few facilitators asked children about their participation and how they found their role in the design process. I conducted a formal focus group in the pilot, but this led to participants feeling shy and experiencing a noticeable shift in confidence. In Workshop 1, I transitioned to a more informal discussion at the end and asked less direct, more conversational questions. This allowed the study to gather insights into what worked well and what didn't, and whether CYP understood their role and impact in the study. The booklets developed for the workshop also featured a guide for prototyping (see Figure 5.10). I focused on giving CYP achievable prototypes they could complete within the time scale. In addition, I gave them a guide on how they should reflect on their prototypes via four "F's": Fun, Feasible (could it be made), Fit for Purpose (addresses anxiety) and Freshness (is it innovative or has it been done before).

After workshop 1, there was a suggestion to have a 'show and tell' themed towards a 'game design pitch', akin to how commercial studios and designers address design problems. Though this introduced a more formalised presentation of prototypes, it gave a designated time slot for discussing and presenting the applied game prototypes. Presentations were conducted in the most comfortable manner for participants, whether standing up and delivering, playing their prototype or asking a facilitator (or myself) to present on their behalf. Presenting on behalf of neurodivergent young people removed the social stress of addressing a large group of participants. Participants were free to choose how they presented their work, whether by displaying their game prototype, discussing the prototype, or giving a presentation on a computer.

## 5.5 Results

In the following sections, I present the context of each workshop, the participants involved, the resulting outcomes, and the high-level observations. A full description of the design and process of the workshop can be found in Appendix E. This information was collated from the ethnographic field notes and study design.

### 5.5.1 Workshop 1

The first study involved three participants, all males aged 15-17. The low number was due to significant attrition, with half of the participants who registered interest not showing up. A designer and facilitator were present during the workshop. The workshop was conducted in a university seminar space. Before the workshop began, participants were asked to complete an activity sheet and a concept map of their comprehension of game design and mental health. In this first workshop, participants completed an icebreaker using ‘Pitch it’, a card game to generate game ideas. This activity gently led to the ideation phase. A brief focus group discussion was conducted to understand what participants knew about anxiety disorders; participants then began conceptualising ideas. Three ideas were discussed, but there was some uncertainty about the feasibility and the goal.

After a brief break, the games were discussed, and rapport was established among all participants. Prototyping was introduced with a demonstration of what a prototype may look like, which was shown to participants before they returned to their ideas. At this stage, participants were uncertain of their ideas and how to prototype them. The designer had to give additional examples and offer guidance on prototyping. The three participants worked together to create two prototypes. The first was conceptualised but judged as “too boring” to play. Participants opted for a second design, using a whiteboard and role-play to play-test the game (see Figure 5.11). Over 3 hours, participants created two games, both of which involved some level of helping anxiety disorders.

Participant Reference	Age	Gender	Participated in a Design Workshop before?	Favourite Game(s)
A	17	Male	No	Rust, Five M (Grand Theft Auto)
B	17	Male	No	Rust, Five M (Grand Theft Auto)
C	16	Male	No	Among Us, Five M (Grand Theft Auto)

Table 5.2: Participant Demographics for Workshop 1

### 5.5.2 Workshop 2

The second workshop involved more participants and a change in location. Workshop 1 participants were reluctant to suggest ‘silly’ ideas or relax in a more formal environment.

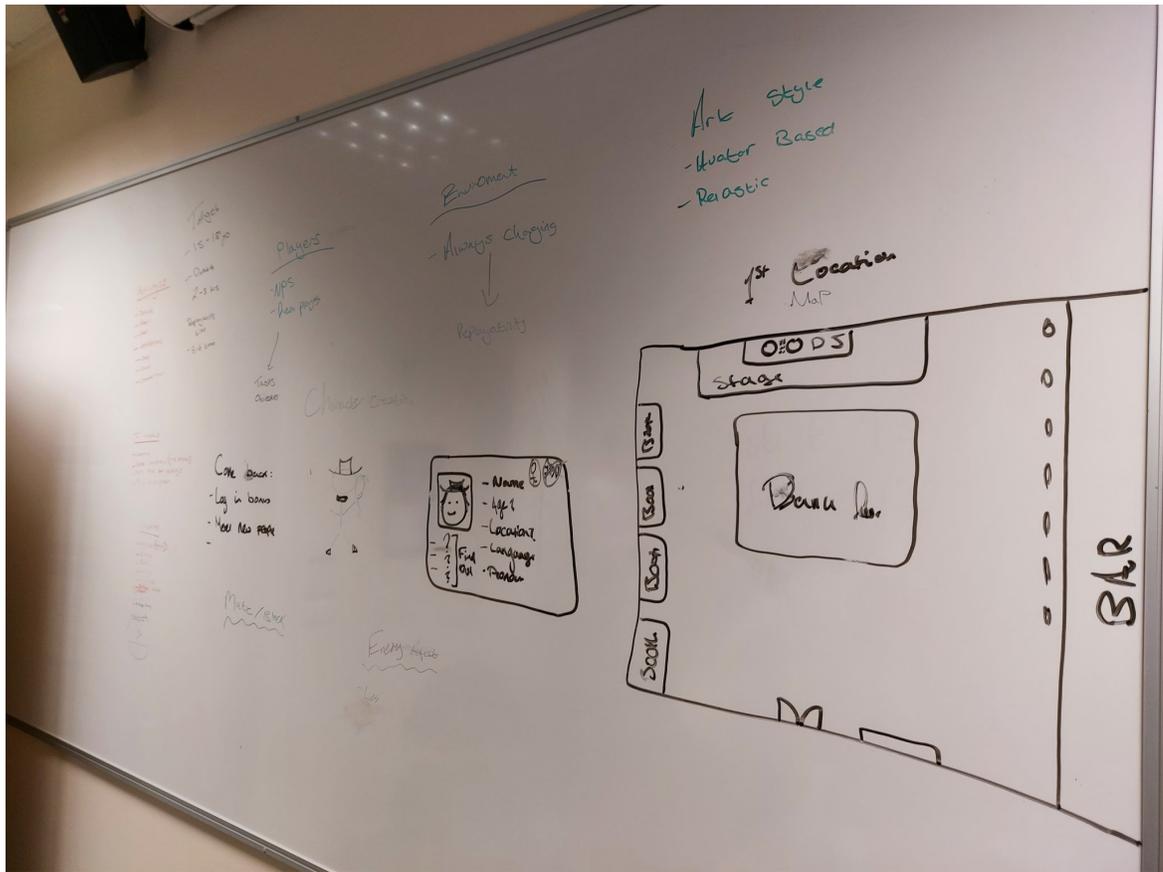


Figure 5.11: Workshop 1 Participants second game concept, a house party game about tackling social anxiety

Therefore, Workshop 2 took place at a Code Club. Seven male participants, aged 10-13, were all interested in mental health, game design, and design processes. Additionally, a designer and two facilitators were available. Before the workshop began, they were given a new activity booklet to learn about their comprehension and understand the games they play and why (see Figures 5.13 & 5.14).

After initial icebreakers, ‘Pitch it’ was introduced, but there were challenges with shyness and confidence. Instead, a post-it activity was conducted where each participant contributed to a wall of goals, rules, themes and experiences found in games. Though participants were initially shy, they became more confident and collaborative. These post-its provided a stepping stone into ideation where, instead of picking a mental health concept, the details supplied in the opening booklet dictated what mental health disorder their game addresses. Participants were free to form their groups for ideation activities.

Providing participants with the ability to form their own groups resulted in larger groups of 3 or 4, often with power imbalances. Therefore, the facilitators and I had to separate these groups into pairs or individuals. During ideation, concepts focused heavily on games, with several participants struggling to integrate the mental health aspect. The facilitators were helpful in asking questions and steering participants toward integrating the mental health components. Each participant, or group of participants, tended to focus on their initial idea

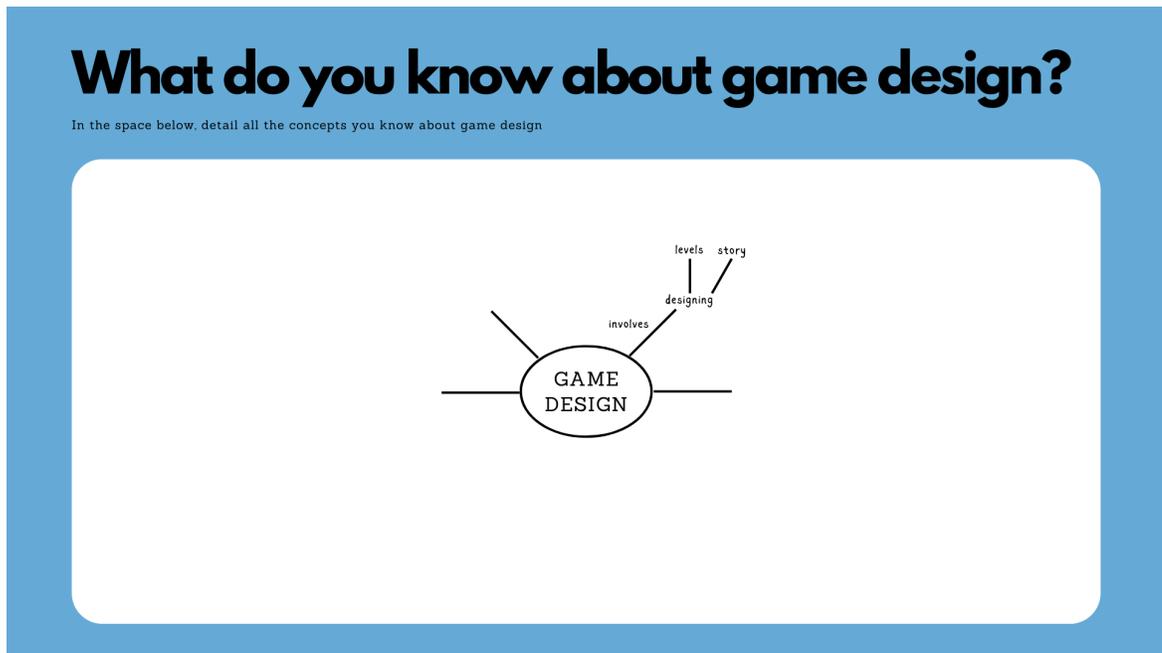


Figure 5.12: Page from the first iteration of the Booklet. This page was one of the Concept maps to gather current comprehension of Game Design and another for Mental Health

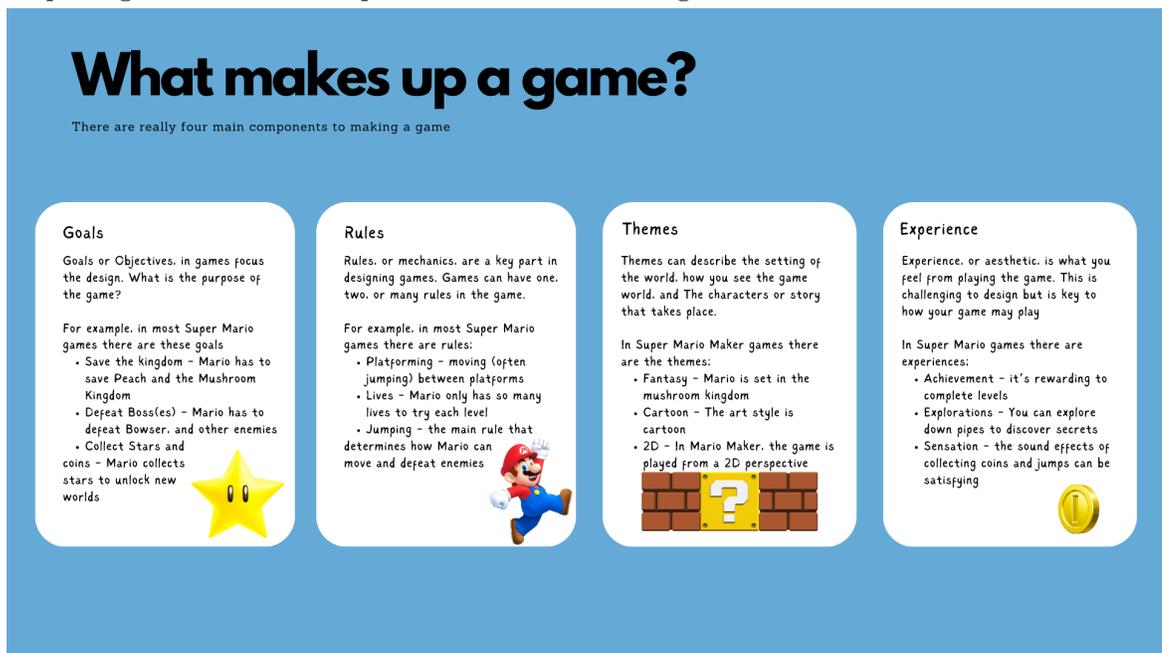


Figure 5.13: This page was kept throughout as a reference to what components make up a game and related to the Pitch'It activity (See Appendix J)

without abandoning any initial idea. Instead, CYP favoured adding more content to their initial ideas. Existing prototypes were shown to help guide the participants. Participants used laptops and software such as Google Slides and mind maps to make their prototypes. A total of four games were produced from the workshop, two of which integrated mental health into their concepts, and two were more afterthoughts.

# Anxiety Concepts

To help you come up with game ideas that address anxiety. Here's some information and prompts to get you started

## General Anxiety

This means having regular or uncontrollable worries about many different things in your everyday life. Because there are lots of possible symptoms of anxiety this can be quite a broad diagnosis, meaning that the problems you experience with general anxiety might be quite different from another person's experiences.

**Goals:**

1. Demonstrate symptoms to raise awareness
2. Create steps to identify when a character experiences anxiety
3. Showcase the broad experiences a character may have with anxiety
4. Build a strong positive character into the game that has symptoms of anxiety

## Phobias

A phobia is an extreme fear or anxiety triggered by a particular situation (such as going outside) or a particular object (such as spiders).

**Goals:**

1. Create a game that helps overcome a fear
2. Raise awareness of the impact a phobia can have
3. Create a world where a community has a shared phobia
4. Create a villain to your game that's influenced by a phobia

## Fear of missing out (FOMO)

Refers to the feeling or perception that others are having more fun, living better lives, or experiencing better things than you are. It involves a deep sense of envy and affects self-esteem.

**Goals:**

1. Reflect and take pride in what the player has
2. Promote self-esteem and achievement
3. Demonstrate FOMO for Awareness
4. Educate an audience on FOMO

## Social Anxiety

This means you experience extreme fear or anxiety triggered by social situations (such as parties, workplaces, or everyday situations where you have to talk to another person). It is also known as social phobia.

**Goals:**

1. Inform the player about social anxiety
2. Design a world that supports someone overcoming social anxiety
3. Create a character that requires steps to approach the problem
4. Reflect on social situations which trigger social anxiety for the player or another character

Figure 5.14: This page was another reference page for Anxiety Concepts, providing contextual information and examples of goals that could be pursued. This was later changed due to too many options, and the full-page handouts of each concept weren't engaging to young people.

Participant Reference	Age	Gender	Participated in a Design Workshop before?	Favourite Game(s)
A	11	Male	No	Legend of Zelda, Minecraft, Sea of Thieves
B	11	Male	No	Minecraft, Mario, Pokemon Let's Go Eevee
C	11	Male	No	Fortnite
D	10	Male	No	Roblox
E	10	Male	No	Fortnite, Call of Duty
F	13	Male	Yes	Assassins Creed Valhalla, Sea of Thieves
G	12	Male	Yes	Monopoly, Fortnite, Gang Beasts

Table 5.3: Participant Demographics for Workshop 2

### 5.5.3 Workshop 3

The third workshop had the fewest participants and was the most challenging to facilitate. Like Workshop 2, it took place in a Code Club, this time in a more affluent area of Scotland, providing technology and support to young people who lacked access to computers or training. Recruitment was conducted through an Eventbrite link shared via the Code Club, which also informed parents about the workshop's purpose. However, significant attrition led to only four participants attending. Additionally, some children arrived without signed parental consent forms and, as a result, were supervised by the Code Club facilitators rather than



Figure 5.15: Wall of post-its produced by participants in workshop 2 before ideation

participating in the workshop.

Participant Reference	Age	Gender	Participated in a Design Workshop before?	Favourite Game(s)
A	10	Male	No	Minecraft
B	10	Male	No	Minecraft
C	12	Male	Yes	Bloons, Minecraft, War Thunder
D	10	Female	No	Minecraft, Roblox

Table 5.4: Participant Demographics for Workshop 3

Firstly, initial data collection was challenging, with icebreakers and learning about favourite games taking a lengthy 30-40 minutes, where over-excitement and behaviour were difficult to manage. In addition to myself, a facilitator and three parents were present in the workshop. Since the pilot, this was the first instance of parental involvement during the co-design process. During the workshop, parents attempted to help manage behaviour, but in some cases, with participants A and B, completed the activities for them or provided written components.

The workbooks and activities had been iterated upon to provide a gentler introduction to game design and mental health (see Figure 5.17). Given the success of the post-it activity in

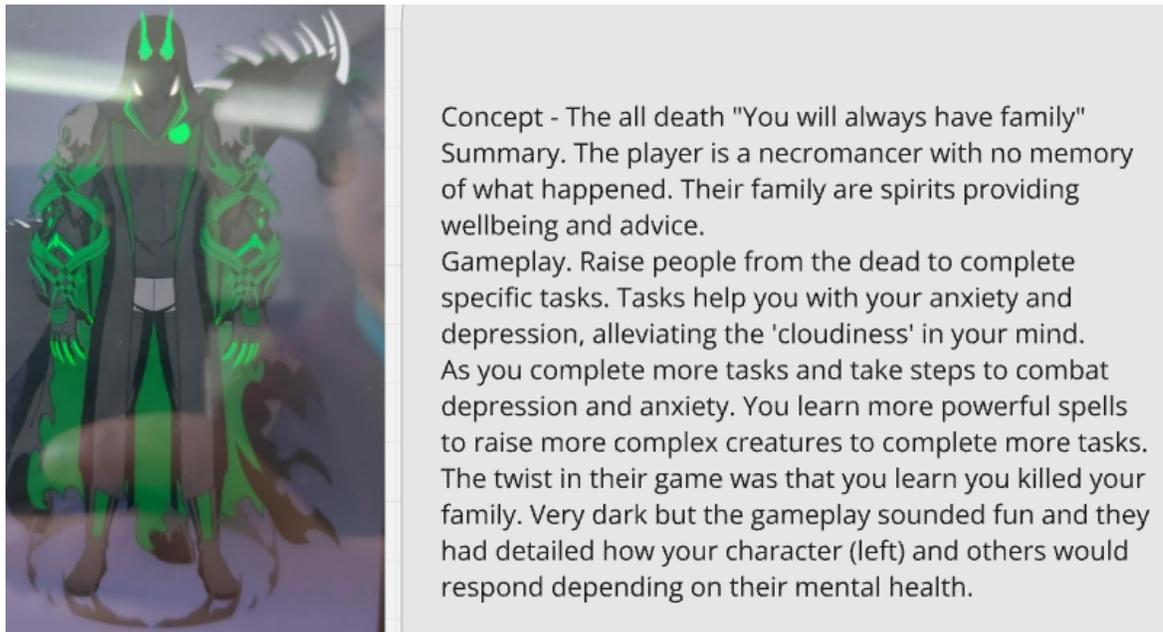


Figure 5.16: “You will Always have Family”, concept incorporating mental health. See Appendix I for further details.

workshop 2, it was attempted again. However, the participants anchored on their favourite game (e.g. Minecraft, War Thunder, see 5.18) and struggled to break down characters, mechanics, or components of games. Ideation was a definite challenge, with all participants producing copies of existing games they liked. To adapt, laptops with *inklewriter* (Studios, 2014) were introduced to the group and an existing idea was proposed to them “*Create a story-driven game about a character overcoming anxiety*”. The introduction of the laptops had a significant impact on behaviour and attention during the workshop. Participants became more focused but still anchored on their initial ideas with little interest in incorporating or involving the applied context of anxiety into their designs.

During the prototyping time, Participant C expressed how they didn’t want to make a game about mental health and wanted to work on their *War Thunder* style game. In addition, Participant D, the only girl present, left the workshop as the loudness of participants A and B became too much for them. Through the use of the *Inklewriter*, Participant B was able to produce an interactive novel prototype (see Figure 5.19); however, there was no inclusion of mental health.

#### 5.5.4 Workshop 4

The final workshop, conducted at a secondary school, was the largest in the series, involving 13 participants. Unlike the previous workshops, it spanned two days to accommodate school lessons, making it the only multi-day workshop. Two teachers were present to assist with facilitation. The workshop was structured into two phases: The first day focused on onboarding and ideation, while the second day was dedicated to prototyping and presenting. For data collection, three separate workbooks were designed to align further with the ‘breadcrumb’

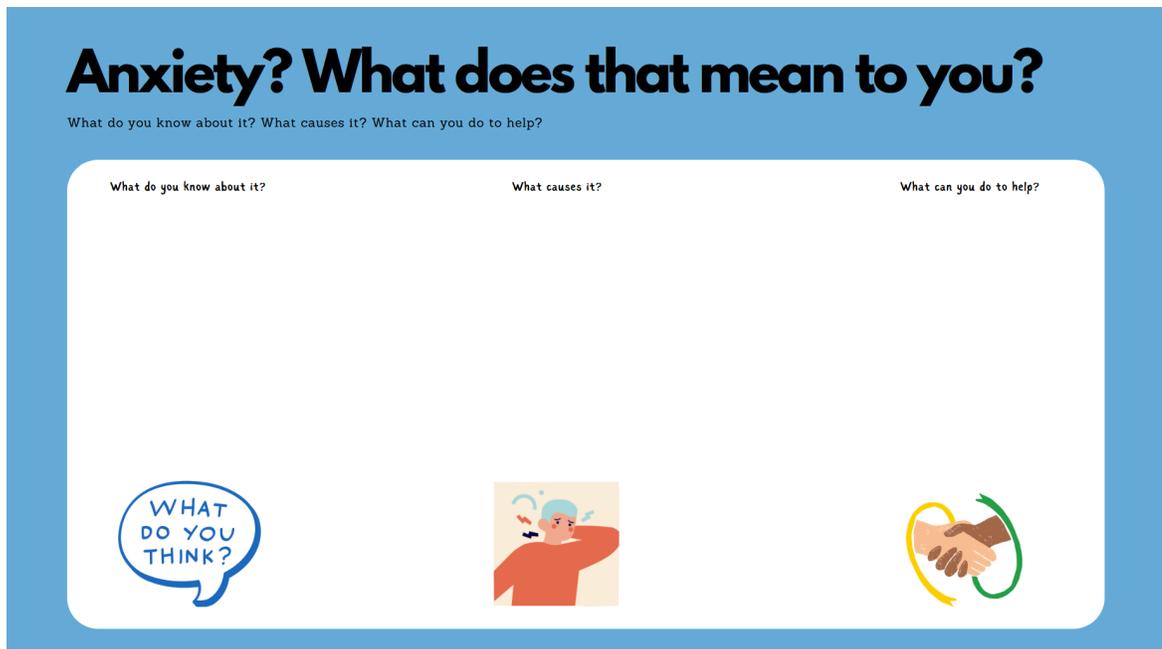


Figure 5.17: Iteration of the workshop, adopting a more interactive discussion focused around anxiety. Less focus on wider topics for simplification

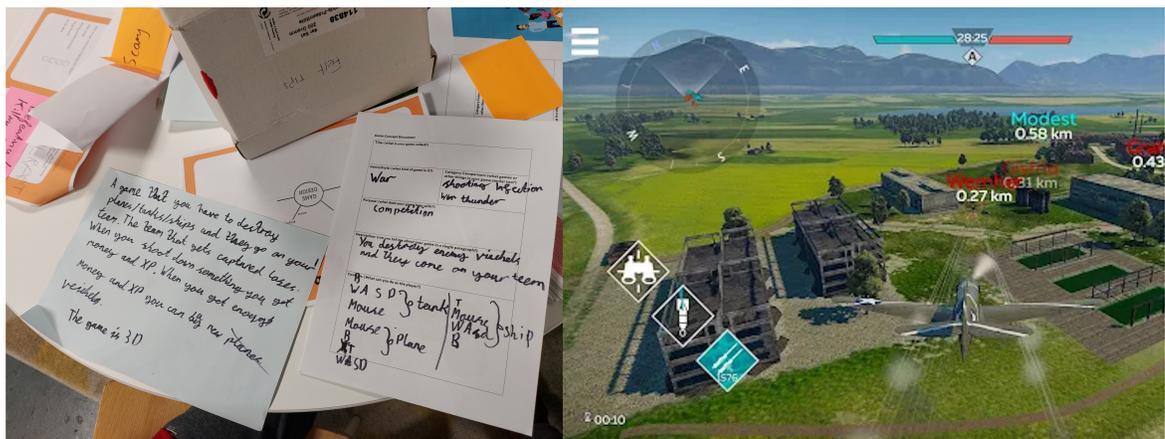


Figure 5.18: Participant C's ideation of their game and on the right, a screenshot from their favourite game, War Thunder (Entertainment, 2012)

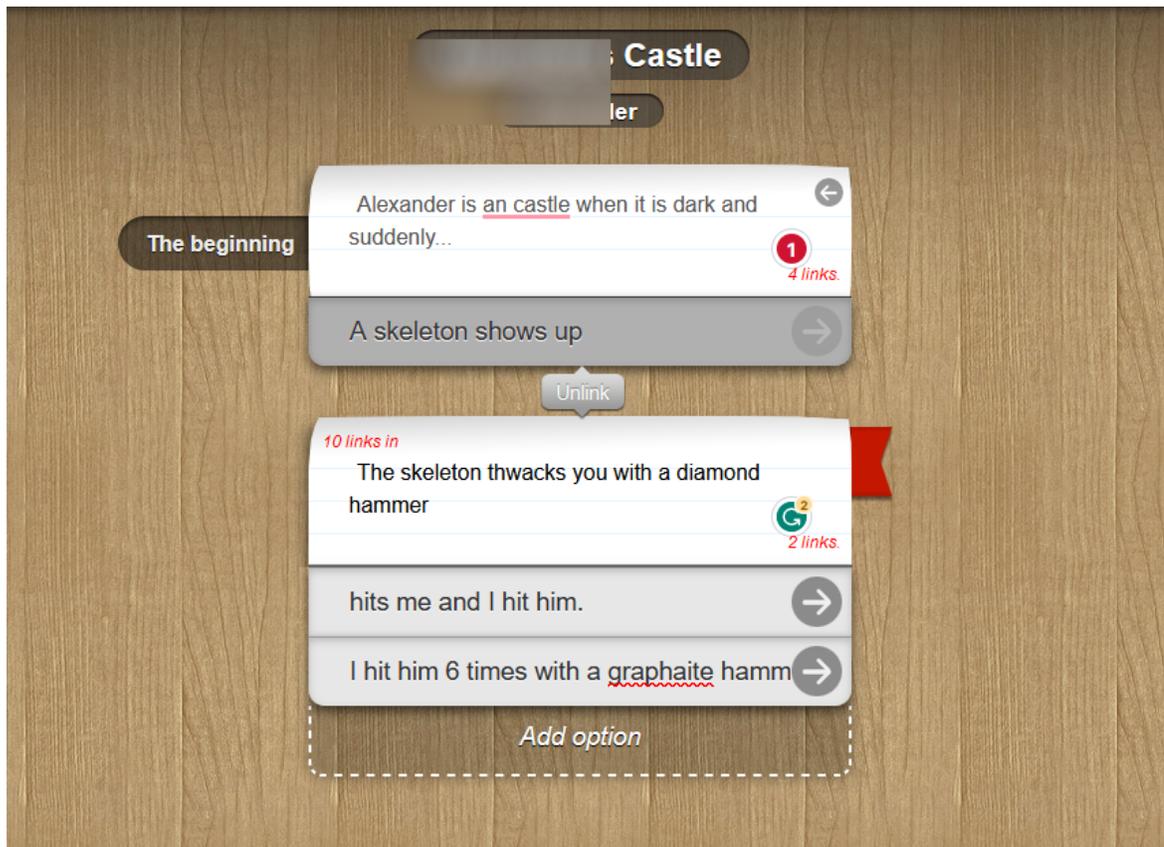


Figure 5.19: Screenshot of Inklewriter tool and short narrative game made by Participant B in workshop 3

approach. Icebreakers moved quickly, as participants were already familiar with one another, similar to Workshop 1.

A particularly engaging moment occurred when participants shared and discussed their favourite games, sparking both enthusiastic conversation and constructive critique among peers. For the ideation phase, two activities were conducted: a post-it note exercise and an additional activity using the BAFTA Young Game Designers Game Idea Generator (Warburton and Phillips, 2025). While the latter activity encouraged creativity, matching ideas to the given categories often became a playful challenge, sometimes overlooking the intended mental health themes.

Participants formed pairs or worked individually. It was also the first workshop where each participant had access to a computer, as the setting was within a computer science laboratory. This meant many participants utilised computers for research, AI-generated images or, similar to workshop 2, using *Google Slides/PowerPoint*. Keeping the participants focused on the task during the ideation was challenging when teachers weren't present. As I, as the game designer, moved between groups, it wasn't easy to allocate enough time to each pair and help co-design a solution. However, in the second half of the workshop, the teachers were present to help manage behaviour and facilitate questions and design.

The prototyping at workshop 4 was perhaps the most varied, with participants producing

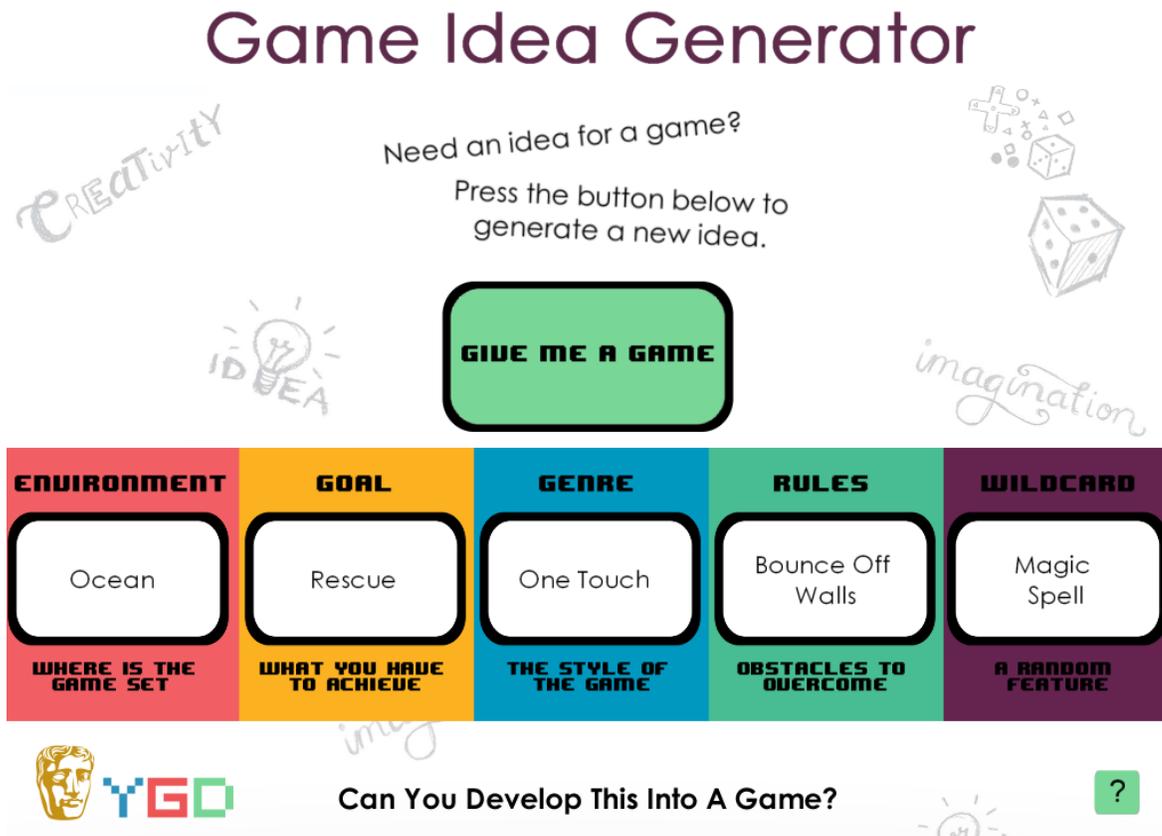


Figure 5.20: Young BAFTA Game Idea Generator (Warburton and Phillips, 2025)

hand-drawn artwork (see 5.21), posters, maps, slide-shows, mock screenshots and AI-generated art of their game ideas. However, many of them struggled with the inclusion of mental health. The resources and training provided did not interest them. Instead, participants were observed searching the web for solutions instead of the materials provided. The workshop's conclusion featured a collaborative presentation and scoring of prototypes produced (see 5.22). Each participant or group presented their idea and then discussed how it addressed the original goal. Though some participants did not produce games with the inclusion of mental health, there was a notion of reflection or an understanding of what they could do better next time. The scoring also encouraged a level of competitiveness to critique whether prototypes were fun or original.

### 5.5.5 Summary of Workshops

Overall, the four workshops conducted all suffered from attrition in terms of participant recruitment. Including additional facilitators, designers, or subject matter experts was challenging to facilitate and organise, particularly around ethics and disclosure. That said, facilitators on-site were very helpful in moderating and supporting workshops. Though each workshop produced prototypes, there were individuals across workshops who excelled in delivering an applied game for mental health.

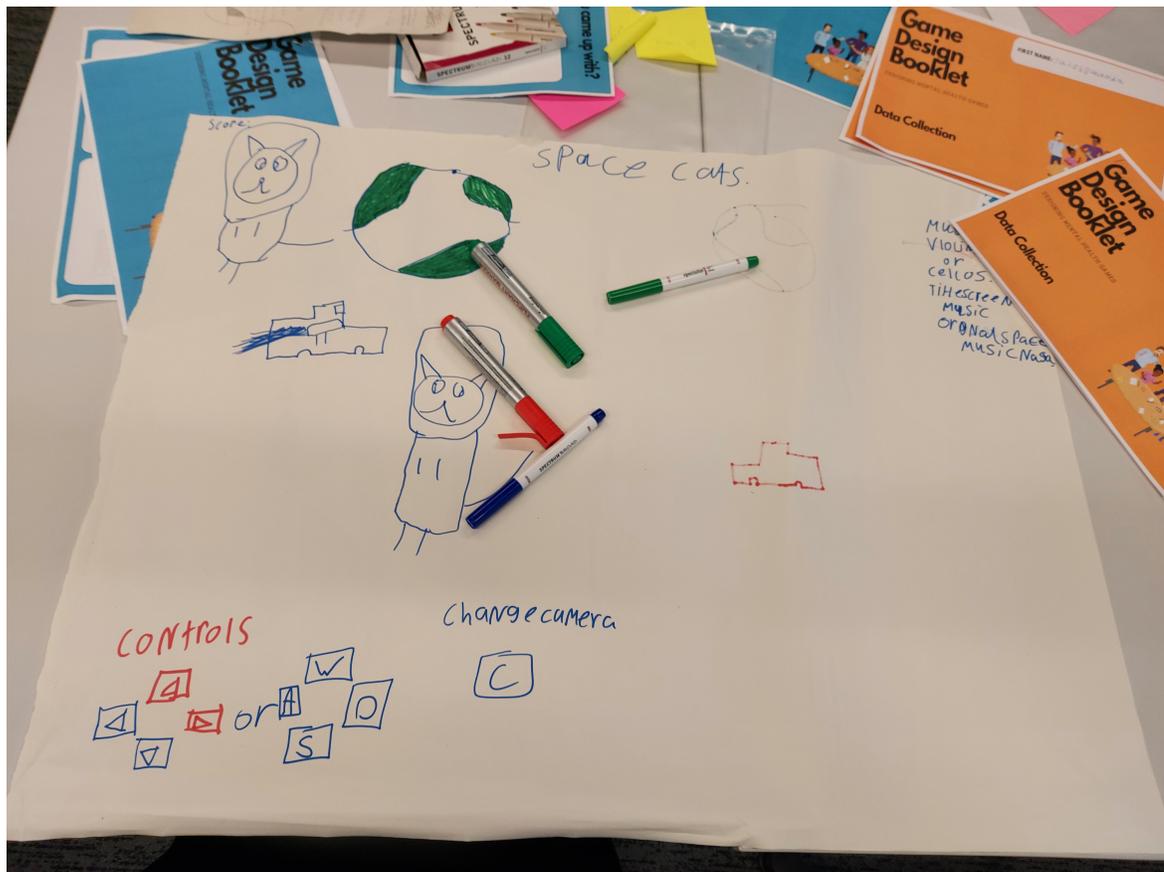


Figure 5.21: Space Cats: A concept that was paper prototyped later with a 2D map around alleviating anxiety by finding and returning lost cats through a space system

## 5.6 Reflection

Prior findings of the thesis described how few studies reflect upon 1) the design of workshops, 2) Data collection methods, 3) Participant Engagement and 3) the generalisability of the study. The following sections discuss these areas.

### 5.6.1 Reflecting upon the Workshop Design

The original proposed method of the workshop is shown in Figure 5.23. The original plan was a fixed process where vehicles would drive comprehension in both game design and mental health. The process was initially conceptualised to control what activities and tools would be used, but this would be detrimental to participant engagement. The reality of the workshops played out much differently than initially planned, but the vehicles of comprehension were tested upon each iteration.

After the pilot, it was clear the workshops needed to be flexible and adapt to CYP's feedback and facilitator observations. Therefore, the methodology considered a design-based research process (Armstrong et al., 2018) where the observations and feedback from each workshop

	4 Extract City	1 Craftmine	3 Alienship	2 Zombie Pulse	7 Space Cats	6 Mr Anxiety Solver	5 Untitled
Fun	7	5	9.5	5		8	4
Feasible	2	6	4	1		6	3
Fit	1	1	7	1		10	1
Fresh	2	3	10	1		7	1
	12	15	30.5	8		31	3

Figure 5.22: The reflection activity involved a scoring activity where each group presented their idea and their peers critiqued their designs.

resulted in iteration. The design-based research process facilitated a more reflective and iterative approach to co-designing with young people. Each workshop presented a learning opportunity, both from improving participant engagement and from a methodological research perspective. Where Chapter 3 described a few processes involved in the development of applied games, I sought to present a transparent process for engaging young people and detailing what their participation entailed. Overall, the flexibility in the design resulted in better engagement and a deeper understanding of the needs. Over each iteration, I was able to better tailor the workshops based on feedback and the behaviour of young people during their participation.

### 5.6.2 Recruitment

A consideration and potential bias of the workshops lies in the recruitment. The pilot and workshops 1-3 were all recruited via posters, advertisements and newsletters, which were likely to attract participants interested in game design, mental health or design. The workshop participants could display 'selection' bias with an established interest in the domain areas, therefore not presenting a broader representative view. However, I believe this is not wholly true for each individual. For example, workshop 4 was a classroom, and across all workshops,

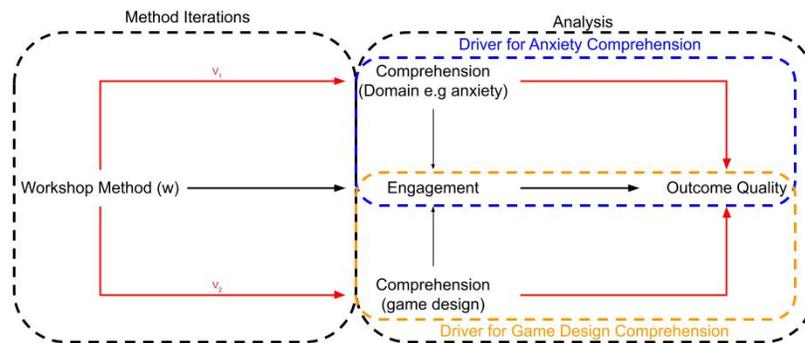


Figure 5.23: Original methodology to explore vehicles to drive and measure comprehension in game design and anxiety/mental health

there were participants interested for different reasons, regardless of interest. Instead, I believe there to be an element of parental/guardian influence on participation.

In the pilot and workshops 1-3, parents/carers were required to sign up and consent their children towards the workshops. Though CYP had their participant consent forms (see Appendix H), they could not participate without their parents' consent. However, the advertisements and recruitment for workshops 2 and 3 were helped and facilitated by code clubs that contacted parents/carers on existing mail lists. Parents/carers might have signed up their children without understanding whether they were interested. What seemed more apparent across the workshops was a different expectation of what they would do (see Chapter 6).

Recruitment plays a key part in user-centred and participatory design methodology. From what I've learned, we should reflect on how industry and external partners assist or portray research. Misinformation may set higher expectations for what children expect and create challenges during engagement. On the other hand, there might be an argument for withholding some details so that expectations can be managed during participation. However, this could present ethical challenges when recruiting CYP to design games.

### 5.6.3 Data Collection Methods

By far, one of the more challenging aspects of the workshop design was identifying a data collection method. Where previous literature had often relied on interviews or focus groups, these methods can be time-consuming and challenging to arrange follow-up meetings. The pilot study attempted short interviews and focus group discussions. However, the former method proved to be too formal for young people. Direct questions throughout the workshops, such as "What features do you like about Minecraft?" were often met with limited explanation or shyness. Instead, the data collection for the workshops adopted an iterative approach.

Initially, the Fun Toolkit, as proposed by (Read and MacFarlane, 2006), was designed to gather data on which elements of the workshop participants enjoyed or disliked. During the pilot and workshop 1, this toolkit gave limited information on what engaged young people.

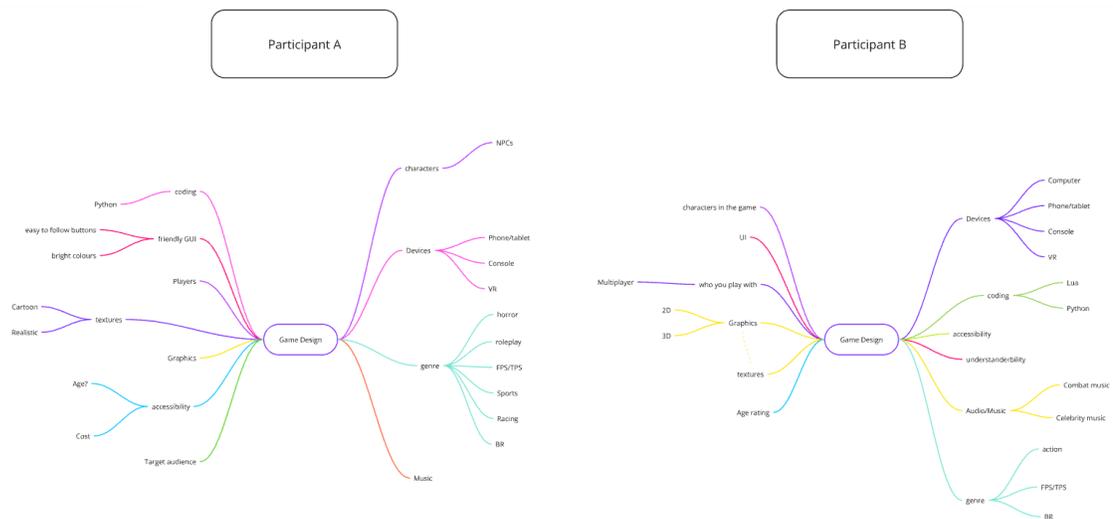


Figure 5.24: Sample image of the digital concept maps completed by all three participants in Workshop 1 regarding game design comprehension

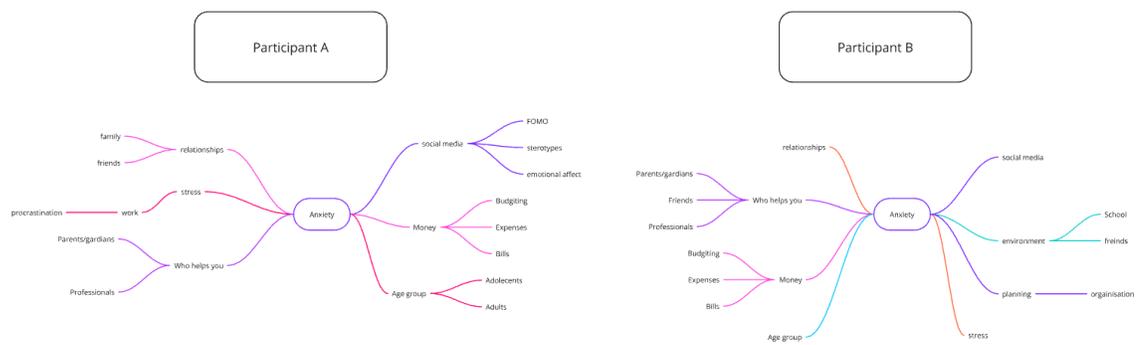


Figure 5.25: Sample image of the digital concept maps completed by all three participants in Workshop 1 regarding Anxiety comprehension

It only evidenced a preference for specific activities, less for what engaged them or detailed their comprehension. In addition, a short survey was also administered across the pilot and Workshop 1 to examine engagement during the classroom (Naibert and Barbera, 2022). However, these surveys again lacked the rich reasoning for what engaged them and why (see Figure 5.3).

This led to an iterative process of re-evaluating how data collection occurred. During Workshop 1, concept maps were trialled. These were done digitally using *Miro* software, a collaborative whiteboard tool. Though this took a long time to complete, this gave insight into what children and young people knew about game design and mental health before the workshop (see Figures 5.24 & 5.25). The concept maps were introduced again at the end of the workshop to be completed again. However, the motivation to start a concept map again or with the workshop drawing to a close meant less detail was recorded onto the concept maps (see Figure 5.26). Drawing and annotating the concept maps seemed to take too long and was not an engaging experience for most young people involved. Between each workshop,



Figure 5.26: Participant A's digital concept maps after completion of the workshop.

the concept maps were iterated to become more accessible and quicker to complete, moving towards a paper exercise, adding in examples and then giving the initial concept back to participants to annotate with any new understanding. Overall, the response to concept maps was mixed, with some participants providing a detailed understanding, while others only completed the first instance and left the rest blank.

Instead of interviews, the whole workshop sessions were recorded, where I tried to disseminate interview-style questions throughout the workshop. In workshops 2 and 4, they formed into focus groups to gather data on game design and mental health comprehension. However, these methods produced little insight into what young people knew. However, through recording the workshop, informal conversations about games between stakeholders and participants brought an understanding of game-playing experience and game design, which was much more informative than a more formal, direct approach. Though prior research has recurrently used interviews (see Chapter 3), the workshops suggest an informal approach can be a more socially appropriate method to communicate and elicit comprehension from young people.

The most compelling data collection method was ethnographic field notes (Fife and Gossner, 2024). Surprisingly, the literature around ethnographic field notes and co-designing games with young people is scarce. Padilla-Petry and Miño Puigcercós (2022) described using ethnographic field notes to understand student engagement in school, whereas Steen et al. (2007) described how ethnographic fieldwork involves researchers immersing themselves in a context and observing interactions. The workshops utilised field notes similar to Padilla-Petry and Miño Puigcercós (2022) to understand participant engagement and observe whether CYP understood the contexts involved as Steen et al. (2007) outlined.

### 5.6.4 Procedure

Upon reflection on the workshop's procedure, there are a few areas for potential improvement. These included the duration and location of the seminar, gauging progression, and facilitating additional stakeholders.

Firstly, the duration and location of the workshops present procedural challenges in terms of the time to set up, the time to run the workshop, and the utilities at your disposal. In Chapter 3, only a few studies discussed the duration of workshops; more often than not, it was unclear whether the duration referenced the study duration or the workshops themselves. From the review, few studies described the challenges of hosting workshops away from university locations or laboratories. In reality, the location changes each presented different facilitation challenges, meaning each workshop couldn't cater to similar surroundings or set-up. Additionally, the duration of each workshop varied due to external factors such as room availability and class duration. This meant each workshop had to adapt to the needs of the surroundings and ultimately impacted how CYP progression through the workshop was handled.

Gauging progression was a consistent challenge at an individual level. Education research often describes how teachers present different levels of challenge during a lesson, sometimes described as differentiated learning (ASCD, 2010; Tomlinson and Allan, 2000). For example, 70% of a class focuses on the main goal, another 15% may need support and help, and another 15% may need another task if they have exceeded expectations. Through the workshops, children and young people participated at different levels, with some excelling quickly through content and others taking longer. Although this is often discussed in relation to developmental age and preferences, I believe it is an additional consideration for providing differentiated learning to cater to each learning level (Sutton et al., 2020; Halldorsson et al., 2021b; Tomlinson and Allan, 2000).

This presents challenges in keeping participants engaged while not leaving some children and young people (CYP) behind, particularly with a fixed amount of time to reach an end goal. Khaled and Vasalou (2014) discussed how some CYP struggled to participate, but giving them a voice in the design was enough to motivate them. Upon reflection, the greatest assets to managing progression were two things: 1) the workbooks having extra tasks to help eager or fast-working CYP to continue without waiting, and 2) having additional facilitators or stakeholders.

Facilitating additional stakeholders was dependent on the context. Where workshop 2 had two facilitators from the venue, these facilitators learned about the workshop before its commencement and co-designed it with young people. They were also instrumental in helping CYP with progression or technical challenges. Facilitation for parents and carers in the pilot and workshop 3 presented challenges where the parents could guide their children towards their solutions or, in workshop 3, complete tasks for them. Parents in the pilot helped keep CYP on task but did not co-design with their children, whereas the opposite occurred in workshop 3. Reflecting on the procedure, a clear protocol should have laid out goals or tasks for additional stakeholders, e.g. teacher(s) co-design and manage behaviour.

## 5.7 Summary

This chapter explored how children and young people's (CYP) comprehension of both game design and anxiety disorders influenced the games they produced. The findings revealed key insights into workshop design, recruitment, data collection methods, and procedural challenges:

- **Workshop Design:** Initial plans for a structured approach proved restrictive, necessitating a flexible and iterative methodology informed by Design-Based Research (DBR). Adapting workshops based on CYP feedback improved engagement and comprehension.
- **Recruitment Challenges:** Recruitment strategies influenced participant diversity and engagement. Early workshops attracted self-selected participants interested in game design, whereas school-based recruitment in later workshops provided a broader participant pool. The role of parental influence in participation was also notable.
- **Data Collection Methods:**
  - Traditional approaches, such as interviews and surveys, provided limited insight into CYP's comprehension.
  - Concept maps, introduced iteratively, yielded mixed results—some participants engaged deeply, while others left them incomplete which rises the question of how do we measure what CYP know when current methods are too formal?
  - Recording full workshop sessions provided richer data through informal discussions rather than structured interviews. Therefore, how do we facilitate informal environments to encourage rich discussions.
  - Ethnographic field notes emerged as the most effective method, offering nuanced insights into engagement, understanding, and workshop dynamics.
- **Procedural Considerations:**
  - The location and duration of workshops impacted facilitation and engagement, requiring adjustments to accommodate different environments.
  - Gauging individual participant progression was challenging, emphasising the need for differentiated learning approaches.
  - The involvement of additional stakeholders, such as teachers or facilitators, was crucial in managing engagement and progression. However, parents and carers sometimes unintentionally influence participation.

These findings emphasise the complexities of co-designing games with CYP and the importance of adaptable methods to foster meaningful participation. However, the next chapter analyses the rich qualitative data collected from these workshops, underlining key factors impacting participation.

## Chapter 6

# Analysing Participation: Themes from Co-Design Workshops

### 6.1 Introduction

The following chapter discusses the findings from analysing four co-design workshops with children and young people. It describes a deductive analysis process, where sensitising constructs were generated from prior research to code and analyse the data sets produced predominantly from ethnographic field notes and recordings. The chapter presents the method of analysis, the predominant themes, and the resulting theory going forward.

#### 6.1.1 Research Question

Prior research in Chapter 3 and Chapter 4 identified common factors that may impact participation. However, little work has explored how much delivery of workshops with CYP affects participation. Though broader research has proposed some common factors in Chapter 2, such as experience of the design team (Hourcade, 2015), considering what research methods are appropriate (Hourcade, 2015) and adopting iterative processes (Hourcade, 2015; Jiang et al., 2017), there has been fewer explorations of the weight these factors can impact participation.

However, as discussed in Chapters 2, 3 and 4, there are potentially multiple components to define successful participation. Participation can refer to the general engagement of CYP, whether they enjoy their participation and are motivated to participate (Foundation, 2025a; Kirby, 2004). Further, successful participation has been discussed in terms of ethical involvement (Read et al., 2013b), exploring whether considerations have been implemented to ensure participation is ethical and fair. From a more facilitator perspective, successful participation could refer to the management of the overall workshop, whether activities and data collection went smoothly (Ward et al., 2022). More often than not, the goal of academic research in co-design is concerned with the outcome quality of the product or service produced (Saiger et al., 2023), rather than the more meta-methodological goals considering involvement

and participation. Because of this, there is a more significant gap concerning the knowledge on how to facilitate co-design, or participatory methods, with children and young people to design games.

Given there are multiple components to define successful participation, my research questions of; *What constitutes ‘successful’ participation in designing applied games?* and *How to consider CYP participation within co-designing games?* encompass what participation looks like and how its conducted. However, this could present an exhaustive list of factors. Therefore, I suggest the following sub-objectives;

- *What factors influence participation during game design?*
- *What challenges are specific to CYP when they participate in game design?*
- *How can we maximise opportunities for “successful” CYP participation when co-design games?*
- *How can we overcome challenges during CYP participation in games design?*

These sub-objectives predominantly focus on the methodological goals of involvement, considering how CYP are engaged and motivated and how this impacts the game(s) they produce.

## 6.2 Method

Qualitative data provides a source of grounded, rich descriptions and explanations that cannot be explained by numerical data (quantitative). Still, it also provides a causation link between events or scenarios (Miles et al., 2014). In addition, qualitative data analysis typically involves a similar set of steps; affixing codes to a set of notes from observations or interviews, noting reflections, sorting phrases and patterns between groups, elaborating a small set of generalizations and then formally discussing those generalization in the form of constructs or theories (Miles et al., 2014; Braun and Clarke, 2013).

The strength of utilising a qualitative data analysis approach is in the groundedness of the data, in that it is collected near the research question (Miles et al., 2014). In the case of this study, the strength of qualitative data analysis is the emphasis on lived experience (Pratt, 2022). In prior research, understanding ‘successful’ or ‘good’ participation remains quite abstract, with most studies focused on product/service outcomes as opposed to meta-methodological outcomes such as observing participation (Saiger et al., 2023). A qualitative approach allows for a deeper insight into the interactions and behaviours during CYP’s participation that quantitative measures would struggle to quantify.

As I am asking what factors impact ‘successful’ participation, qualitative data is suited to understanding the events, perceptions, preferences and assumptions surrounding CYP’s involvement in the workshops of Chpater 5 (Braun and Clarke, 2013; Miles et al., 2014).

### 6.2.1 Data Analysis Method

Analysing the workshops requires a qualitative data analysis approach which integrates insights from the broader literature, the systematic review in Chapter 3, and interviews in Chapter 4. This approach is essential for interpreting qualitative data from transcripts and ethnographic field notes (Emerson et al., 2011). Ethnographic field notes are typically analysed using grounded theory methodology or ethnographic content analysis (Emerson et al., 2011). These methods involve identifying and categorising key constructs while exploring their relationships (Miles et al., 2014). Meanwhile, transcript data from discussions, interviews, and focus groups are most commonly examined through thematic analysis (TA) (Braun and Clarke, 2013), with increasing attention given to reflexive thematic analysis (Braun and Clarke, 2021).

Braun and Clarke (2021)'s approach to reflexive thematic analysis involves a flexible approach where it can be used for a more deductive or more inductive analytic process, where inductive is grounded in the data and deductive provides existing research and theory to act as the lens through which data is interpreted. Considering the pre-established research from chapters 2 and 3, a deductive approach would be more appropriate, which is why I considered a deductive qualitative analysis (DQA) (Fife and Gossner, 2024; Fereday and Muir-Cochrane, 2006).

### 6.2.2 Deductive Qualitative Analysis

Deductive Qualitative Analysis (DQA) is where researchers combine deductive and inductive analysis to examine existing evidence towards a research problem and present a theory that better fits the present sample or phenomenon being examined (Fife and Gossner, 2024). Deductive qualitative analysis shares many similarities to other qualitative methods like Reflexive thematic analysis (Braun and Clarke, 2021), which involve deductive and inductive coding approaches. Despite the contradiction, the approach of DQA presents a more logical set of steps when analysing data with existing theory. Fife and Gossner (2024) utilised DQA to evaluate and expand on existing theories and constructs by establishing sensitising constructs. These constructs were determined from key literature or previous research. They describe how DQA involves a similar coding and analysing stage to other qualitative data analysis methods, such as grounded theory.

- Develop a research question that connects the theory with the phenomenon under investigation
- Operationalising theory involves the development of sensitising constructs (key concepts from existing literature or theory), which create a working hypothesis towards addressing the questions
- Gather sample data and begin analysing using sensitising constructs and guiding theory
- Coding and analysing data, developing a rich, nuanced understanding of the phenomenon under investigation, compiling supporting, contradicting, refining and expanding evidence.

- Theorising, refining theory that includes data-supported sensitising constructs and inductively derived themes

After coding, theorising occurs on how the findings support, contradict or refine the pre-established theories or constructs. This ‘theorising’ stage is similar to how reflexive thematic analysis (Braun and Clarke, 2021) proposes themes and contrasts the themes within broader literature. However, Fife and colleagues discuss how DQA alternates between an initial inductive phase and the deductive analysis, including negative case analysis (Fife and Gossner, 2024). The negative case analysis is described as a conscious search for instances that add dimensions that may detract from or contradict the examined theory, providing a more trustworthy and in-depth analysis (Fife and Gossner, 2024). In summary, though it shares similar practices to other approaches to qualitative data analysis, it differs by intentionally incorporating deductive and inductive analysis and utilising negative case analysis to prevent premature suggestions (Fife and Gossner, 2024).

In this case, I used DQA to establish sensitising constructs from prior research or existing informal theories that have suggested factors to impact participation. From these constructs, I carried out coding across a data sample (workshops with CYP). The first stage involved an inductive coding process coding relevant extracts. At the same time, I kept the list of sensitising constructs close to hand and deductively coded any extracts or transcripts that aligned with the construct. As I was employing negative case analysis, some codes would contradict the sensitising constructs, but, for clarity, were coded separately and later grouped. Using inductive and deductive coding, I considered the existing theory and constructs that impact CYP participation. The final step involves grouping and theorising themes to encapsulate the inductive codes and deductive sensitising constructs. The theorising part examines the resulting codes in terms of how they support, contradict or expand the existing literature surrounding CYP participation for the design of games.

### 6.2.3 Coding and Analysis

The process for coding involved utilising the sensitising constructs as codes across the qualitative data recorded. This formed an initial deductive analytic framework to the process. At the same time, I conducted inductive coding to examine factors that impact participation that were not covered by the existing sensitising construct codes. A few examples from inductive coding included interaction preferences, ethics of involvement, ideation facilitation, and managing expectations. This resulted in a mixture of codes generated from existing constructs via deductive and emergent codes from inductive coding. After initial coding, I revised the codes produced and analysed the sample data again for supporting, contradicting, refining and expanding evidence in line with DQA methodology.

Theorising occurred during each phase of the analysis, during which I compared the findings to existing theories (e.g., sensitising constructs). These constructs helped me understand the initial construction of final themes, contrast each theme with the pre-existing data, and understand what factors impact participation. I labelled the results where sensitising constructs arose in broader themes with supporting evidence. Still, where there are differences, I provide new evidence to support a new theory.

### 6.2.4 Sensitizing Constructs

Before conducting coding, part of DQA includes setting up sensitising constructs. Sensitising constructs can be based on key elements of existing theory or literature or generated from working hypotheses. In this study, the sensitising constructs were established from prior literature. In this study, I used the following common factors elicited from Chapters 3 and 4, as well as broader literature:

- Developmentally appropriate tools and settings drive engagement;
  - As described in Chapter 4, how specific tools (Hourcade, 2015) and activities (Saiger et al., 2023) can impact CYP’s engagement during participation.
- Managing expectations via clear goals sustains and directs attention ;
  - As described in Chapter 4, how CYP’s expectations of participation can be managed by providing clear and concise goals they can achieve (Hourcade, 2015; Fleming et al., 2017; Bossavit and Parsons, 2016b).
- Informing CYP through onboarding, briefing, and training improves comprehension
  - As described in Chapters 2 and 3, how participation can be impacted by CYP’s comprehension of key concepts involved in their participation (Saiger et al., 2023). Consequently, how onboarding, training and upskilling can improve their understanding (Sutton et al., 2020; Vallentin-Holbech et al., 2020; Schoneveld et al., 2017).
- Communication impacts cohesion between stakeholder groups
  - As described in Chapters 2 and 3, how communication between CYP and other stakeholders can impact their participation and the cohesion between participant groups (Rötkönen et al., 2021; Saiger et al., 2023; Eriksson et al., 2019).
- Accessibility and inclusion for CYP,
  - As described in Chapter 3, wider literature described how participation can be impacted by considering the developmental age of CYP (Malinverni et al., 2017; Hourcade, 2015), their accessibility needs and how to make them feel included (Saiger et al., 2023; Zahlsen et al., 2022).
- Confidence and Agency promote deeper participation from CYP
  - As described in Chapter 3, wider literature described how CYPs’ general confidence and comfort during participation can result in more agency and more active participation during their involvement.
- Affording creative time and space maintains participation
  - As described in Chapter 4, wider literature described how affording a creative and fun space can impact participation alongside giving CYP enough time to be creative.

- Ethical concerns to participation
  - As described in Chapter 2, the ethical involvement of CYP presents several concerns to what is considered ethical involvement. What do CYP get out of it? How are they compensated for their involvement? Is their participation tokenistic?

## 6.3 Results

To summarise, data from each workshop described in Chapter 5 was collected through audio recordings of group discussions, written information from concept maps and booklets, and ethnographic field notes. Quotes are referenced via participant and workshop, e.g., P1A references Workshop 1, Participant A. These references can be found in Chapter 5 or in Appendix D. In a similar vein, fieldnotes are reported as FN1, referencing the field notes stored in Appendix D. I transcribed all audio data and collated excerpts taken from field notes. I then utilised DQA to code the data. I broke the transcripts and excerpts into smaller sections to be coded and organised more efficiently in Microsoft Excel. Then, the subsequent coding was applied to identify inductive and deductive codes related to the sensitising constructs. From the results of the coding process, I refined the codes into prominent themes seen across each of the workshop sample groups. These were:

### 6.3.1 CYP Prefer Interacting with Digital Technology

Across the workshops, participants seemed less interested in paper-based or writing exercises; “2-3 participants struggling with writing tasks. Using single word answers” [FN17]. When physical card or board games were employed, older participants (16-17) in workshop 1 preferred non-technology methods to interact with, “*I kind of enjoyed, like, on piece of paper, because it was more, like, the whiteboard as well. More visual. I think it was easy to do as a good paper.*” P1A<sup>1</sup> However, in the other workshops, which were for children between 10-13 years old, there was much less interest in paper-based activities such as the card game Pitch it, post-it note ideation and booklet activities. This could be due to the social nature of card/board games, which may appeal more to teenagers compared to children aged 10-13 who expressed many favourite video games that were predominantly single-player experiences (such as *Pokemon Scarlet* in Figure 6.1 and *Minecraft* (Mojang Studios, 2009)).

Written components of the workbooks were often ignored in favour of verbally discussing ideas or, if possible, typing up their concept on a computer or laptop. Regarding prototype development, participants in workshops 2 and 4 delivered prototypes via digital methods. The use of laptops and collaborative software, such as Google Slides, seemed to engage participants more, “*Google image search helped with communicating ideas between participants*” (FN324). In workshop 2, there were six pairs and one individual, and each group used a laptop to research and present their prototype. The individual in workshop 2 was the only one not to use *Google Slides*, opting to create a digital mind map of how their game systems interconnected. Similarly, pairs in workshop 4 also used *Google Slides*, which may be due to familiarity

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<sup>1</sup>P1A indicates participant A from workshop 1. Similarly, FN1A indicates field note 1 from the fieldnote codebook stored in Appendix D.

Theme	Description
CYP prefer interacting with digital technology	Overall, participants were more engaged using technology than traditional paper prototyping methods.
Higher expectations of Game Design Technology	CYP expected to work in-engine and with game making tools given their literacy with games
Prototyping was a more accessible co-design phase than ideation,	The problem-solving nature of ideation was a challenging barrier to CYP. Prototyping and creating were much easier for participants to do.
Strong guidance and constraints drive the delivery of output	Managing CYP goals and tasks with time-boxed tasks and providing guidance helped with the completion of tasks
More time and space results in convoluted outputs	Giving CYP longer time for tasks and creativity was detrimental to the outcome product and their participation, resulting in convoluted ideas and sometimes frustration.
Ideation chiefly emulates game titles they already know	How fostering originality was a challenge when CYP's ideation is anchored to what games they are familiar with.
Group dynamics can impede participation	describes how cohesion and communication challenges arose and how they were mitigated
CYP rely on existing knowledge rather than up-skilling or learning	CYP weren't responsive to learning new knowledge or skills and often relied on their existing understanding
Game-making is exciting, which can result in behavioural issues	Across workshops, managing behaviour, whether excited or disruptive, was a challenge to participation.

Table 6.1: Themes produced from DQA



Figure 6.1: Pokemon Scarlet/Violet, one of the more frequent examples of games played by participants aged 10-14

with the software or the association of presenting a task with a presentation-based software. However, despite the preference for using technology, there were instances where *“Laptops were distracting with pre-existing software”* (FN150) and *“technology issues surfaced from hardware capabilities* (FN460). These problems presented obstacles to Workshops 1, 2 and 3 participants, but didn’t dissuade CYP from using laptops.

Overall, younger CYP (ages 10-13), particularly boys, preferred to use technology, e.g. laptops and computers, over paper-based tools. Despite the technical limitations and learning challenges they presented, CYP would rather persevere with technology than opt for paper-based methods. In addition, there was a great interest in working in game engines, which may be related to their experience of game design in level editors or the expectations not being clear upon recruitment.

### 6.3.2 Higher Expectations of Game Design Technology

The desire to work in game engines was potentially a mistake in recruitment communication. However, I endeavoured to clarify the workshop involvement from the advertising materials and participant information sheets (see Appendix F). It could also be due to the lack of grammar and understanding discussed by professionals in Chapter 4, who had suggested that there isn’t an existing grammar or basic knowledge of how games get made. This led to some CYP having unrealistic expectations of developing games via in-game editors such as Fortnite’s Unreal Engine or designing games in Minecraft, *“I just want to work in-engine”* (P2E). Attuning CYP’s expectations to the workshop was risky in not losing their interest. In workshops 2,3, and 4, I showcased prototypes developed in the pilot and workshop 1 *“Examples of possible prototypes helped direct participants”* [FN304]. These examples helped direct participants and guided them towards creating their solutions, but there was still a present desire to make a game-based solution inside a game engine.

In workshop 2, one young boy commented, *“Are there any engines on this laptop I can use?”*

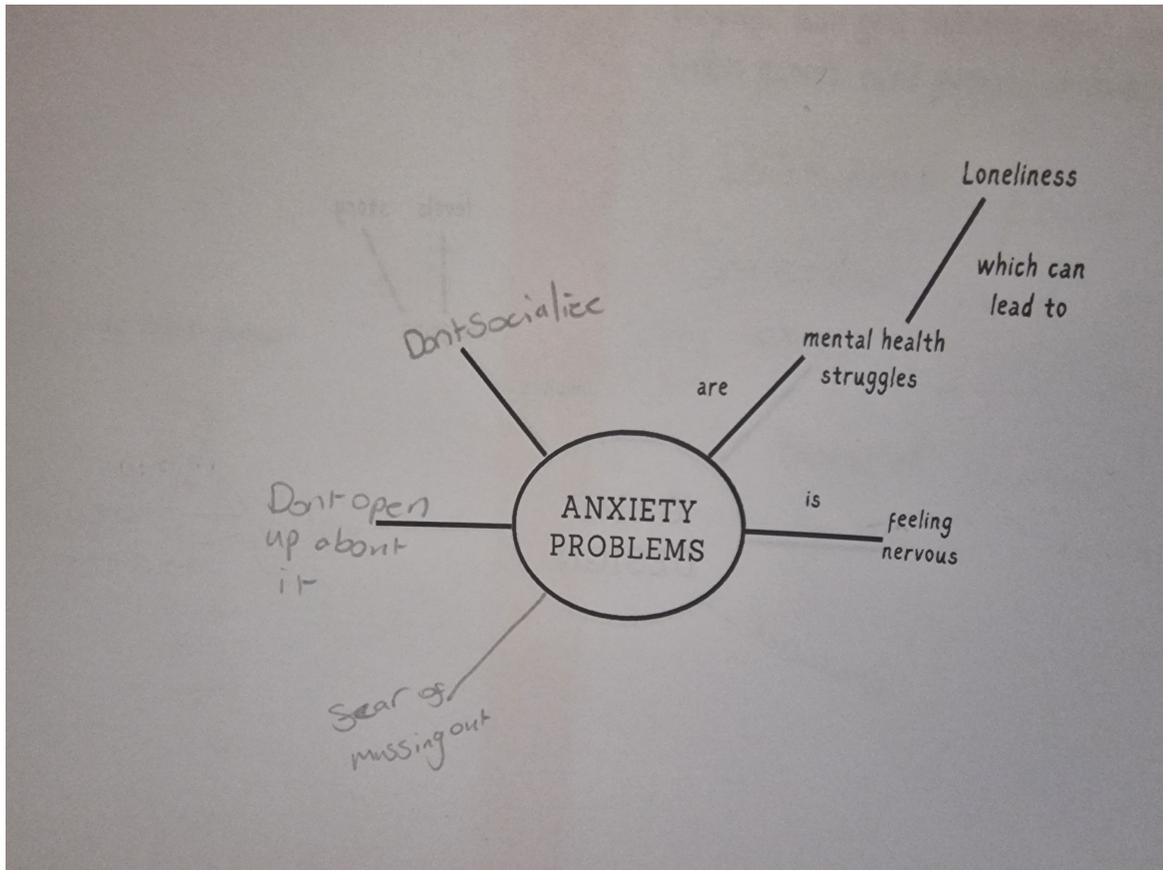


Figure 6.2: Ideation booklet pages weren't often used. With a preference for using blank pieces of paper or digital technology

P2D, which was similarly expressed across workshops 2, 3 and 4, where most participants were disinterested in using paper-based tools. In observing the interactions across each workshop, there was a definite attitude shift when an activity could be completed on a computer instead of paper. For example, the initial ideation activities were conducted on paper, providing paper-based activities to generate ideas and present them in the poster. Figure 6.2 shows an image of booklets used by participants in workshop 2, where very few used the space to note their ideation process. Compared to the prototyping activities, where the majority had access to laptops, there was substantially more excitement and enthusiasm, “*Participants seem more engaged working via laptop compared to booklets*” FN184. This could be due to a generational shift in access and use of digital technology. In addition, it could be related to the prevalence of technology in schools as a requirement, where drawing and paper methods are not engaging enough. This may also be gendered, given men still spend more time on computer games than women: the few female participants who participated in workshops 3 and 4 were much more comfortable with paper prototyping than using a computer. They completed their tasks quickly via paper prototyping and appeared more comfortable drawing their proposed ideas than working with technology.

In workshop 3, I introduced Inklewriter (Studios, 2014), a browser-based engine for creating simple narrative games with multiple choices. At first, participants were “hard to manage” [FN34] and “screaming and shouting a lot [FN47]” from two participants, P3A and

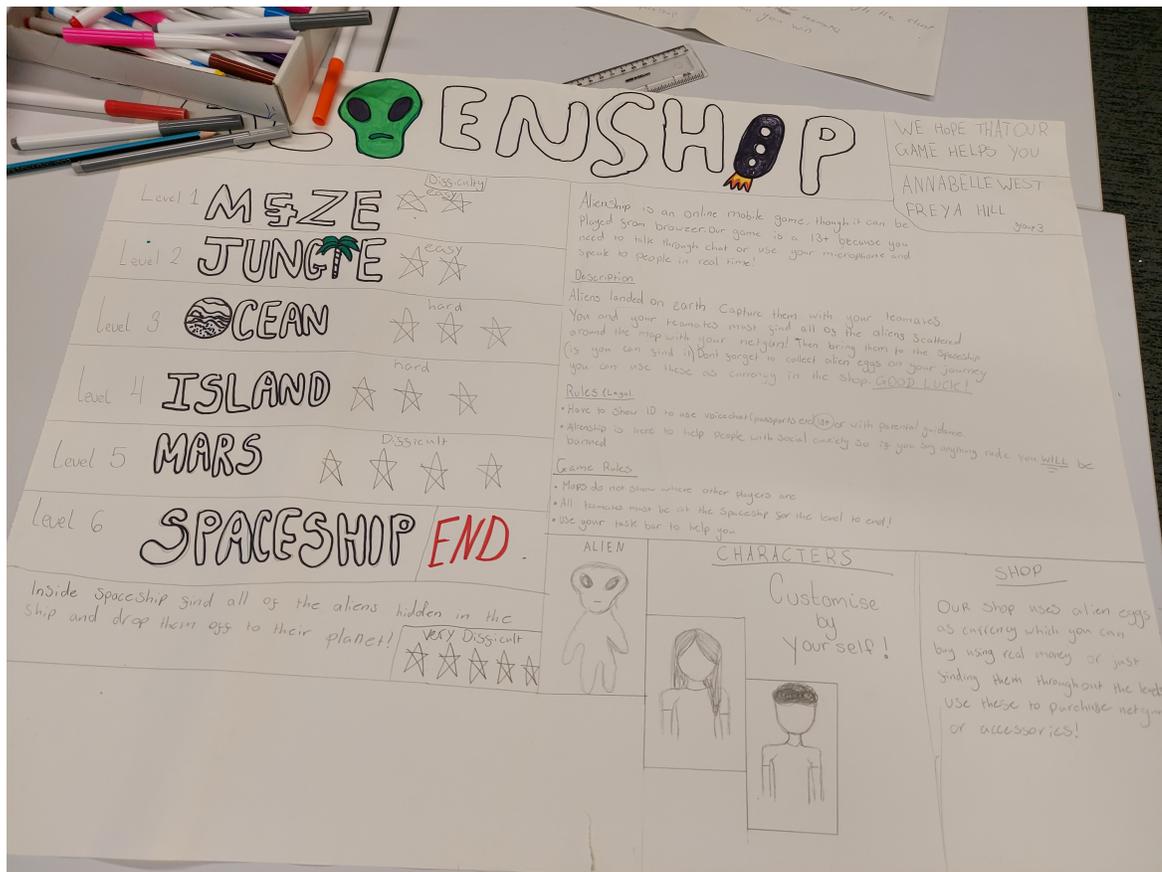


Figure 6.3: Poster Paper prototype made by two female participants in Workshop 4, with little experience of playing games

P3B, which resulted in disinterest and loss of focus. Yet after introducing Inklewriter, there was a definitive change in behaviour and attitude. Participants' "over-excitement for games" [FN314] was calmed and directed towards the possibility of making a game in a simple game engine. As they used Inklewriter, P3A and P3B became focused on making their own game. P3A asked additional questions on how to add more options and change content in the game. This interaction suggests that choosing a specific tool or game engine can engage CYP and manage disruptive behaviour. The same engine was offered to participants in workshop 4. Still, the restrictions of the inklewriter tool as a narrative engine seemed to disinterest participants in thinking of larger and more ambitious ideas. In workshops 2 and 4, male participants tended to create game ideas similar to what they knew, which included games such as *Fortnite* (Epic Games, 2017), *Call of Duty* (Ward, 2025), *Roblox* (Roblox Corporation, 2006), *Rainbow Six Siege* (Montreal, 2015), and *Fifa* (Sports, 2022).

These games formed the baseline expectation of what they see as a game, "It's like *Rainbow Six Siege*, but you need to calm hostages down who've got (inaudible) like PTSD" (FN430). On the other hand, games CYP play, such as *Fortnite* (Epic Games, 2017) and *Roblox* (Roblox Corporation, 2006), offer built-in level design tools for players to make their own content. Creating content with highly polished assets and an accessible interface may persuade participants that designing a game is easier than it is in reality. Therefore, asking participants to problem-solve games for anxiety on paper or without those familiar level designs seems

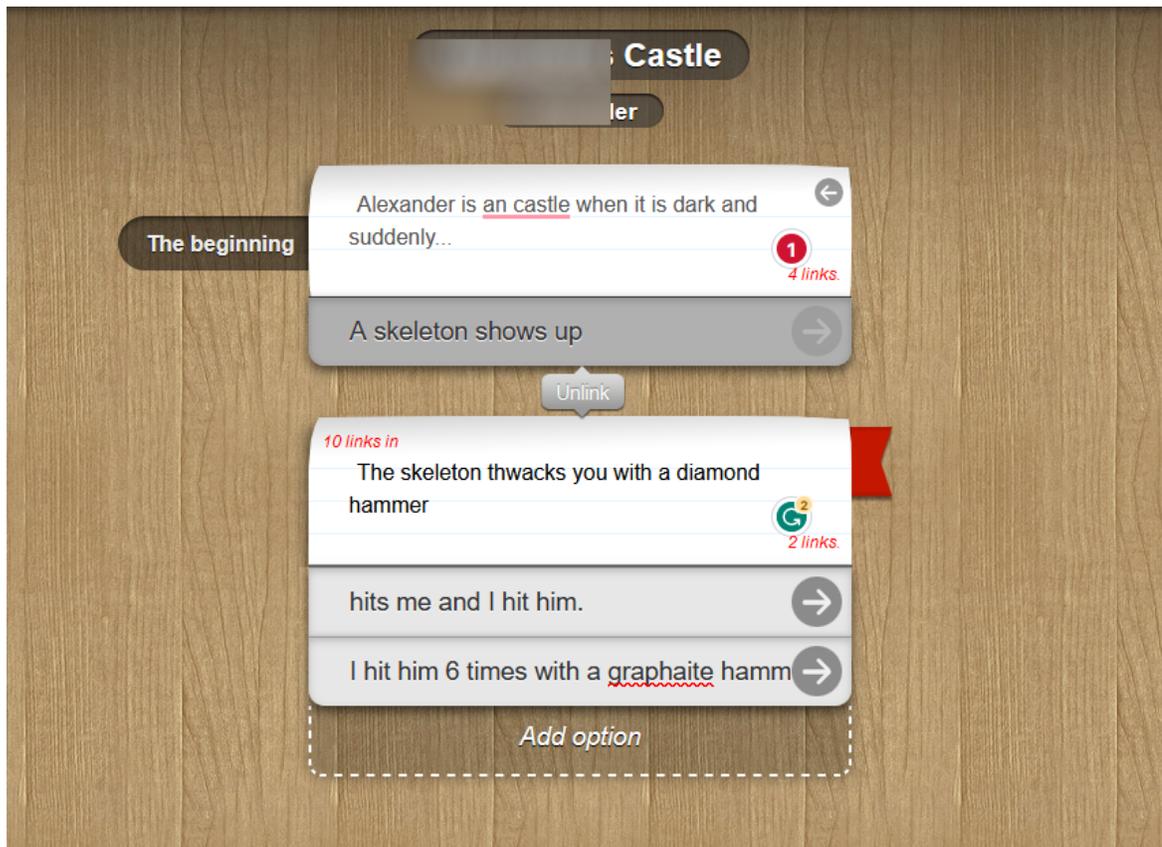


Figure 6.4: Narrative game engine Ink used by one participant

dull and unattractive compared to the tools they are consuming.

### 6.3.3 Prototyping was a More Accessible Co-Design Phase Compared to Ideation

In the previous two themes, obstacles to participation were impacted by how they wanted to interact and their expectations of game design tools. About these themes, there was a noticeable difference between the two phases of development, ideation and prototyping. I attempted to afford an equal amount of time to each development phase as outlined in Chapter 5, and there was some variation between each workshop on how these phases were conducted. However, the ideation phase predominantly involved participants' problem-solving around "how to make a game that helps with anxiety". Even with guidance, there was a struggle for participants to think of ideas, and field note observations reported how *"ideation methods by paper methods aren't fun"* FN136. Though there were exceptions where, once an idea had formed, *"Participants didn't want a break, jumped straight back into ideation"* FN204, suggesting they were enjoying the ideation process. However, this was the case for workshops 1 and 2 only.

Though there was enthusiasm for ideation, it was clear that prototyping, once understood, was a much more accessible and enjoyable activity. Once they had a clear idea of what to

make, there was a lot more fun to be had in designing parts of their game, with some wanting to stay longer, as expressed in workshop 2; *“I’d stay another 4 hours to do more” (FN71)*. In addition, there were multiple cases across workshops 2 and 4 where participants desired more time to work on their game prototypes before showcasing to everyone else; *“Participants would ask for more time as it ran out” (FN410)*. However, there were observations that some participants were not engaged towards the end of workshop, where field note observations reported participants watching the clock in workshop 4, talking about what they were going to do after (FN84) and checking phones during the final data collection phases (FN468) which could potentially indicate the workshops were too long in duration for some participants.

In workshops 2, 3, and 4, at least 1 or 2 participants were impatient with ideation. They chose to ignore the ideation phase and wanted to start *“programming or developing a game without any ideation” FN258* of what to make. Similarly, when it came to the iterative part of the workshop where they refined their idea, Workshop 1 participants aged 16-17 were much more open to scrapping ideas and starting again, going through 3-4 different ideas. However, in ages 10-13 in the other workshops, participants were much more attached to their ideas, where *“Iterating came pretty natural in prototyping but not Ideation. Once they had an idea they didn’t want to scrap it” FN24*. This could have been due to the challenge of the workshop, where participants struggled to generate an initial idea or feared failure. In at least workshops 1 and 2, there was a concern about presenting the ‘wrong’ solution.

Overall, the design phase of ideation presents a significant challenge to CYP, regardless of age. The ideation of applied games requires contextual knowledge of game design, applied context and potentially co-design processes. These areas are potentially new topics to CYP, requiring them to upskill or learn more before making informed decisions. However, as the theme of *CYP rely on existing knowledge*, CYP may not be susceptible to learning these new topics. In addition, ideation involves problem-solving where participants must consider what exists and what they can do differently. Though CYP may have a vast experience of game-playing knowledge, they may not understand the grammar behind how games are made, as suggested by participants in Chapter 4.

On the other hand, prototyping presents many more interactive activities. With an established solution, they can draw, research and describe how the game works or potentially addresses anxiety disorders. The constructive side of prototyping comes much more naturally to CYP age groups and is much more enjoyable than ideation.

### 6.3.4 Strong Guidance and Constraints Drives the Delivery of Output

An outcome of chapter 3 suggested there was a larger push for researchers and developers to involve CYP as design partners in co-design sessions. In addition, the sensitising concept of *“Managing expectation via clear goals sustains and directs attention”* was encompassed in this theme after theorising and refinement. Involving CYP as designer partners places decision-making power, self-directed learning and autonomy in end-users’ hands. In this case, from the pilot onwards, I had endeavoured to give CYP more decision-making control and creative space to create solutions for games for anxiety. However, involving CYP as design partners had not been as productive as the wider literature had suggested.

It was evident across workshops that direct tasks were preferred over open-ended autonomous tasks. When participants were given freedom to design or come up with a solution, e.g. during ideation, there was a lot more difficulty in brainstorming a solution: *“Designer: you’re almost at 20 minutes, how do you think it’s going” P1A: “it’s really hard. ” Participant P1B: “we’re pretty confident in the idea but the general idea is how we keep people interested”*. Ideation across the workshops seemed to be a more difficult challenge for CYP than prototyping activities. In workshop 2, CYP struggled to balance components of a game in the post-it activity *“I don’t know how to make all these (post-it components) fit (P2H)”*. When participants were overwhelmed or stuck, I gave them tighter constraints, such as asking them to make a role-playing game where they help someone feel less anxious, rather than including additional components such as the characters, the world, the experience, etc. Once an idea or solution had been formed, developing it was much more task-oriented, which seemed to suit CYP more. It suggests that CYP require more guidance rather than creative freedom when it comes to co-designing a solution. Alternatively, setting constraints helped focus ideas.

The analysis suggested that providing constraints, whether it be from a *“vertical slice”* or asking for a *“USP (unique selling point)”* helped CYP constrain their ideas and prevent their prototypes from becoming too broad or unfocused. Alternatively, having myself or another facilitator available to provide guidance helped with progression through workshop activities and prevented CYP from becoming overwhelmed *“guiding participants with one game component at a time helped with progression”*. If I or other facilitators were not present, the challenge of problem-solving during ideation could lead to CYP becoming disinterested or frustrated if they did not fully comprehend the topics involved. In addition, constraints in the form of breadth of task and time to do task created a deadline for participants to deliver a solution; *“Assigning a task and time constraint worked better than giving them time” (FN363)* With an established idea, participants in workshops 2, 3 and 4 were more comfortable in adding content and additional details, but weren’t comfortable with iterating upon their idea or removing content. This resulted in a recurring issue of participants adding more content over time.

### 6.3.5 More Time and Space results in Convolved Outputs

Closely related to the theme of Strong Guidance and Constraints Drive Delivery of Output (6.3.4) is how time and space impacted CYP participation. In chapter 3, wider literature discussed how CYP should be afforded the greatest amount of time and creative space that can be facilitated in a study. Studies have suggested that giving CYP more time and space increases what they learn and improves the outcome quality. However, that was not the case in this study. In creating their solutions, there was a recurring theme across all four workshops where the longer the participant groups worked on their ideas, the more convoluted their concepts became. For example, below is an excerpt from a workshop participant 2 describing their game:

*I think first I should explain how this, um, game would work. So, um, basically how it would work would, um, there would be a ship with, like, an island. Which for the first ten and nine levels, you’re trying to fend off pirates and get materials. And then for the final level, you have your engineer, who will, um, like, build, um, some rocket boosters to, um, put the island into the sky. And then you’ll go to*

## Characters\main characters

At the start of the game you get the choice of male or female the name of the female is bobbie and the name for the male is bobby with a character creator and you get to choose a role between 5 different characters archmage archer warrior engineer captain and there is a messenger bear that flies



Figure 6.5: Characters and Pets content from P2A and P2B

*different places, and it'll be ten levels each, and get like a dome, and make your island be able to go to space. Um, with like, correct materials, and then when you've gone to space you'd complete the final 10 levels, which would allow you to go into the boss, (P2D)*

Despite giving constraints and specific goals, CYP developing games often focused on a lot of 'additional features' not core to the solution. For example, one pair in workshop 4 presented their idea which was predominantly a collection of extra content features; *"So, the only way to actually get it, Aldi, is by, there's no other way, uh, it's got micro-transactions, skins, and weapons, uh, so you can get a big panda. (P4H & P4I, FN431"*. There was a focus on the content these games offered, but little consideration was given to how these systems worked together or addressed the core aim of their game. This may be due to their game experience or the lack of clarity towards what they need to deliver. In workshop 2, two participants started with a team-based game to promote social cohesion to address social anxiety. Still, they ended up focusing on character classes and in-game pets (see 6.5). When asked how these helped towards the goal of social anxiety, they struggled to describe how these content additions facilitated the goal, but didn't want to remove this content.

In addition, when co-designers, like myself or other facilitators, asked questions around how a concept, for example, helps with anxiety, participants would often add more content rather than refine or iterate upon their game. This happened regardless of participant age, where rather than revisit and refine an idea or concept, they would add more content to the game; *"A common response to questions or critique, from myself or other participants, was for some participants to add more content"* (FN282) The result would be convoluted design pitches or confusion about their solutions. There's also the potential that their game ideas were heavily impacted by what they play and by association, they want to incorporate the content that they interact with most; *"Because I quite like VRChat. Yeah. I wasn't going to say... there I*

*think it needs Multiplayer. Definitely.” (P1B, FN232).*

### 6.3.6 Ideation Is Chiefly Limited to Emulating Game Titles They Already Know

Across all four workshops, it was clear that CYP comprehension of games was predominantly impacted by what games they had played or watched played. During ideation, many initial game ideas were inspired by existing games; *“I’m kind of, like, thinking about Grounded, and how that’s quite a, like, a massive world. (P1C)”*. Not only did I as the facilitator raise questions around these derivative game ideas, raising questions of uniqueness or ‘why to play their game over the original’, there was in-depth feedback shared between participants; *“It’s not very unique, it could be made as a mod in Rust” (P4F)*. In workshops 1, 2 and 4, this feedback and discussion was more visible, particularly in the ideation stages where participants commented on the solution proposed *“I just don’t get that. Its like, you know, VRChat, but there’s gonna be like, it’s like, but how does that help with it [anxiety]?”*. In workshops 3 and 4, scoring proposed game prototypes on their freshness or originality reflected ideas, with a few participants appearing to reflect on the design choices; *“Those that scored poorly on their games looked like they wanted to try again and do better”*

To address the challenges of originality, other facilitators and I at workshops 2, 3 and 4 attempted to prompt CYP to consider unique selling points or aspects that would make their game stand out *Teacher: “What makes your game unique, hey? What makes it so special?” P4Teacher1 (FN333)*. This was a significantly harder exercise for some participants than adding content to their ideas. One method in workshops 1 and 2 was by giving them ‘wildcard’ components (from the *Pitch it* deck of cards) and asking them to create something new; this then resulted in ideas where the game idea was more aligned with the goal of the workshops. For example, participant H in workshop 2 proposed a game about mindfulness and alleviating anxiety tied to a character’s powers *“...the more he recovers, the more he can, uh, use the more powers he will get from his mind clearing up.” (P2H)* The use of tools such as *Pitch it* (appendix J), Young Baftas game design tool (Warburton and Phillips (2025)) and game design booklets (see appendix K) did help participants with a genuine interest in game design explore new creative ideas related to the goal, but for those less interested, they were mostly ignored.

However, more often than not, the attractiveness of designing a game similar to what they played overshadowed the overall objective of designing an applied game for anxiety. Though workshop 3 and 4 participants appeared to have fun designing ‘clones’ or parodies of their favourite games *“Powers? I’m just going to take this from the Diablo games. (P2H, FN77)*. Overall, boys aged 12-13 in workshop 2, 3 and 4 participation did not lead to many feasible or fit for purpose games such as P4E and P4F proposed game which they described as a Call of Duty style game set in their nearby town but you were to rescue friends in specific locations 6.6 and P3D in whose ideation resulted in a like for like representation of War Thunder 5.18

Overall, the challenge of fostering originality in CYP’s proposed game ideas seems linked to their ability to ideate. Moreover, it appears that most male participants aged 13-14 rely heavily on what they are playing and essentially ignore the goal of applied games. The exceptions occur in those who are genuinely more interested in game design or have little game



Figure 6.6: Participant E and F from Workshop 4 prototype. A mock screenshot of a Call of Duty style game set in their local town.

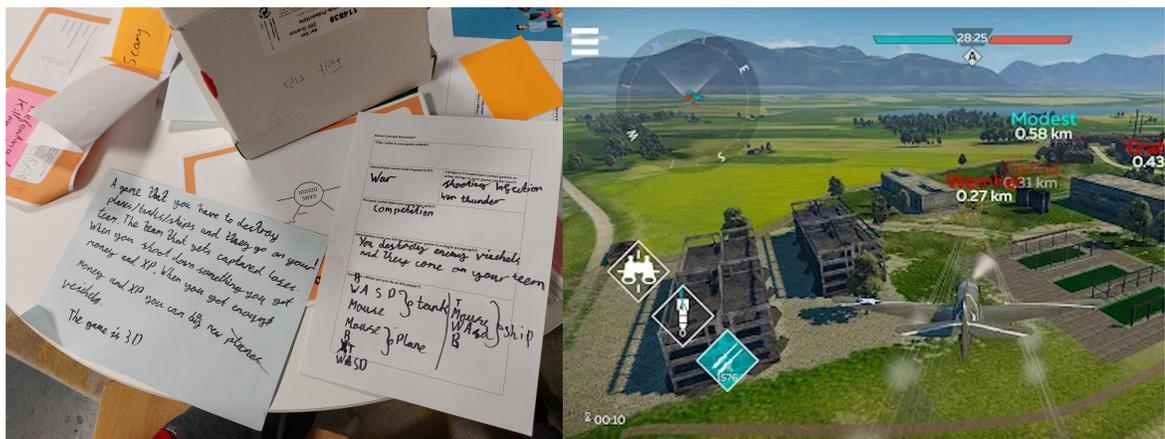


Figure 6.7: Participant D's ideation result. A like-for-like description of War Thunder (pictured right)

experience. Those with genuine interest tried much harder and asked more questions about their ideas. Those with little experience of games (mainly female participants in workshop 4) had few existing ideas to anchor to, producing more unique and different solutions. Given the challenge of problem-solving in ideation and avoiding game ideas based on existing games, it may be easier to deliver an existing solution and have them improve upon it or critique the solution, given the ability to identify where games share similarities with existing games.

### 6.3.7 Group Dynamics can Impede Participation

Previously, in chapter 4, I identified communication impacts cohesion between stakeholder groups from interviews with professionals. Knowing this, I utilised that theme as a sensitising construct to explore communication, collaboration and cohesion amongst the data collected. Through analysis, clear communication was not always ‘clear’, with instructions being misconstrued. In addition, communication between CYP participants presented a challenge to cohesion, impacting CYP enjoyment and participation in the workshop.

Collaboration between participants faced a few issues across the workshops, predominantly in workshops 2, 3, and 4. There were issues sharing technology like laptops, sharing workloads, and in some cases, cliques were formed based on gaming preferences; *Participant B4 “I play Monopoly with my family” Participant B5 “Monopoly is terrible. Why do you play that?”*. On the other hand, there were examples where technology, such as Google Slides, promoted collaborative work simultaneously and helped ensure collaboration between participants. When co-designing alongside CYP, there were challenges in not guiding participants towards a biased solution. Still, in workshop 2, adults co-designing with CYP worked better for collaboration and communication rather than giving them total power and authority over each other.

Navigating power imbalances and group dynamics was also observed. Though recruitment tried to constrain age groups, in workshops 2 and 3, some groups had a few age differences of 1 or 2 years. The effect was *“Older participants tend to disregard participants younger than them”*, resulting in the younger participants becoming dissuaded from participating. In groups of 3 or more, there was also an imbalance in group working *“In a group of 3, there was 1 participant who led decisions. And often 1 participant doing a lot of notes.”*. To amend this, from workshop 2 onwards, CYP worked in pairs, with adults or facilitators jumping in to co-design. Pairs worked well for collaboration and division of power dynamics, although there were still a few occasions where pairs weren’t supportive in their communication. The communication between CYP participants varied across workshops. Participants already knew each other in workshops 1 and 4, whereas they were strangers in workshops 2 and 3. Pre-existing relationships helped with collaboration and communication between CYP, which often meant icebreakers weren’t necessary or interesting to CYP.

A recurring challenge for CYP was overcoming shyness and building confidence in their participation. From the icebreaker activity in workshop 2 at the start of the workshop, *“There was a shyness to share what their favourite games were and why”* but after there was a noticeable change in confidence as time went on; *“participants gradually More confident in participating in post it activity”*. Though their confidence to participate gradually increased with the workshop duration, the data collection measuring confidence indicated

an overconfidence in their skills which they then struggled to demonstrate, for example in workshop 1 it was observed that *“Participants claimed they knew how to do a concept map, but had to be corrected later”*. Finally, confidence and communication were impacted when it came to communicating with adults; *“Not too confident in presenting ideas to adults”* and participants’ behaviour suggested there was a concern of being ‘wrong’ when proposing a solution.

Upon reflection on navigating collaboration and communication with CYP, participation can be significantly affected by group dynamics and the power balances between group work. CYP participants can significantly impact each other’s cohesion and confidence and influence their engagement and enjoyment. Demonstrating to CYP how to communicate or having facilitators present can help manage behaviour and address issues of cohesion earlier on. Confidence also plays a bit part in effective communication, where an unfamiliar activity (workshop) can result in caution, and having participants with pre-established friendships could help support confidence and participation.

### 6.3.8 CYP Rely on Existing Knowledge rather than Up-skilling or Learning

The initial aim of these workshops was to explore the factor of comprehension in further detail. Chapters 3 and 4 explored known factors to impact young people’s ‘successful’ or ‘good’ participation during a design process. The outcome of these chapters suggested that CYP’s comprehension is a predominant factor that impacts engagement and the successful production of a solution. However, broader literature had not demonstrated methods to ensure participants comprehend the context and their role. Gathering tangible data on CYP’s comprehension was a challenge throughout the workshops. Multiple methods involving focus groups, interviews and concept maps were explored as methods to understand CYP’s comprehension of game design and anxiety disorders.

Across the workshops, there was evidence of participants’ efforts to bridge the gap between game design and anxiety disorders/mental health. Participants tended to avoid researching or utilising materials supplied to educate them on mental health contexts regardless of whether they were greatly interested in participating in the workshop or not. Instead, they relied on their understanding *“You can do... anxiety, social media, and then you can do like stereotypes, so how you should be and act. I guess.” (P1A)*, *“Like beef (disagreements) can affect your anxiety?” (P1C)*. In workshop 1, participants seemed to be well informed about anxiety disorders, relevant treatments and self-help methods, whereas across workshop 2,3 and 4, there was a lot more guesswork. For example, participants in workshops 2 and 4 often only described stress as a factor for anxiety. On the other hand, when it came to their understanding of design process or design thinking, participants in workshop 1 & 2 expressed how they hadn’t done anything like the workshops before, but highly enjoyed the process **“Me:** *Have you typically done something like this before school?* **Participant P1A:** *What? Erm no not really. It was difficult but really interesting to do.* Despite trialling different ways of informing their comprehension on game design and anxiety disorders, whether participants were well informed or not, they were not interested in addressing the gaps in their knowledge. However, this could also be a limitation of what was feasibly facilitated across the workshops. There could be alternative approaches to informing CYP.

On the other hand, comprehension of game design and game concepts was often drawn upon existing knowledge and media. As discussed in 6.3.6, CYP often relied on the games they had played to design their solutions and frequently anchored their knowledge of game design to what they played. However, there were instances where their comprehension of game design resulted from game systems which required creativity *“is game design like DnD (Dungeons and Dragons)? Creating characters and worlds?” Participant P2H*. Participant P2H had extensive experience with playing tabletop games, sharing their experiences creating characters, designing worlds and planning adventures. This experience of tabletop role-playing games (such as Dungeons and Dragons) contributed to their comprehension of game design. Participants with a broader understanding of media, such as tabletop games, films and television, leveraged this knowledge into their design. For example, Participants A, B and C from Workshop 1 frequently included knowledge from favourite TV shows in their ideas.

The enthusiasm to leverage existing knowledge into their designs seemed to create varying levels of engagement during CYP’s participation. While some expressed enthusiasm about their favourite games *“And also how it would work would be a bit like Minecraft Dungeons (Mojang Studios, 2020), where you would have a certain space you could run around and defeat them”* there were others who struggled to redirect their focus towards the task at hand, often resulting in challenges to managing their behaviour *Note: a lot of screaming and shouting; Participant P3A “MINECRAFT. I love Minecraft. My favourite mob is the warden”*.

### 6.3.9 Game-making is Exciting which can Result in Behavioural Issues

Managing behaviour was a significant challenge to engaging CYP on key concepts. Mainly in workshop 3, there were frequent challenges to managing over-excitement *“Participants were very excitable, hard to manage so.”* and were not interested in the activities planned. As a result, participants were more interested in the recording technology than the activities offered. Similarly, workshop 4 at a school required the teacher to intervene when behaviour got out of control *“Without the teacher, there was a larger effort to manage behaviour”*. Across both workshops, young boys’ behaviour and loudness caused discomfort to female participants, knocking their confidence and hampering their participation. Despite the assistance of parents and teachers across these workshops, managing excitement and behaviour detrimental to others’ participation is challenging. Separating participants in workshop 3 from their parents resulted in a much slower workshop and more time required for a facilitator.

In an informal environment, workshop participants 1 and 2 demonstrated a deeper understanding of game design knowledge compared to the data capture via concept maps. Discussions arose around previous games they had played at school to help with mental health, where 2 participants in workshop 1 described a mental health game as *“it was a good game, but i didn’t think kids my age would use it, we don’t need that to get on with things”*. In workshop 2, where I asked direct questions relating to comprehension, CYP’s confidence wavered, resulting in brief answers. However, during a break after initial ideation, discussions continued from a ‘favourite game’ icebreaker (see 6.8). These informal discussions demonstrated that participants better understood game design and why they play games. The informal debate resulted in many components in the subsequent post-it activity to generate game design components.

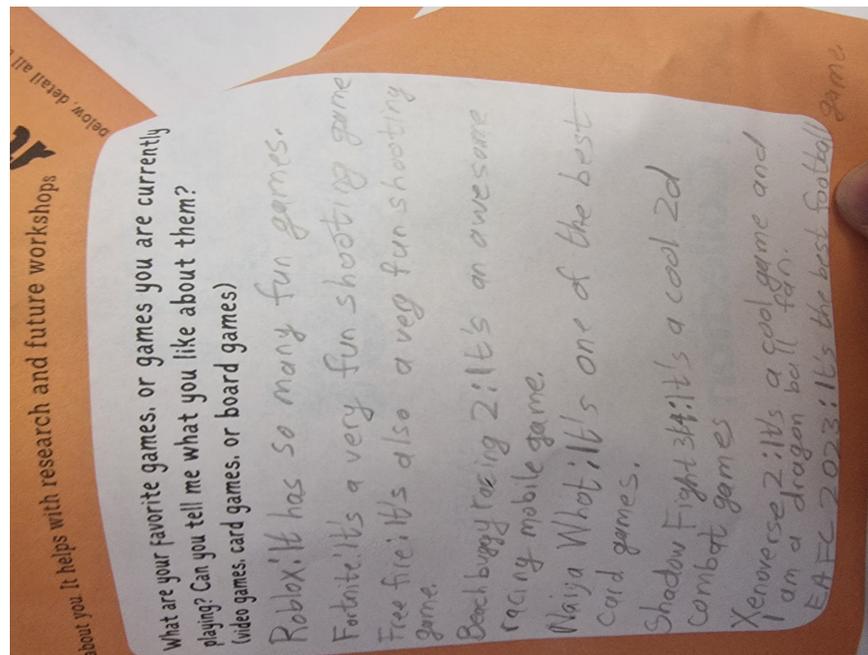


Figure 6.8: Favourite game icebreaker example

In workshops 2 and 3, there was a learning curve for each participant to befriend their assigned partner. In workshops 2, 3 and 4, there were examples of pairs not working well together, “... a couple pairs where one is doing more work and put down by their partner”, “one participant wasn’t interested in ideation activity” or “one giving harsh critique which ejected the other boy from engagement”. In workshops, steps had to be taken to demonstrate how helpful critique can be given without knocking confidence. In workshop 3, I had to separate CYP participants due to their negativity towards each other and partner them with their parents.

Overall, engaging CYP on key concepts is an uphill battle, with most participants not having a willingness to learn but instead relying on their comprehension. Nevertheless, this is an insight into what they already know and what misconceptions they may have. However, methods to engage CYP were met with challenges to managing behaviour. Potential solutions could be having an introductory session with parents or, in the case of workshops 2 and 4, having additional facilitators to help manage behaviour. With only one facilitator in workshop 3, it was hard to maintain focus and engage each participant.

### 6.3.10 Concept Comprehension and Design Output

The themes previously discussed in this Chapter suggest the games produced were dictated by the participants’ pre-existing comprehension of games and mental health, often influenced by the games they have played. In addition, with the majority of CYP reluctant to upskill or learn new concepts, they often relied on what they already knew.

Participants who possessed a deeper understanding of mental health were able to integrate applied themes into their mechanics more effectively. A prime example is “Mr Anxiety Solver,”

created by a participant literate in anxiety concepts, which featured mechanics specifically designed to address real-world struggles. Conversely, those with limited mental health literacy often “tacked on” anxiety elements as a superficial afterthought to standard gameplay.

While participants displayed high game literacy (familiarity with playing games), this did not equate to game design literacy (understanding how systems work). Consequently, many outputs were derivative “clones” or parodies of commercial titles participants consumed daily, such as *Minecraft*, *Call of Duty*, or *War Thunder*. Without the formal “grammar” of game design, participants struggled to deconstruct mechanics, leading to convoluted or unrealistic prototypes when they attempted to move beyond these familiar templates. This could be due to the complexity of designing applied games and, upon reflection, inappropriate comprehension tools. Workbooks, speakers, flashcards and discussions all struggled to bridge the understanding of the applied context (anxiety). On the other hand, this could also be a challenge of recruiting CYP for the design of games, where the more appealing and exciting element of games casts a shadow over the applied context.

Nevertheless, participants did still manage to produce an artefact to represent their game idea. Below is a short summary of the games produced by CYP across the workshops and more details can be found in Appendix I:

- **House Party:** A social deduction, House Party was a game about tackling social anxiety through exposure therapy-based steps. The goal was gradually working through more challenging social tasks through a social deduction game. Players would be tasked with learning a shared interest (generated on a card) from another player or non-playable character (NPC).
- **Airport game:** Designed on paper, a management game for running an airport. The goal was to manage the anxiety of passengers and flights throughout a busy airport. This was seen as a strategy game, but participants struggled to provide evidence that the game could support anxiety in young people their age.
- **SAM the Socially Anxious Ant:** A 2D platformer/metroidvania where the player learns social skills by interacting with different insects to help the protagonist return to their colony
- **Back To Earth:** A co-operative combat game focusing on achievement and overcoming loneliness, requiring players of different “classes” to work together to complete levels. The goal is to help with concentration. You’re playing with people that you don’t know and develop friendships. There is no communication to those people playing the game, you have to talk to people in the game using actions.
- **Factory Odyssey:** A game addressing sleep hygiene, featuring a day-night cycle where gameplay becomes harder and the screen dims if played late at night, encouraging the player to rest. Presented as a slide show, the game would become significantly harder if played late at night and easier during the day, promoting the player to sleep at night rather than gaming. The theory was that lack of sleep impacted general anxiety.
- **You Will Always Have Family:** A narrative-driven game about a necromancer dealing with grief and depression, using spells and family spirits to clear “cloudiness” in the character’s mind. Designed using a digital mind map.

- The Dome: A time-management prototype where the player must stop an impending disaster while managing a character's anxiety levels to prevent them from passing out. 2D side-on game. Presented in MS Paint.
- Alienship: Team-based game. Poster presentation on how players had individual abilities e.g. only one can see an alien, and have to help herd them back to ship. Collaborative team based game to address social anxiety.
- Mr Anxiety Solver: Powerpoint presentation of a narrative game with a map where you could visit characters and places in a fictional community (based on real world). With iterations and feedback, the game focused more on the dialogue and reward from helping people with anxiety problems.
- X's Castle: Named after the participant so anonymised title. Developed in *inklewriter* a short narrative adventure based heavily on *Minecraft* experiences. The game presented three paths to explore the castle, with a number of loose ends where they had not completed the story thread.
- Minecraft Clone: Clone of *Minecraft*, revolving around them playing as a 'mob' (enemy entity) within the game.
- War Thunder Clone: A massively multiplayer game based heavily on *War Thunder*.
- Craftmine: A parody of *Minecraft*, participants utilised AI image generation to imagine Minecraft with modern weapons and 'shooter' mechanics. No inclusion of mental health.
- Zombie Pulse: An initial idea behind working together to alleviate social anxiety through playing together and promoting cooperative rewards to help characters during a post-apocalyptic setting. However, despite co-design efforts from teaching assistants and designers, this idea did not develop further than a Call of Duty-style game set in local areas familiar to participants.
- Untitled: Parody of *Rainbow Six Siege* and incorporated elements of anxiety. The game involved rescuing people with severe mental health issues from a warzone. Efforts were made to discuss how the idea would impact players from warzones. The idea did not develop further from *Rainbow Six Siege* clone.
- Space Cats: 2D game where the player pilots a car around space, searching for lost cats and returning them to their anxious owners. Designed on large posters and levels conceptualised.

## 6.4 Trustworthiness and Reflexivity

To promote trustworthiness in data processing, I intentionally identified and examined negative cases, such as instances in the workshops that contradicted the sensitising constructs or prior research themes identified. For example, where onboarding had been recommended by facilitators in chapter 4, I identified instances across the workshops where onboarding was not necessarily engaging or absorbed by CYP, where introducing key concepts was a formality, given CYP relied on their knowledge and experience. These instances factored

prominently in the analysis, along with the combined data sources from recordings, memos and ethnographic field notes (Emerson et al., 2011).

To promote reflexivity, the themes produced were discussed with broader supervision to understand whether they communicated perspectives on factors to impact participation. For transparency, the sensitising constructs encompassed the factors previously identified in chapters 3 and 4, demonstrating the perspectives on successful participation before this research.

## 6.5 Discussion

This study aimed to understand what factors impact CYPs' 'successful' or 'good' participation during in-person group workshops to design applied games, as defined by the workshop facilitators. I produced nine themes that impacted participation and workshop facilitation from my analysis. The following sections discuss these themes across the wider literature and their implications for future research.

### 6.5.1 What Factors Influence Participation during Game Design?

The wider literature has discussed several factors that can influence CYP's participation during a co-design process, such as the level of involvement, the nature of collaboration, the support and resources available to CYP, and the methodological aspects of their involvement. However, other elements may be considered when co-designing games with young people.

#### 6.5.1.1 Level of Involvement

When it comes to the level of involvement, there has been a push to involve CYP more as design partners, where they are making more key decisions and spending more time engaged in the design process (Halldorsson et al., 2021b; Bevan Jones et al., 2022). In addition, Maheu-Cadotte et al. (2021) explored the differences between involving CYP at different levels of involvement, suggesting an optimal level of involvement is at an informant level where they are brought in at key stages for feedback and reflection. Whereas Schepers et al. (2018b) described fundamental changes to how we involve CYP, suggesting a *process designer* role focusing on children's interactions with each other, other stakeholders and objects as evidence for co-design. This study reported a similar effect to that reported by Maheu-Cadotte et al. (2021) across the workshops. Where I initially involved CYP as design partners, I gave them more time and space to design and create as previous literature had suggested CYP needed time to learn and explore. However, the results of the workshops indicated that more time and space often resulted in convoluted outputs (see 6.3.5 More Time and Space results in Convoluted Outputs). In addition, giving them the freedom to design removed a lot of constraints, which created a vast challenge to CYP, involving CYP as a design partner puts a lot of weight on their decision-making power.

As discussed in the results, the ideation phase of development requires CYP to make decisions.

Broader literature has discussed how CYP should be given more control over decision-making, even though some CYP may not be fully informed on the contexts involved (Ward et al., 2022; Bevan Jones et al., 2022). Regarding decision-making in the workshops, CYP showed a level of uncertainty. They were unsure of their ideas and often debated in their groups, lacking the confidence to present them to a broader range of participants. In addition, CYP relied on existing knowledge rather than upskilling or learning, meaning their decision-making was often made without confidence that they would achieve the goal. Furthermore, CYP's experience with design-based research and iterative processes was lacking, meaning they lacked the key skills and knowledge to decide whether their ideas addressed the core goal of the workshop.

### 6.5.1.2 Nature of Collaboration

A constraint of these workshops was that they only involved CYP in the ideation and prototyping phases of the development process. CYP were not engaged in wider stages, such as co-research or analysis, due to the constraints of research focused on participation. In other studies, CYP have been involved in wider steps of development, which could impact how invested CYP are and how much they understand their participation (Scheppers et al., 2018b; Iivari and Kinnula, 2016; Raman and French, 2021). Prior research has discussed how distinguishing the nature of collaboration can impact the level of engagement. In chapter 5, I discussed how participants were recruited and informed of their collaborative role in the design process and the research goals. Despite communicating the goals throughout the workshops, CYP often struggled to collaborate with facilitators, designers and other participants, refusing to iterate, refine ideas or “kill their darlings” (scrap an idea and start again), relating to how Group Dynamics can Impede Participation and CYP Rely on Existing Knowledge rather than Up-skilling or Learning themes. Collaborating and communicating with others involved has also been discussed in wider literature.

Common language, working with similar-aged peers and understanding anecdotes had been previously suggested to improve collaboration between CYP and other participant groups (Gulliksen et al., 2003; Eriksson et al., 2019). The workshops were constrained to involving age groups within a few years to avoid challenges in developmental age (Hourcade, 2015). Across the four workshops, there were a few examples of how collaboration and communication impacted participation, particularly the group dynamics. Where prior research had discussed how collaboration and communication impact cohesion, I found that CYP were greatly influenced by who they were directly working with. For example, I learned that CYP worked better in pairs than in groups of 3 or larger. However, though pairs were mainly successful, there were challenges to some pairs who did not get on. In these cases, pairs can disrupt and disengage participants, having a knock-on effect on confidence to design and participate. A big factor of handling group dynamics appears to be navigating power imbalances. Hourcade (2015) discusses how power imbalances in co-designing with CYP can arise through the setting or the activity involved. They discussed how schools often have a power imbalance from necessity, where teachers hold all the decision-making power and control. Whereas when it comes to activities, CYP can often suggest things adults want to hear (Bevan Jones et al., 2020).

Broader research suggests empowering children to tip the scales on power imbalances, but how

to effectively empower CYP is unclear (Metatla et al., 2020; Raitio et al., 2020; Malinverni et al., 2014). The workshops I conducted showed that power imbalances were better managed in pairs than larger groups (see section 6.3.7). Further, age differences automatically resulted in power imbalances, where older CYP would often dominate conversations or ignore younger participants. Participants with existing friendships had already developed a dynamic with their friends. Though the power was not likely balanced, pairings of friends were more likely to be receptive to ideas or encourage each other. Parents and teachers were invaluable in helping navigate the power imbalances at these stages. However, parents and teachers also presented a power imbalance where they suggested, or sometimes guided, participants towards a solution they had in mind. From the workshops, I don't believe there is a straightforward method to remove a power imbalance. Still, some efforts can be made to empower and encourage CYP by pairing them with collaborators who listen and offer a space to communicate.

### 6.5.1.3 Support and Resources

Prior research in co-designing games has discussed using supportive tools or onboarding to help participation (Vallentin-Holbech et al., 2020; Sutton et al., 2020). Vallentin-Holbech et al. (2020) demonstrated one example of onboarding where, before the first workshop, they revised the context of their research with the wider developmental group. The trade-off of onboarding is often requiring more time to introduce these concepts to CYP. Given the ethical and recruitment challenges around recruiting CYP, affording additional days to onboard can challenge facilitators or researchers. In my workshop, I tried to support CYP's onboarding by examining what they knew and gently introducing a few concepts. However, a key challenge here was the method of interaction. I presented onboarding materials in a paper-based format, which was not engaging to most workshop participants (see section 6.3.1). Furthermore, the additional challenge was that most CYP were not interested in upskilling or learning more.

A key takeaway for conducting co-design or participatory methods is the impact on learning during participation. Benton et al. (2012) discussed how participatory design offers an opportunity for CYP to develop new skills, whether social, mechanical or emotional. Other research has also attributed how participation can improve learning of related context (Bossen et al., 2016), improve awareness (Cosma et al., 2015) or develop key skills such as critical thinking (Rötkönen et al., 2021). However, over the workshops I conducted, maybe 2 or 3 participants out of 31 showed a genuine interest in learning or developing skills. Most CYP participants were content in relying on their existing knowledge. Participants were provided with learning materials to help support their participation, but these were often ignored in favour of relying on what they already knew. When it came to developing the iterative design skills, there was a reluctance to follow the guided steps, requiring a facilitator or designer to intervene and provide guidance. However, workshops 3 and 4 showed a genuine interest in learning how to use the browser-based engine Inkwriter to design a narrative game. This suggests a potential relationship between CYP's willingness to learn and their expectations of game design tools. CYP's participation was much more engaging when working with game development tools, and their interest to learn more about the game engines was more significant than that of the paper-based equivalents.

Challenging behaviour presented challenges to fairness and equity amongst participants, with challenging participants disrupting other participants. For example, a male participant in

workshop 3 shouted and screamed, resulting in the female participant dropping out. This presented an ethical challenge on handling behaviour, mainly when parents are present. In my case, I referred to the participant information sheet and asked parents to handle the behaviour, moving participants away. However, this doesn't remedy the fairness and participants' disengagement during their involvement.

#### 6.5.1.4 Methodological Aspects

In the systematic review (Chapter 3), a wide range of activities have been demonstrated and included during CYP participation. Providing opportunities and choices to CYP has been suggested to influence participation. Opportunities to participate give flexibility to engage how CYP want to (Khaled and Vasalou, 2014). Contrary to these findings, the results indicated that too much freedom and choice can overwhelm participants and leave them directionless. During the pilot (see Chapter 5), I presented 3-4 different activities on how they could develop their prototypes, which was often met with confusion or uncertainty with how to design. The same was seen with ideation phases, where giving workshop 1 the freedom to create solutions was 'hard'. Instead, when the workshops were more guided and had fewer choices, such as providing them the post-it activity, CYP was more active and understood what was required of them. Further, as iterations of the workshops progressed, more task-based activities were more receptive to completing the task set. On the other hand, when it came to prototyping, it was advantageous to demonstrate a few choices or options to how they could prototype their idea. By presenting multiple options, CYP could choose a method that suited their preferences or circumstances.

Perhaps the most significant contradiction to the literature was the change in interaction preferences. In Chapter 3, paper prototyping was the most frequent method of interaction. Paper prototyping has been attributed as a low-cost and rapid iteration tool to test products before implementation. In game development, designers and developers utilise paper prototyping to test ideas before costs, such as money and time, are used to develop an idea that may not achieve the set goals. Paper prototyping has been used widely in participatory design and developing game-based materials, where it helps establish a common understanding (Gonsalves et al., 2019), test the user interface and interactions (Martens et al., 2018), and test whether games are fun (Terlouw et al., 2021). Though studies often describe the benefits of paper prototyping from a development perspective, few studies evaluate whether paper prototyping is engaging or enjoyable for CYP participants. The workshop results suggested that paper prototyping was not pleasant for CYP. Among 10-13-year-old boys, there was a reluctance to complete paper-based tasks or paper prototyping. Older boys aged 16-17 and female participants aged 10-13 were much more involved in paper prototyping, potentially due to the more social aspect of paper prototyping. 10-13 boys were much more interested in prototyping their games on a laptop or computer, with more desiring to work in a game engine despite their lack of experience.

### 6.5.2 What Challenges are Specific to CYP when Participating in Game Design?

Chapter 3 of the systematic review identified five challenges to the involvement of CYP in the design of games: 1) comprehension, 2) cohesion, 3) confidence, 4) accessibility and 5) time constraints (Saiger et al., 2023). These findings were deduced from methodological limitations and discussions of the wider literature. In addition to these, CYP's challenges represent the intended playful interactions with digital technology via paper prototyping (Saiger et al., 2023). Games also present a multifaceted method of engagement with complex controls, complex reward systems and feedback loops (Tekinbas and Zimmerman, 2003). However, these challenges did not predominantly surface during CYP's participation in the workshops I conducted. Instead, challenges surfaced around preferred interactions with digital technologies, expectations of game development tools and behaviour management.

The process of involving children and young people in applied games design through in-person workshops poses three main challenges that are either unique or more pronounced in this age group, compared to adults: 1. disengaging from non-digital workshop materials and participatory activities; 2. confusion or non-comprehension of the nuanced difference between game playing and game design; 3. challenging behaviour triggered by excitement.

#### 6.5.2.1 Interaction Preference

The methodological aspects of what influenced participation touched on how paper-based activities (such as paper prototypes) were less preferred by the majority of CYP. Recent studies have demonstrated a shift from paper-based activities towards more game-based activities (Pollio et al., 2021; Thabrew et al., 2018b; De Jans et al., 2017). For example, Pollio et al. (2021) described how they utilised existing games (Plague Inc (Ndemic Creations, 2016)) to engage participants and then have them paper prototype based off the game they played. This helped ground participants in what was required and set a level of expectation. However, Pollio et al. (2021) do comment on the limitations of both time and experience (game design experience or game-playing experience). In a similar vein, Jones and colleagues used a mixture of board game prototyping developing into digital prototyping to test this location-based game (Jones et al., 2017). The latter digital prototyping tested functionality more than designing (Jones et al., 2017). Regarding the specifics of how CYP participates in designing games, there appears to be a shift in preference towards digital technology use. The use of paper materials and activities did not seem to excite or engage participants compared to when participants were offered the opportunity to utilize computers. Game-based activities did have more success, particularly the icebreakers, where CYP described their favourite games and deconstructed a game to understand how it's made. However, for the most part, CYP were more interested in using digital technology. Though computers or laptops made tasks take longer or presented frustrating obstacles (such as slow speeds or internet connectivity), these frustrations were minor. CYP seemed to put up with the frustrations as long as it meant interacting with digital technology.



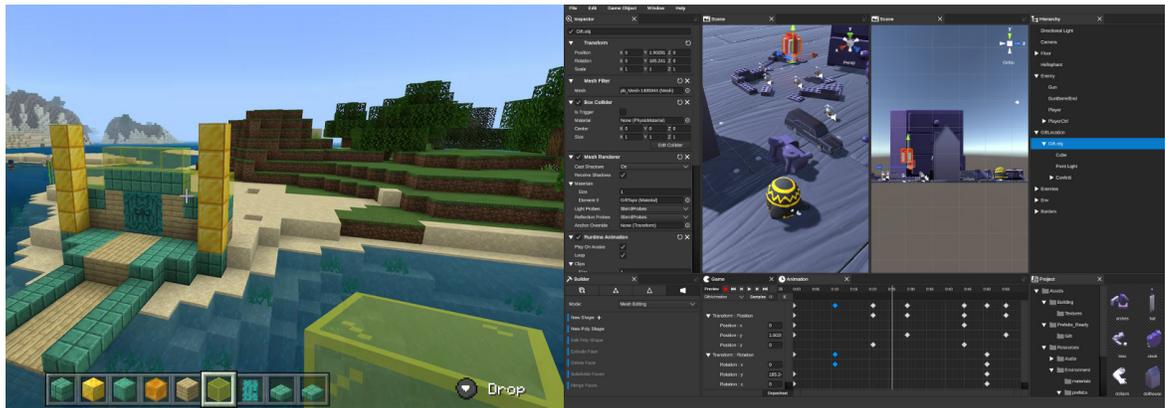


Figure 6.10: Left, Sandbox editor in Minecraft creative mode, Right, editor inside Unity, a desktop development engine

2014) and the idea that modern CYP are ‘digital natives’ (Prensky, 2001) and have grown up with technology most of their lives (Halldorsson et al., 2021b). However, there appears to be a fundamental misunderstanding between game playing and game design. As discussed in Chapter 4, Participant D suggested that CYP may not fully grasp how games are created. While many CYP interact with creative tools within games, such as level editors and mods <sup>2</sup>, these tools provide prebuilt mechanics that allow for rapid content creation. For example, Minecraft (Mojang Studios, 2009) enables players to design mini-games within its ecosystem (see 6.10), whereas commercial game development requires building systems from scratch in more complex engines like Unreal Engine (Epic, 2025), Unity (Technologies, 2025), or proprietary engines like RE Engine (Capcom, 2014).

These commercial game engines demand technical skills and require designers to construct movement systems, camera controls, UI, and interactions from the ground up. Unlike level editors providing built-in functionality, professional game development involves assembling core mechanics from fundamental components. I assume that CYP often overlooks this distinction, leading to misaligned expectations during participatory design workshops. Many thought that core game elements, such as movement, camera navigation, and menus, would be automatically available rather than requiring design and implementation.

This misunderstanding was particularly evident among boys aged 10-13, who expressed frustration during ideation and wanted to “just make something in engine” rather than conceptualising ideas beforehand. Their approach suggested an expectation of an open-ended sandbox experience where they could experiment with tools and create content spontaneously rather than engaging in structured design thinking. This was further demonstrated in Workshop 3, when Participant C prototyped in *Inklewriter*, a narrative-based engine. While this tool successfully maintained engagement, its limited functionality (e.g., text-based narratives, branching choices, and fixed images) led to frustration over the lack of additional mechanics.

These findings present a broader challenge in engaging CYP in game design: their high literacy in gameplay does not necessarily translate into an understanding of game development.

<sup>2</sup>Mods or modifications are changes to a game’s content, features, or assets often made by players or third-party developers

Participatory processes should account for these misconceptions by incorporating scaffolded activities that bridge the gap between game playing and game making. Future workshops that can afford multiple sessions or continued participation could introduce progressive exposure to design concepts before transitioning into game development tools. This ensures that CYP develops a more comprehensive understanding of the creative process rather than relying on assumptions shaped by gaming experiences and online content.

### 6.5.2.3 Managing Behaviour

Previous research has identified confidence management as a key challenge in engaging children and young people (CYP) in participatory processes. Studies have shown that CYP with low confidence often struggle to express their genuine thoughts, sometimes deferring to adult expectations rather than voicing their own ideas (Martens et al., 2018; Khaled and Vasalou, 2014). Additionally, more vocal or dominant CYP can overshadow quieter participants, leading to an imbalance in contributions (Khaled and Vasalou, 2014). While collaboration-related issues have been widely discussed in participatory design, the specific context of game design introduces unique behavioural challenges that have received limited attention in prior research.

A key distinction of game design participation is the inherent excitement and emotional engagement that games evoke in CYP. As discussed in Chapter 4, the intrinsic appeal of games can act as a powerful motivator, encouraging active and enthusiastic engagement. However, this high level of excitement can also lead to disruptive behaviours. During the workshops, there were instances where CYP struggled to stay on task, disregarded instructions, or exhibited difficulty in collaborating cohesively. Some CYP actively dismissed or disparaged their peers' ideas, discouraging meaningful participation. Given CYP's emotional investment in games, the challenge of regulating excitement and maintaining constructive interactions becomes particularly relevant when designing game-based interventions.

While HCI and participatory design have explored issues of facilitation and engagement, discussions around behavioural management in co-design settings remain scarce. In contrast, fields such as education have developed well-established strategies for managing CYP engagement, including methodologies that mitigate disruptive behaviours (Tomlinson and Allan, 2000). Techniques such as role-taking activities (Peng et al., 2010) have been employed to help structure participation and maintain focus in learning environments. These behavioural management strategies could be adapted to co-design settings to foster a more balanced, inclusive, and productive engagement process. Given the increasing integration of end-users in HCI and game design (Thabrew et al., 2018b), there is a pressing need for further discussion on effective facilitation strategies that account for the behavioural dynamics of CYP.

### 6.5.2.4 Reluctance to Learn

Where previous research had suggested giving CYP time and space to be creative (Benton and Johnson, 2014; Zahlsen et al., 2022), the results of the workshops stated the opposite. Regarding the design process or design-based research process, Khaled and Vasalou (2014) described how user participation has often taken constrained forms, where CYP give feedback

to designers. They discuss how serious game development processes require participants to be fluent in the serious context and the game design. This requirement creates a barrier to a more constrained design process, requiring upskilling and more time to inform CYP. A participatory design process will take much time to facilitate and make the development processes longer. However, from the results, it's evident most CYP aren't interested in upskilling and developing skills. Because of this, I suggest the need to constrain the design process for successful participation. Attempting to involve CYP in the ideation, prototyping, evaluation, and potential iteration steps may be counterproductive to their participation. The concept of iteration was a struggle to CYP aged 10-13, where they didn't want to scrap their ideas. Though there's merit in teaching them about the iterative design process from a problem-solving perspective, this could make for an unsatisfactory participation in both CYP enjoyment and output.

### **6.5.3 How can we Maximise Opportunities for “Successful” CYP Participation when Co-designing Games?**

In chapter 2, I discussed factors that potentially impact ‘successful’ participation. Opportunities for successful participation have been attributed to clear and accessible communication (Brown et al., 2014), creating an inclusive environment (Khaled et al., 2014), and addressing practical barriers (Whitaker, 2016). The workshops I conducted showed three positive opportunities for involving CYP: Enthusiasm to participate, tailoring outcomes to their expectations and Interest in Game Development.

#### **6.5.3.1 Enthusiasm to Participate**

Previously, the involvement of CYP in the design of games has been related to their literacy of games (Khaled and Vasalou, 2014; Prensky, 2001), ability to learn new skills or knowledge (Tavares et al., 2021) or raise their awareness through co-located studies (Lara et al., 2019). However, I think one of the most significant positives that is sometimes overlooked is CYP enthusiasm to participate. Of the participants that signed up and attended the workshops, there were perhaps 5 who did not seem to enjoy or engage, the majority from workshop 3 which was challenging to facilitate. Meanwhile, the other participants were enthusiastic to talk, share and attempt the tasks set for them. Putting the activities and phases of design aside, CYP seem to enjoy being involved in a collaborative design process. This could be related to the theories of play in children, where specific age groups, e.g. 10-13, still want to play with parents or adults (Lockman and Tamis-LeMonda, 2021). On the other hand, workshop 1 involved 3 participants aged 16-17 and they were equally enthusiastic to participate.

Benton et al. (2012) and colleagues discussed how an enthusiastic member of a co-design team can impact CYP participants' enthusiasm. Given that I was keen to collaborate with CYP, they may have reflected that back. In addition, the facilitators in workshops 2 and 4 were equally enthusiastic to see what CYP would develop through their involvement. However, the parents and facilitators in workshop 3 were much less eager to collaborate and help the young people, which may be attributed to some of the behavioural problems. When involving adult participants, there is the regular challenge of motivating adults to engage with the activities

or goals of the workshop (Zahlsen et al., 2022). Prior literature has described challenges to engaging with the subject matter and whether adults find the goal meaningful (Havukainen et al., 2020).

### 6.5.3.2 Tailor Outcomes to their Expectations

One of the main reasons for involving CYP in participatory methods is to understand user requirements (Soysa et al., 2018). Previously, research has discussed how designers assume what a target audience wants (Barcellini et al., 2015), often providing products that underwhelm or impact adherence to interventions. However, an argument for involving CYP in designing games and interventions is the improved understanding of user needs. Designers and researchers can better understand the specific needs and behaviours of young people (Thabrew et al., 2018b; Saiger, 2018). Specifically, young people often have different developmental preferences, and a solution for some 11-year-olds won't translate to another population. From the workshops conducted, there was a stark reminder of young people's expectations for games technology. Examining the games available to young people (e.g. 10-13), there are often simplistic game mechanics with little reward or motivation to play. Figure 6.11 gives an example of *SuperPets*, a game marketed towards young people, but lacks long-lasting entertainment as suggested by consumers.

Young people are playing more and more complex games. As evident from the initial icebreaker activity (see chapter 5), CYP are playing games such as *Call of Duty Warzone* (Ward, 2025), *Rainbow Six Siege* (Montreal, 2015), and *Rust* (Studios, 2013), to name a few. These games are not age-appropriate, presenting more mature themes such as violence. But in terms of interest, they provide complex systems and rewarding player journeys. Most of the games mentioned by young people involved some level of competition or a multiplayer aspect. Therefore, the workshops inform us that young people's expectations are changing. They want more mature themes and interesting mechanics. In addition, this extends to the narratives and stories they want to explore, where participant P2H produced a *Diablo 4* (Blizzard, 2024) genre game around coping with grief and depression, interweaving their own experience of loss of a family member (see figure 6.12). Consequently, an advantage to involving CYP in the design of games can tailor the outcome to the audience expectations, potentially delivering a game that is engaging and aesthetically targeted at what young people want and expect.

### 6.5.3.3 Interest in Game Development

In the previous section 6.5.2.2, I discussed the expectations of game development from CYP. CYP's preferences for how they want to interact and 'jump in' a game design engine can impact their participation. However, this could also be an opportunity to explore new methods of interaction and co-design. Though Game engines and programming tools (e.g. Scratch 6.13) are complex and potentially overwhelming to young people with little experience in games, there are alternative approaches to engaging young people. Li and Wang (2023) incorporated *Minecraft* (Mojang Studios, 2009) into their co-design activities with young people when teaching agriculture. They reported how game-based tools helped improve the learning experience. Similarly, Pollio et al. (2021) involved the use of existing games like

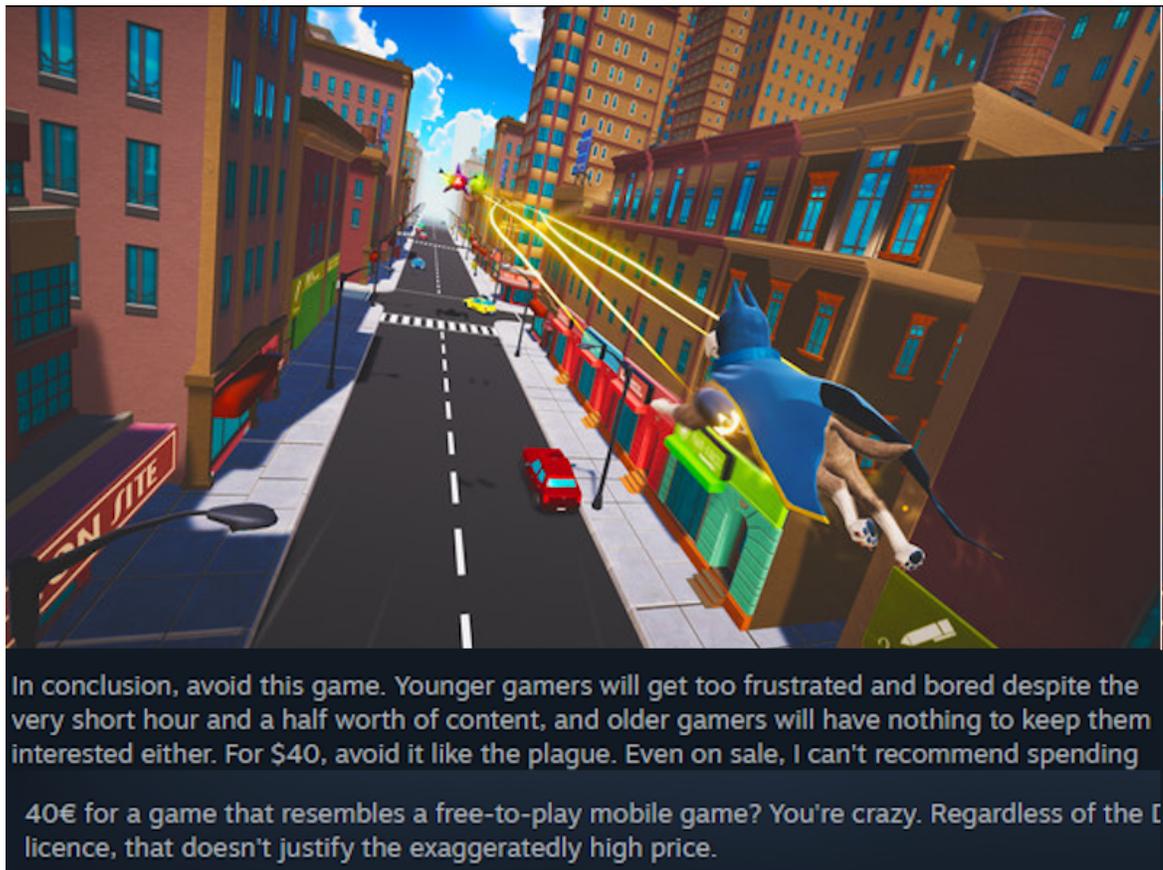


Figure 6.11: Superpets reception on Steam. Lacking in value and entertainment to young people

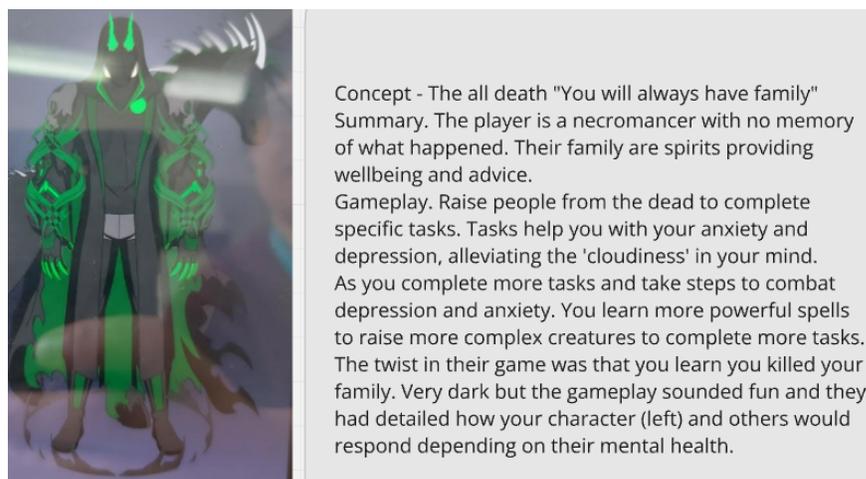


Figure 6.12: Reference Image to Participant P2H game around grief and depression. Evidencing a more mature theme expectation from games.

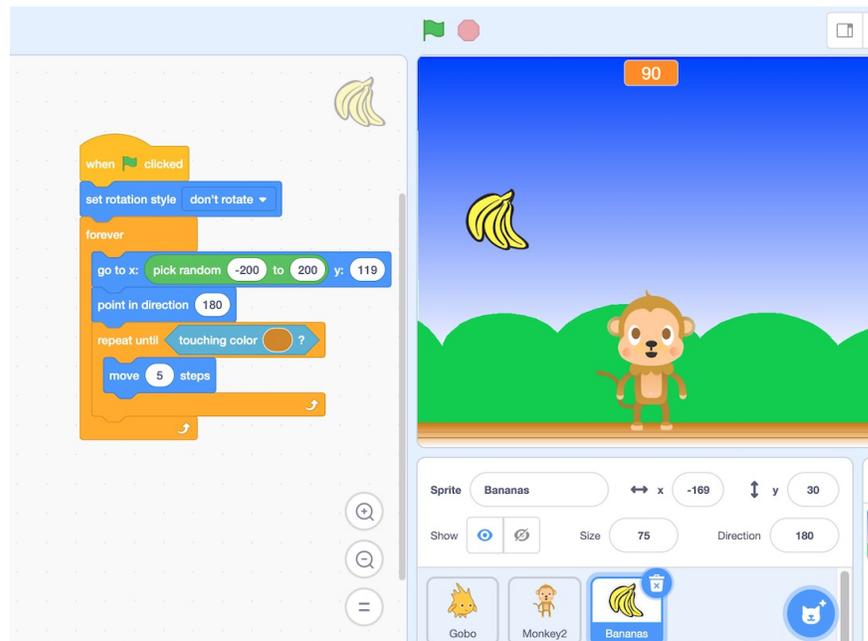


Figure 6.13: Scratch, a platform designed to support educating young learners in software development, such as game development

*Plague Inc* (Ndemic Creations, 2016) as previously discussed.

The suggestion of this research is to examine the game-based tools available. Though I previously discussed the use of simpler game engines (such as inkewriter Studios (2014)), there are potentially more playful sandbox tools in existing games which CYP may already be aware of and have experience in creating. Examples such as *Roblox* (Roblox Corporation, 2006), *Minecraft* (Mojang Studios, 2009), *Dreams* (Media Molecule, 2020), *LittleBigPlanet* (Media Molecule, 2012), *Super Mario Maker* (Shigeru Miyamoto, 1985), provide out-of-the-box level editors or tools to create your games. Though CYP struggled with ideation, these games with editors could be used to examine what game modes and interactions are interesting and fun to specific populations. In addition, they could provide researchers and designers with a low-cost prototype that could be playfully tested and iterated upon within a game, thus adhering to CYP expectations. Creating this space creates a middle ground where CYP can create a game (or content for a game) without being too overwhelmed by programming. And from a facilitation side, it lowers the cost to design and implement technical documents to upskill CYP, as discussed in Chapter 4.

#### 6.5.4 How can we Overcome Challenges during CYP Participation in Games Design?

Wider literature has previously suggested creating an inclusive environment, improving comprehension (Saiger et al., 2023), improving communication (Durrant et al., 2013), enhancing skills (Van Mechelen et al., 2019), offering diverse methods of participation (Ward et al., 2022), addressing power dynamics (Rötkönen et al., 2021) and providing follow-up feedback (Read et al., 2022b), to overcome the challenges of participation for CYP. As outlined in

the introduction, there are still contesting definitions for participation. For clarity, I believe there to be three main areas to define ‘successful’ participation: 1) CYP engagement, 2) output quality, and 3) ease of facilitation. Overcoming challenges to each of these impacts the successful participation of CYP.

#### 6.5.4.1 Challenges to CYP Engagement

Previous research has identified several barriers to engagement in participatory design with CYP, including the role they play in the process (Waddington et al., 2015), their confidence in expressing ideas (Khaled and Vasalou, 2014), and ethical considerations (Read et al., 2022a). This study further examined factors influencing participation, inferring that the method of interaction played a more significant role in engagement than previously assumed. In particular, different phases of development affected CYP engagement levels, with prototyping being more interactive and accessible than ideation.

While Hourcade (Hourcade, 2015) suggested that CYP’s user experience did not differ significantly between low- and high-fidelity prototypes, later research by Lee and Lau (2018) found contrasting results. They observed that engagement increased when game elements were integrated into participatory activities and that structured, task-driven prototyping was a more effective communication tool than offering CYP complete autonomy. Similarly, Bossavit and Parsons (2016a) found that various tools helped sustain engagement, reinforcing the idea that interaction design directly influences participation levels.

A persistent challenge, however, lies in how engagement is measured within design processes. Engagement was often difficult to assess throughout this study, even with multiple analytical methods such as ethnographic field notes and recordings. One reason for this difficulty is that engagement is a broad and multifaceted concept, which can refer to the enjoyment CYP experience, the level of attention they pay, or their adherence to tasks. Without a clear and standardized framework for evaluating engagement, it remains challenging to determine whether CYP are genuinely engaged or simply present in an activity.

Despite these challenges, this study provides insights into what factors supported or hindered engagement. For example:

- Short, structured tasks were more effective in maintaining CYP’s attention and adherence than open-ended activities.
- Technology and digital tools significantly increased engagement, as CYP were visibly more enthusiastic and focused when interacting with digital interfaces.
- Group dynamics played a crucial role in motivation, as participants were easily distracted or disengaged when working with disruptive peers—a challenge also noted by Ward et al. (2022).

A key challenge moving forward is developing reliable methods for evaluating engagement in CYP-led game design. While this study employed multiple analysis methods, it remains unclear which activities or phases of the design process were the most engaging overall. Future

research could explore standardized engagement metrics tailored to participatory design with CYP, potentially incorporating observational coding frameworks, self-reported engagement scales, and physiological measures (e.g., eye-tracking or heart rate monitoring) to assess attention and immersion objectively. Additionally, integrating more gamified and interactive elements into early design phases may further enhance participation, ensuring CYP remain actively involved throughout the design process rather than primarily during prototyping.

#### 6.5.4.2 Challenges to Output Quality

One of the main focuses of participatory methods involving CYP is to conceptualise a solution to a problem. Chapter 3 evidenced that most studies aimed to create or improve a game (Saiger et al., 2023). Bossen et al. (2016) described how evaluating participatory methods may involve the outputs in terms of how many people were engaged, how many solutions were conceptualised, and the output quality. Pollio et al. (2021) described how the games' output was challenged by how children wanted to participate. They attempted multiple methods to engage CYP and generated multiple 'dead ends' regarding solutions.

In the results of this study, there were a couple of instances where a 'dead end' was encountered in workshop 1, but with the younger participant groups, there was a reluctance to abandon their ideas. This was the first challenge to output quality, where CYP could not abandon potentially unsuitable ideas. Perhaps due to time constraints of the workshops, but when encouraged to reflect and iterate upon their ideas, CYP opted to add more to their designs. There were multiple instances where constructive advice or guidance was offered on their ideas. CYP added more content instead of conceptualising a new solution or removing content. This resulted in convoluted ideas that CYP could not describe and pitch to others.

Another challenge to output quality was the CYP literacy of games. Previously, studies described how CYP literacy of games was a strength of their involvement, being experts in the consumers of games. However, the games produced which best addressed the goal of games for anxiety disorders came from participants who had either 1) less experience of games or 2) more varied experience of games and other media. Two female participants in workshop 4 had little game experience but presented a novel concept. Similarly, participants P1A, P1B, and P1C all had varied experiences of games and other media to present novel ideas, which may also be due to their being older than the others sampled. However, participant P2G and P4D worked independently and demonstrated a wider range of game literacy than others in their workshop who had similar literacy and experiences of games. Most young boys aged 10-13 had similar experiences of games, resulting in outputs which emulated what they played.

#### 6.5.4.3 Providing Existing Concepts

Alongside a constrained design process, providing CYP with existing concepts or existing games can help maximise participation. CYP involved had not participated in design workshops, let alone around games for mental health. In other studies, researchers have either provided existing prototypes (Arnab et al., 2019; Cheng et al., 2018) or provided similar games to the product they are trying to achieve (Terlouw et al., 2021). These studies'

results suggest CYP find it easier to brainstorm solutions or iterate on an existing solution. The workshops I conducted showed that without some grounding on what was expected, participants would often emulate games they had played or seen played. As mentioned in the results, emulating some factors of games they have played isn't a bad outcome, as these are factors they find engaging.

However, when ideas are constrained to copies of games, there is little value in terms of successful outcomes. Existing games or prototypes used in previous research can anchor CYP ideas around what's shown (Bossavit and Parsons, 2016a; Terlouw et al., 2021) but also offload some of the critical game design thinking needed. In my workshops, I attempted to upskill CYP's knowledge of game design through presentations, handouts, and a small card game. Though the latter was best demonstrating a paper prototype and informing them of game design terminology, this was still a lot of information to process in a short time. When I provided existing prototypes in workshop 2 and subsequent workshops, there was an easier understanding of what to expect.

Proposing an existing prototype could be the necessary guidance to help CYP and constrain their thinking. Previous research has discussed using boundary objects to constrain design thinking (Khaled and Vasalou, 2014; Terlouw et al., 2021). Boundary objects have been described as low-fidelity prototypes, sketches or role-playing games; they are primarily used to help participants navigate a problem space (Terlouw et al., 2021; Khaled and Vasalou, 2014; Mohr et al., 2013). However, boundary objects can fail to provide enough guidance or scaffolding to help participants establish relevant ideas (Mohr et al., 2013; Khaled and Vasalou, 2014). This could be related to these activities being open-ended (Khaled and Vasalou, 2014), which could share similar challenges to the previous theme, where these activities primarily involve ideation, requiring problem-solving and open-ended thinking. Considering the challenges to expectations and ideation in my results, during the workshops, presenting examples created from previous workshops was beneficial in communicating the workshop's expected outcome and what was possible in the time frame.

#### 6.5.4.4 Concise Guidance and Objectives

A recurring theme across all workshops, and among some of the other themes reported in this chapter, is how *Strong guidance and constraints* impact the participation of CYP. Without guidance, the CYP in the workshops struggled to understand the disciplines involved and how to translate anxiety disorder objectives into game design thinking. Numerous times, CYP would require validation or support in their design thinking, often due to a lack of comprehension of a discipline. Asking CYP to consider anxiety disorder objectives and game design thinking presents a considerable challenge to their ideation process. However, presenting a more breadcrumb approach <sup>3</sup> as described by a participant in Chapter 4 is easier for CYP to digest without overwhelming them.

The results of the workshops suggest that CYP doesn't understand the game development process, which is much less a design-based research process. Unless the goal is to educate them on this process, successful participation in CYP enjoyment and research output should consider constraining the design process. The workshops involved an ideation, prototyping

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<sup>3</sup>Delivering information in small sections to help lead them towards the goal or objective

and presentation/discussion stage in a short 3-4 hour workshop. In this time, ideation was a struggle for participants across wider age groups (though this was with a small sample). Given that CYP would likely need training and upskilling to suggest novel, feasible ideas, a shorter, constrained design process could involve CYP more as an informant at key design stages. As outlined by Maheu-Cadotte et al. (2018), informant design seems more consistent in involving CYP despite the calls to involve CYP as design partners. In addition, a constrained design process can also facilitate more rapid iterations in terms of development. The cost of design-based research is the time required to recruit, educate, and run workshops with CYP. By constraining the design process and being involved at certain stages, CYP are not overwhelmed; they engage with the design process, and the output can likely be delivered quicker.

#### 6.5.4.5 Challenges to Ease of Facilitation

There was a noticeable difference between ideation and prototyping among the CYP sampled. Whereas, more often than not, researchers conducting co-design or participatory methods often utilise ideation activities more than prototyping (Bossavit and Parsons, 2016b; All et al., 2012). Ideation is predominantly used to *capture player experiences* or identify solutions (Grieb et al., 2018). Yet the results suggested CYP had an easier time completing prototyping than ideation. It could be that researchers have not explored or evaluated whether the participation of ideation is engaging or enjoyable to end-users. Where research has considered factors for successful ideation (Shah et al., 2003), the same considerations are potentially missing for CYP's preferences.

Ideation in wider literature has discussed the decision-making process, where CYP often needs to consider their values, how to implement an idea, and negotiate with other stakeholders (Bossavit and Parsons, 2016b). Bossavit and Parsons (2016b) discussed how in their study, CYP were less interested in participating in discussions and decision-making, questioning their role as co-designers. Similarly, the same occurred in my workshops, where the ideation often involved more guidance or 'hand-holding' towards a solution. Regarding prototyping, there was less pressure on CYP to make decisions; it was much more task-oriented.

CYP had a set time to work on their idea, giving them creative freedom with a fixed goal established in ideation. It was evident from the workshops that CYP found prototyping easier and, by comparison to ideation, much more enjoyable. There were fewer comments regarding the difficulty of the task. In workshops 1 and 2, existing examples were required to help direct CYP towards what was achievable in the time frame. This reflects the need for scaffolding and guidance (Ward et al., 2022). In addition, the prototyping phase is where CYP's ideas start to form, designing characters and artefacts on their concept, which creates a great deal of ownership (Lee et al., 2019).

As Lee et al. (2019) and colleagues have discussed, prototyping can create a great deal of participant ownership in young people. Further, they discuss how 'to-do' tasks are much more effective communication tools, completing assignments and asking what 'to-do' next (Lee et al., 2019). This was similarly observed across ideation and prototyping, where the latter involved more 'to-do' tasks, a more accessible task and creating ownership. There were instances during prototyping where CYP became distracted from the core goal or objective

of their solution, and as reported in the results, a preference for CYP of certain ages to focus on additional content instead of the core purpose. Similar observations were reported by Hawkins and colleagues, who noted that 42% of participants deviated from set activities.

Considering that the wider literature tends to involve CYP in phases of ideation compared to prototyping, the implications of this theme suggest the participation of CYP as informants compared to design partners. Despite calls for involving CYP as design partners throughout co-design and participatory processes (Halldorsson et al., 2021b), the findings are more aligned with involving CYP as informants at core phases of development (DeSmet et al., 2016; Maheu-Cadotte et al., 2021). DeSmet et al. (2016) colleagues reported how involving participants as informants was more beneficial than involving them as co-designers, as participants may be unable to consider the game characteristics translating into educational goals.

### 6.5.5 Implications for the Planning and Management of Co-Design with CYP

The results of these workshops have broader implications for specific stakeholders. Specifically, they affect game design, CYP involvement, and practitioners, whether designers or researchers.

#### 6.5.5.1 Use Appropriate Game-engines

The implications of these themes suggest that research needs to consider how CYP wants to interact and how to facilitate game engines that meet their expectations. One approach could be to utilise the existing level editors and available game engine tools. For example, Li et al. (2014) and Wang and Hannafin (2005) conducted a study with CYP aged 9-12 where they aimed to improve agricultural education via Minecraft (Mojang Studios, 2009). They facilitated co-design sessions, beginning with paper prototyping and implementing it into the game. However, using existing tools can present financial limitations on whether the games or software can be purchased, installed or quickly learned by CYP. In addition, utilising existing games can present limitations where CYP becomes distracted by irrelevant elements unrelated to the core task.

Another approach could be to use freely available game engines such as Unity (Technologies, 2025) and Godot (Juan Linietsky, 2007), but these engines are complex to learn and potentially beyond the scope of CYP learning ability within a workshop. Involving games engines such as these would require either a) an existing primed and trained group of CYP, or b) significant training over weeks of involvement (Ward et al., 2022), the latter of which could potentially lead to guiding participants to a desired outcome.

As mentioned by Ward et al. (2022), CYP would need scaffolding and support. In addition, these engines are technical and would often require specific expertise, which may not be accessible to each study. Though there are more child-friendly options to game engines, such as Scratch, these still require scaffolding, time to learn and time to create. With the results of this study and considerations of wider literature, future studies involving the co-design of games with CYP should consider moving towards including game elements in paper prototyping to help maintain engagement and evaluate the use of game-making tools.

Where CYP are becoming less interested in paper prototyping methods (see section 6.3.1), there should be a move towards simple game development tools to pique their interest without the need for programming expertise. Employing simple engines such as Inklewriter, Playingcards.io or existing game editors like Minecraft (Mojang Studios, 2009) could improve participation regarding CYP's engagement and enjoyment. These examples present lower barriers to entry for facilitators, academics and CYP, which may overcome more significant obstacles to learning game development technology. The involvement of game development technology may also impact what phase of co-design CYP should be involved in.

#### **6.5.5.2 CYP Don't like Paper Prototyping**

The use of paper prototyping among young boys aged 10-13 from a low socio-economic demographic isn't of interest to them. This is contrary to the observations in both the Chapters 2 and 3, where paper prototyping was one of the more prevalent activities, particularly in the latter. There will be a few exceptions where CYP prefer to draw or write, but for the majority, there is a desire to work with computers or interactive technology when designing games. This could be intrinsic to the design of games, but the wider literature has suggested paper prototyping as the most frequent method of interaction.

Facilitators in design and academia should consider employing more game-based tools to promote motivation and engagement from CYP. However, using technology like laptops and computers can present additional challenges. At a very high level, computers and laptops caused some disruption in the workshops, with distracting software, issues with functionality, and some frustration. In addition, unless software can be catered to in group work, laptops and computers can be pretty isolated. Using Google Docs allowed for collaborative working, but participants rarely discussed and shared with partners outside of that software.

#### **6.5.5.3 Task-Based Activities over Open-ended activities**

The themes identified in this chapter present new considerations for facilitators. Where previous researchers have suggested many 'sensitizing' events to build rapport or introduce CYP to concepts (Durl et al., 2017; Nouwen et al., 2016), this can be time-consuming and, to some extent, a form of priming participants (Bossavit and Parsons, 2016a). Training participants on completing the tasks could almost guide them on how the facilitators would complete it, therefore removing the nuanced thinking or ideas produced by CYP. Instead, the results suggest that facilitators should employ more task-based activities (e.g. Brainstorm 10 features in games) that align with what they would have already experienced in personal or academic settings. In addition, practitioners should steer towards prototyping or iterative development stages as these seem more manageable and interactive for CYP than ideation stages.

#### 6.5.5.4 Smaller Groups Improve Cohesion and Confidence

The results also indicated that facilitators need to consider the group dynamics and preferences of the CYP involved. This aligns with similar findings reported by Rötökönen et al. (2021), who had also suggested learning CYP preferences in advance and leaning on Teachers and Parents to help partner young people up. Group dynamics played a significant role in the successful participation in terms of adherence and engagement of CYP. Echoing the findings of Metatla et al. (2020) and Rötökönen et al. (2021), group dynamics can impact children’s motivations. I would, therefore, recommend smaller groups of pairs to manage power dynamics and balance tasks. Rötökönen et al. (2021) described how careful pairing selection is necessary, and I would agree with this observation, given how unbalanced pairings may result in participants disengaging or having behavioural challenges.

Further, practitioners must consider how much time they can afford for these workshops. As time is a finite resource in development and research, affording creative time and space, as previously reported, is not conducive to ideation or task completion. The results of these workshops suggest that too much time and space resulted in convoluted ideas and a degree of disengagement as CYP was given too much power to do what they wanted, which may not be related to their participation goal. I found that four hours was sufficient time to introduce a concept and goal while allowing plenty of time for **either** prototyping or ideation. Upon reflection, conducting both phases was ambitious given the iterative nature of design. Focusing on one phase would give more time for experimentation and lower the expectations of what CYP can achieve.

Chapter 5 surfaced the methodological challenges to measuring or eliciting CYP’s comprehension of design processes, game design and mental health. However, the analysis suggests CYP’s comprehension did not change throughout their involvement. Attempting to inform them of key information was met with disinterest. Despite wider literature arguing for upskilling (Bossavit and Parsons, 2016a), learning (Alves and Hostins, 2019a; Arnab et al., 2019) or training participants (Hourcade, 2015) to improve outcome quality, CYP’s participation may be impacted adversely.

Given that most CYP are in full-time education, most participants sampled in this study were disinterested in learning. Consequently, researchers and designers may have to consider how informed participants are. This raises this study’s methodological challenge in evaluating understanding and comprehension. Spending time with CYP and understanding their preferences and abilities is one approach that can also build rapport (McAra, 2017; Rötökönen et al., 2021), but this brings about additional facilitation time. In addition, CYP can be quite impatient, and spending time to learn their abilities and comprehension may be a one-sided deal. What is the benefit for CYP involved? (Read et al., 2013a).

The workshops I conducted brought up the factors that impact CYP’s participation and motivation. Participation appeared to be more easily facilitated under firm guidance and constraints. In addition, the interpersonal relationships between stakeholders and other CYP can impact CYP’s motivation. Where previous research had pushed for more creative time with CYP, I believe the results of this study indicate more constrained activities. As suggested by a participant in Chapter 4, a “bread-crumbs” approach to guiding participants may be needed when developing games. Given the topics involved, small achievable tasks

could prevent CYP from becoming overwhelmed and disengaging. However, practitioners should look to CYP experts, such as parents and teachers, when managing communication and collaboration.

Though participants may have pre-existing relationships, which helps speed up icebreakers and rapport sessions, there is a chance (as seen in workshops 1 & 2) that partners are imbalanced. CYP are still developing social skills, and in some cases, this can lead to negative feedback or unfairness regarding collaborative ideas. Researchers have described how stereotypical boys can be loud and assertive, causing other participants to remain quiet (Khaled and Vasalou, 2014). Therefore, practitioners should look to manage these situations throughout involvement, splitting groups or inserting themselves to manage collaboration.

### 6.5.5.5 Implications to Designing Games for Mental Health

A goal of the research was to produce rough prototypes of games to help address anxiety disorders in children and young people. As discussed in chapter 1, a growing number of children and young people have poor mental health, but many go without support and develop mental health problems. There have been games designed to support anxiety disorders and mental health in young people (Schoneveld et al., 2016). Still, there is a lack of representation in the broader consumption of games to suggest CYP use or seek out these interventions. Involving CYP in the design of games has been discussed as one method to generate novel approaches to addressing anxiety disorders (Hourcade, 2015). However, there is a significant lack of clarity in how CYP are involved in these co-design methods and what their participation involves (Saiger et al., 2023).

Journals and conferences do not facilitate space for transparency regarding methods and considerations regarding whether CYP was engaged or content with their participation. In this study, we asked CYP to consider games, anxiety disorders, and the phases of ideation and prototyping. After executing the workshops across the pilot and four workshops, there is the possibility that designing ‘novel’ or new ideas for games that address anxiety disorders is beyond the scope and capabilities of what can be achieved by co-design with CYP. The complexity of designing and developing a game requires a lot to be asked of CYP. Even if they are knowledgeable or experienced in writing code and making games, they are asked to creatively problem-solve and suggest a game idea related to anxiety disorders. Even with weeks of sensitising (Vallentin-Holbech et al., 2020) or in-depth onboarding (Barnes and Prescott, 2018), there is also the consideration of CYP not being receptive to learning. Alternatively, researchers and developers could consider involving CYP as informants on existing prototypes to guide upcoming design decisions while remaining grounded in users’ expectations and requirements.

## 6.6 Outcome

In seeking to address what factors influence participation, the results of this study presented contradictory findings to the broader literature. Where Bevan Jones et al. (2022) and colleagues called for more co-design involving CYP as design partners, my research findings

suggest that CYP participate better as informants in the context of in-person group workshops to design applied games, removing more complex problem solving, autonomy, and decision making results in better engagement and less confusion among participants. In addition, though broader literature (Khaled and Vasalou, 2014; Read et al., 2022a) has argued for affording creative time and space during CYP’s participation, the majority of CYP sampled required targets and constraints to focus and give them direction. Regarding the design of games, the results indicated specific challenges to CYP’s participation.

How CYP wants to interact is changing; their preference for paper-based activities is shifting, with the expectation of utilising digital technology and software. These expectations also relate to the aspect of game design. There has been a slow shift in HCI and CCI towards using game-based activities or game elements within participatory methods. With experience in games, CYP expects that designing games involves game design tools. However, it’s clear CYP do not understand the complexity of game design. This study recommends exploring simpler game engines with low barriers to entry as a method of engaging CYP and addressing these expectations. When engaging CYP during the design of games, managing their behaviour needs to be addressed by researchers and designers. Studies rarely discuss CYP behaviour during their participation, but it was evident from this study that the excitement of games can cause disruption. CYP can become overexcited and disruptive not only to their participation but also to others.

A key discussion point was maximising opportunities for “successful” CYP participation. The results of this study suggest three areas in which we can improve “successful” participation in improving CYP engagement and facilitation. A constrained design process was much more effective for engaging CYP and achieving an output product. In prior literature, studies had argued for more creative time and space and offered many dynamic methods for CYP to interact (Khaled and Vasalou, 2014; Brown et al., 2014). In contrast, the results suggested that a task-oriented approach with deadlines and constraint interaction methods was much more effective.

Initially, affording longer time and variable interaction methods gave CYP too much choice and eventually led to the creation of convoluted ideas. This relates to the other opportunity to maximise participation, providing existing concepts. Using existing concepts or prototypes will likely present anchoring issues, where participants create a concept similar to what they are shown. However, existing games or prototypes were highly effective for motivating CYP towards what they can achieve and much clearer than instructing them, echoing the theory of “show, don’t tell”. Finally, chapter 3 discussed 42 different activities used during the involvement of CYP for the design of applied games. The activities employed in this study were met with mixed feelings, but the iterative process of the workshops was able to move away from activities that were perceived as boring. Activities such as storyboarding and group discussions have been used in the past, but these activities weren’t enjoyable to the population sampled. As Terlouw et al. (2021) mentioned, game-based activities or activities with game elements are more engaging to CYP. Including the use of existing games or focusing activities around games can improve CYP motivation and engagement.

The last question of this study was how we overcame challenges during CYP participation in designing games. Given the multiple definitions of “successful” participation, I distilled the results into three challenges: CYPs engagement, output quality and the ease of facilitation. The main findings suggest engagement (encapsulating fun, adherence and attention) is

impacted by the length of time they have for tasks, the clarity of the goal, and their precise role in the design process. In addition, CYP's engagement is impacted by group dynamics and their expectations of a 'game design workshop'. A more widespread methodological challenge is examining and evaluating engagement during CYP participation, as there is a lack of specific methods to address this. With most studies aimed at producing a game or product (Saiger et al., 2023), challenges to output quality included CYP's ability to conceptualise a solution, iterate upon an idea and understand the disciplines involved.

During the workshops, CYP were disinterested in learning new skills or information, contrary to the findings in more exhaustive CYP studies (Hourcade, 2015; McCashin et al., 2019). In addition, all CYP involved had not participated in a design process before and were reluctant to abandon or iterate upon ideas. CYP were unaware of participatory methods and not fully informed on mental health or game design, so there was a significant knowledge gap in participating fully. These factors potentially impacted the outcome quality and may be why participants opted to emulate existing games they played. Finally, when CYP were involved in the design of games, there were challenges to facilitation, namely the stages of the design process, where CYP found prototyping to be an easier task than ideation.

### 6.6.1 Limitations

While this study provides valuable insights into the factors influencing CYP participation in game co-design, several limitations should be acknowledged. One key limitation is the specific methodological setting in which the research was conducted. The study was based on in-person group workshops, which inherently shaped the nature of participation. The findings may not fully generalise to other participatory settings, such as remote or hybrid workshops, which could introduce different engagement patterns due to variations in communication dynamics, access to technology, and facilitator support. Future research could explore how various methodological approaches, such as online participatory design or individual design exercises, affect CYP engagement, autonomy, and creative output.

The characteristics of the sampled population also shape the study's findings. The participants consisted of a specific age range, likely influencing the observed preferences for structured guidance, digital tools, and constrained design tasks. Different age groups or cultural contexts may yield different results. For example, older CYP with more experience in creative disciplines or game development may be better equipped to handle open-ended design tasks. At the same time, younger participants may require even more structure and support. Additionally, socioeconomic factors and prior exposure to technology could impact engagement levels, as CYP from more technologically literate backgrounds might have different expectations and capabilities when participating in game design.

Another limitation concerns the duration of the study. The workshops were conducted within a finite timeframe, meaning that participants had limited opportunities to iterate on their ideas or fully grasp the complexities of game design. A longer study with extended engagement, iterative feedback loops, and different involvement methods might reveal different outcomes. For instance, while the study found that CYP were initially disinterested in learning new skills or engaging in iteration, a longitudinal approach might show that attitudes shift over time as participants become more comfortable with the design process. Future research

should examine how longer-term involvement in participatory game design affects engagement, output quality, and learning outcomes.

Finally, these workshops highlight challenges in assessing engagement and participation success, as no standardised evaluation framework exists for CYP involvement in co-designing applied games. The reliance on workshop observations and participant feedback provides valuable qualitative insights. Still, alternative methodologies—such as eye-tracking, behavioural analytics, or in-depth longitudinal case studies could provide a more nuanced understanding of how CYP interact with different participatory design approaches. Future studies could also compare different facilitation techniques to determine which strategies most effectively mitigate behavioural challenges and enhance CYP’s contributions.

## 6.7 Summary

This chapter examines the factors influencing children and young people’s participation in game co-design, presenting findings that challenge several established perspectives in the literature. Existing research broadly advocates for open-ended, creative, and co-designed approaches that position CYP as design partners, emphasising autonomy, collaboration, and creative freedom. However, the findings from this study contradict these assumptions, suggesting that structured guidance, explicit constraints, and digital engagement are more effective in ensuring successful participation.

- **The Role of CYP as Design Partners** While prior research (Bevan Jones et al., 2022; Halldorsson et al., 2021a) recommends greater inclusion of CYP as design partners with decision-making authority, my findings indicate that CYP are more engaged when positioned as informants rather than partners. This study reveals that excessive autonomy in participatory design can overwhelm CYP, leading to hesitation, decision fatigue, and convoluted ideas. Instead, a more structured approach, where facilitators provide clear constraints and goals, fosters better engagement and more aligned outputs to research aims.
- **The Effectiveness of Open-Ended Creativity Literature on participatory design** (Khaled and Vasalou, 2014; Saiger et al., 2023) argues that affording CYP extended time and open-ended creative freedom enhances engagement and innovation. In contrast, this study finds that CYP require task-oriented approaches with deadlines and structured constraints to stay focused. When given too much freedom, participants often struggle with decision-making, leading to disengagement and reliance on familiar game concepts rather than generating novel ideas. Constraining the creative process and providing clear objectives enhances both engagement and the quality of outputs.
- **Collaboration and Power Dynamics** The literature surrounding group-based collaboration was inconsistent, with some advocating its benefits for participatory design, whereas others suggesting more individual processes. However, my findings indicate that group size and existing social dynamics significantly impact participant engagement. Larger groups often result in disengagement, with some CYP dominating discussions while others become passive. Power imbalances were also observed among CYP, particularly in mixed-age groups, where older participants often overshadowed younger ones. These

findings suggest that pairing CYP with receptive collaborators or working in smaller teams is more effective than larger, unstructured group interactions.

- **The Role of Digital vs. Paper-Based Activities** Previous studies describe the value of traditional paper-based prototyping in participatory design (Terlouw et al., 2021). However, CYP strongly preferred digital tools, reflecting broader digital literacy and expectations shifts. Despite occasional technical challenges, participants were more engaged using browser-based game engines or digital prototyping tools. This finding suggests that participatory design methods need to evolve to incorporate more digital tools, aligning with the expectations and experiences of CYP.
- **Behavioural Challenges in Game-Based Participation** While prior research acknowledges the benefits of game-based participatory activities, few studies discuss the behavioural challenges associated with them. This study identifies that CYP’s enthusiasm for games can lead to overexcitement and disruption, impacting individual engagement and group dynamics. Managing behaviour is a crucial yet often overlooked aspect of game design workshops, requiring structured facilitation and behaviour management strategies to ensure productive participation. I recommend that designers and researchers consider education research in adopting strategies such as differentiated learning and how to engage and motivate young people.
- **Reluctance to Learn New Skills** Contrary to studies suggesting that participatory design fosters skill development (Hourcade, 2015; Rötönen et al., 2021), my findings reveal that most CYP are not intrinsically motivated to acquire new skills during participatory workshops. Participants preferred immediate engagement over personal development and were often resistant to revising ideas. This reluctance suggests the need for participatory design methods that minimize learning fatigue and structure skill-building in an accessible, engaging manner.

Based on the findings of the workshop, I would recommend the following for engaging children and young people in the design of games:

- **Providing Structure and Constraints** – Setting clear expectations, structured tasks, and deadlines improves engagement and output quality.
- **Leveraging Digital Tools** – Digital prototyping methods align with CYP’s expectations and enhance participation, contrasting with traditional paper-based approaches.
- **Managing Expectations and Behaviour** – Facilitators must address misconceptions about game design, manage group dynamics, and mitigate disruptive behaviour to maintain productive workshops.

This study inadvertently challenged long-held assumptions in participatory game design. Instead of assuming that autonomy, open-ended collaboration, and paper prototyping naturally enhance engagement, I suggest that:

- Structured guidance is essential for ‘successful’ participation.
- Smaller, carefully curated teams are more effective than large, unstructured groups.

- Power imbalances exist within CYP groups and are often overlooked.
- Digital prototyping is more engaging than traditional paper-based methods.
- Behavioural challenges in participatory game design require additional emotional management.

## Chapter 7

# Discussion and Conclusion

### 7.1 Introduction

This thesis aimed to understand how we can design mental health games with and for young people. While the literature recommends user involvement methods, such as co-design, there was little prior evidence to support its effectiveness and best practices for co-design. This chapter distils the findings of this thesis in the following conclusions and contributions. Firstly, the research questions set out in Chapter 1 are addressed, followed by overarching contributions and then the research limitations are presented.

### 7.2 RQ1. How Have CYP been Involved in the Design of Applied Games?

Recent studies continue to suggest that poor reporting of CYP involvement in research is a persistent issue. For example, Preston et al. (2023) found that health research rarely documents the impact of involvement on the research process. This issue extends beyond CYP contexts; Benz et al. (2024) noted similar gaps in co-design reporting with older adults, particularly regarding the application of methods. While some efforts to reflect on involvement exist, such as Bromark et al. (2023), who explored tensions between participants, clear documentation of co-design processes remains limited. Prior literature suggested that children have been involved in one of four roles in technology design: users, testers, informants and design partners (Druin, 2002). Yet as described in Chapter 2, it was unclear what those roles entailed and how young people were involved. Furthermore, few studies have detailed what happened during ‘co-design’ with young people (Halldorsson et al., 2021b), whether involvement was meaningful (Romero et al., 2019), and whether they have the expertise to collaborate effectively (Balli, 2018). In addressing RQ1, the studies in this thesis aimed to fill these knowledge gaps.

Chapter 3 described the results of the systematic review into how children and young people were involved in the design of applied games. For the review, Druin (2002)’s involvement

roles were used to identify studies' involvement of CYP. The resulting 47 studies described CYP involvement as informants (35/47, 74%) with a growing involvement of CYP as design partners (34/47, 51%). However, upon reflection of the review, there were instances where it was unclear what the label of 'informant' entailed (Saiger et al., 2023). To examine CYP involvement more deeply, the interview study in Chapter 4 explored how practitioners and facilitators of co-design involved children and young people. The results suggested that researchers report little concern for the labelling role or involvement. Upon analysis, practitioners predominantly involved children and young people (CYP) in validating design decisions and testing materials. Practitioners involved CYP in roles more akin to users and testers. The findings of the interviews supported prior reviews of involvement (Maheu-Cadotte et al., 2018), suggesting a greater involvement of CYP as informants or tester roles compared to design partners. Only 2 or 3 of the interviewed participants suggested involving participants in an informant or a 'deeper' design partner role, often coinciding with long-term involvement in a project. Despite the call for 'deeper' involvement outlined in Chapter 2, the actual involvement of CYP appeared to be more practically based towards informant or tester functions.

The results of my first two studies presented two different mindsets *in literature* versus *in practice*. The review suggested a strong or even over-reliance on Druin (2002)'s model in the literature, with few studies detailing what involvement entailed and a lack of reflection on how to effectively engage participants. On the other hand, in practice, most co-design leads were more concerned with research outputs and focused on involvement in terms of young people having an 'enjoyable time'.

Chapter 2 and 3 unpack how and why 'deeper' participation has been considered to be *better* in the literature; it suggests that 'deeper' participation improved participant engagement (Malinverni et al., 2014; Hourcade, 2015), collaboration between stakeholders (Arnab et al., 2019), and novel outcomes (Vallentin-Holbech et al., 2020). Since expert interviews shed little additional light, the workshop studies described in Chapters 5 and 6 explored the potential benefits of 'deeper' participation via research-through-design. The workshops leaned into involving CYP 'deeply', namely as design partners in Druin's taxonomy.

It became more apparent with each iteration of the workshops that involving CYP as design partners is potentially unsuitable in designing applied games in a short workshop session. Where prior work suggested 'deeper' participation leading to improved engagement, better collaboration, and more novel outcomes, the workshops suggest the opposite: CYP felt ill-equipped for a design partner role. This could be possibly due to the dynamics they experience in places like school, where, as students, they have less agency and decision-making as a learner at school compared to a design partner. As I shifted participants' involvement more towards informants with each iteration, CYP became much more confident with the resultant pre-assigned specific tasks to complete. In contrast, agency on how to design a solution, given in early iterations, tended to overwhelm them. This was likely related to their lack of know-how of (applied) game design.

Overall, our findings challenge the default assumption of existing literature on participatory design that CYP should be engaged as 'full' design partners, or co-designers (Bevan Jones et al., 2022; Halldorsson et al., 2021b). They suggest that the roles of CYP should be limited to more pre-defined, short-term validation roles rather than the 'deeper' decision-making design partner roles. In responding to RQ1, there are challenges to the current expectations

vs realities of CYP participating in the design of applied games, what are we involving young people for, and how we can involve them from a methodological perspective.

### 7.2.1 Practical Realities of CYP Participation

This research found that, particularly in short, one-day workshops, structured participation through predefined tasks, such as giving feedback or customising existing elements, was more engaging, confidence-inducing, and productive for children and young people (CYP) than open-ended co-design activities requiring them to generate and justify design decisions. As demonstrated in Chapters 5 and 6, participants responded more positively to constrained, goal-oriented activities than roles that positioned them as full design partners. These findings echo earlier work questioning whether deeper participation always results in more meaningful or effective involvement (Cassidy et al., 2015; Anthony et al., 2012).

While the literature often advocates participatory design to empower CYP and improve outcomes, this study complicates that narrative. The systematic review and interview study (Chapters 3 and 4) showed that CYP were rarely given meaningful decision-making roles, and when they were involved, it was often without clear justification or follow-up on how their input influenced the final design. Rather than revealing PD as a robustly implemented practice, this supports critiques that PD with CYP is often treated as a procedural checkbox rather than a purposeful or thoughtfully integrated method (Read et al., 2013a; Hart et al., 2020).

Given the methodological constraints of co-designing with CYP, ensuring ‘successful’ participation and engagement can be challenging (Cassidy et al., 2015). The assumption that ‘deeper’ participation is inherently better may be situational; extended involvement may not always align with CYP’s abilities, interests, or the project’s needs. Instead of expecting CYP to immediately assume roles as design partners, a gradual approach—progressing from user to tester, informant, and eventually to co-designer—may be more appropriate if time allows. The studies in this thesis suggest that assigning CYP to highly involved roles without sufficient scaffolding can be overwhelming, particularly given their unfamiliarity with game design methodologies, specific key context (e.g. mental health), and co-design methodologies. This raises two critical considerations for future research: *what* are young people involved for, and *how* should their participation be structured to maximise both their engagement and the impact of their contributions?

#### 7.2.1.1 What are Young People Involved for?

Firstly, **what** are young people involved for? Is it to act as informants, providing feedback at key points in development, or as design partners, actively steering designs and contributing to key decisions? Chapter 2 described how the goal of applied games needs to engage users earlier on, but in considering CYP involvement, there need to be clear goals on *what* CYP are involved in. This can relate to the degree of agency (Cheng et al., 2018; McAra, 2017), decision-making power (Bossavit and Parsons, 2016b; Christie et al., 2019), and overall influence (Hourcade, 2015; Heard, 2023) afforded to CYP, which in turn shapes broader discussions on what constitutes meaningful participation (Raman and French, 2021; Schepers

et al., 2018a). Chapter 4’s findings indicate that professionals had a variety of motivations for involving CYP. Yet, there was often no clear articulation of why their involvement was essential to the research or design goals. This lack of clarity of purpose suggests that, rather than being embedded as equal partners, CYP are frequently included in more symbolic than substantive ways.

Moreover, Chapter 3’s analysis of project methodologies further demonstrates that the roles assigned to young people often fluctuate depending on external constraints, such as time, resources, and institutional priorities, rather than being dictated by what would maximize their contributions. While some studies in the review positioned CYP as testers or informants—providing insights into usability, engagement, or thematic appropriateness—others sought deeper involvement but struggled to implement co-design approaches effectively. Without a structured framework that defines their roles and establishes the expectations of participation, CYP’s contributions risk becoming performative rather than integral to the design process.

A key insight from Chapter 4 reinforces this issue by outlining that the practicalities of co-design research often shape the extent of CYP involvement. While models of co-design advocate for iterative, sustained collaboration, real-world constraints mean that CYP are frequently engaged in short-term consultations with limited follow-through on their input. This calls into question whether participation is truly about empowering young people or whether their involvement primarily serves as a means to validate adult-led decisions. Addressing this requires defining what CYP are involved for and ensuring that their roles are designed to genuinely leverage their perspectives while balancing feasibility within the development pipeline (Constantin et al., 2017). Thus, future research and practice must critically assess the intended purpose of CYP involvement, ensuring that their participation is well-structured, well-reported and meaningfully integrated into the co-design process to deliver on that purpose.

### 7.2.1.2 How do we Involve Young People?

What young people are involved in differs in **how** we involve CYP, which should be approached as a methodological question addressing **when** in the design process CYP are engaged, **how** their contributions are structured, and **what** strategies are used to maintain involvement. Often, reporting on CYP participation lacks clarity regarding the specific phases of development in which they contribute (Gerling et al., 2016; Durl et al., 2017; Grindell et al., 2022). Are they engaged in the early preconception stage to co-research and ideate, or are they primarily involved in later testing phases, providing feedback on nearly finalised designs?

A recurring tension in the literature is between flexibility and structure. While participatory design researchers acknowledge that there is no single ‘best fit’ approach for involving CYP due to the exploratory nature of co-design (Simonsen and Robertson, 2013), human-computer interaction (Adams et al., 2019; Fails et al., 2013) and child-computer interaction (Hourcade, 2015) researchers often emphasise structured activities and methodological considerations to facilitate participation. Chapters 3 and 4 mirror this tension: while some studies adopt structured frameworks for CYP involvement, others engage them in more ad hoc or undefined

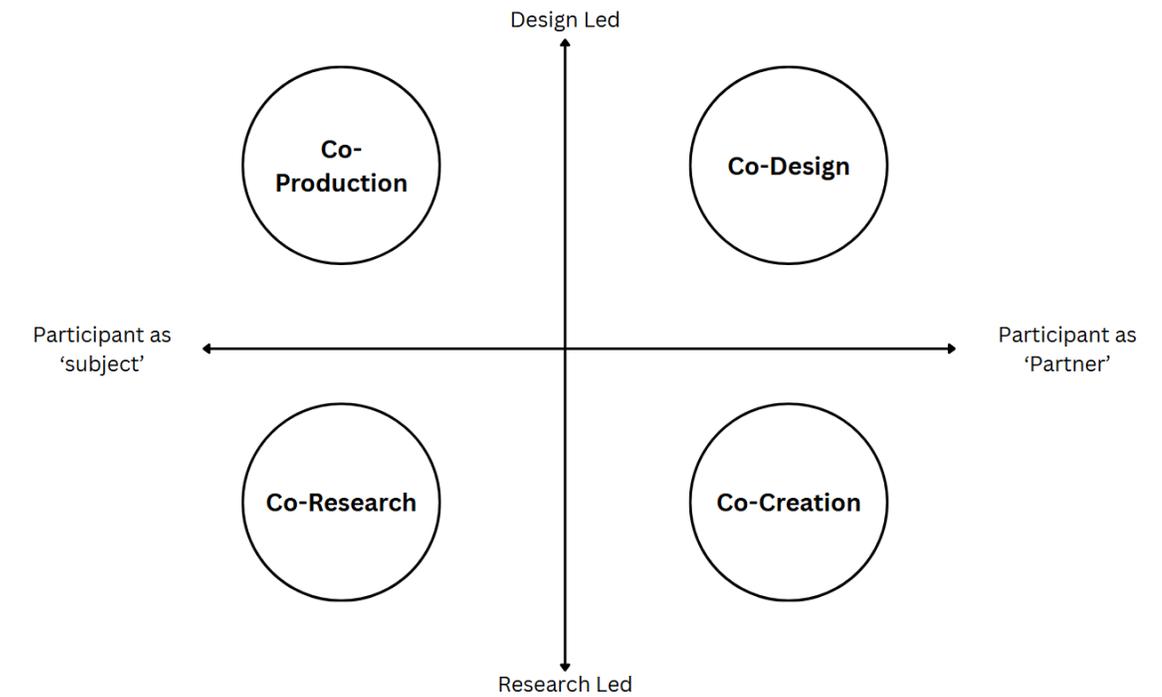


Figure 7.1: Suggested Taxonomy of Involvement

ways.

Chapter 3 suggested a potential taxonomy when referencing the ‘co-’ involvement method when considering applied game design with CYP. Figure 7.1 illustrates the taxonomy as a starting place for researchers and designers to consider how to involve young people in the process. Similar work has been discussed on moving towards a shared understanding by Vargas et al. (2022). This may address how to engage and report involvement without being so undefined.

The results of this thesis suggest striking a methodological middle ground that prioritises flexibility and transparency. No single method can universally address the multi-domain challenges of applied game co-design. However, greater clarity regarding how young people are involved, including their participation’s timing, structure, and duration, can help establish best practices that maximise their impact. This requires thoughtful planning regarding their roles and contributions in the design process. In particular, differentiating between short-term involvement (e.g., providing feedback in testing phases) and long-term, iterative engagement (e.g., participating in co-design workshops over multiple sessions) is essential for documenting how participation should be structured.

Additionally, the findings emphasise that engagement strategies should be adaptable to CYP’s evolving familiarity with design methodologies, rather than assuming young people can immediately function as design partners. As CYP gain applied game design expertise, they could gradually transition from users to testers, then informants, and eventually co-designers, again dependent on **what** they should be involved in. This can provide a more structured model for CYP’s meaningful participation in applied game design.

Addressing how we involve CYP requires transparent documentation of when and where CYP are involved, clear articulation of their roles, and strategies for supporting their sustained engagement. By carefully considering the methodological dimensions of participation, researchers and practitioners can better assess CYP's impact on the design of applied games and move beyond tokenistic forms of engagement toward more meaningful, well-integrated contributions.

## 7.2.2 Barriers to Effective CYP Involvement in Applied Games

While prior literature discussed broad challenges such as power imbalances and methodological inconsistencies in participatory design (Iversen and Brodersen, 2008; Sanders and Stappers, 2008), this thesis provides specific insights into the structural and logistical barriers affecting CYP participation in applied game design. These barriers include comprehension, power hierarchies, and time and resource constraints.

### 7.2.2.1 Comprehension

One of the initial outcomes and focuses of the thesis was the impact of CYP's comprehension on participant engagement and outcome quality. Despite barriers to measure comprehension effectively (a point for future research), it was still clear that CYP's comprehension of key domains involved, game design, mental health and design methodologies, did impact their engagement in some way. That said, our findings challenge assertions in prior work that CYP can naturally develop an understanding of design principles through participatory involvement (Hourcade, 2015): many CYP struggled with core design concepts and practices, particularly ideation, prototyping, or iterative refinement.

Chapters 5 and 6 identified that many CYP found it challenging to implement mental health contexts into game mechanics without structured support and guidance. Though this detracted from producing meaningful outcomes, it did not impact the enjoyment of collaborating and co-designing. These findings align with studies that indicate participatory approaches often require significant scaffolding to be effective, particularly when engaging children and young people with limited prior exposure to design methodologies (Fails et al., 2013; Fitton et al., 2016).

In addition, participants' learning fatigue was not widely discussed in prior literature, and it was evident in chapters 5 and 6 that the integration of an 'applied' context added another layer of complexity that many participants struggled with. Findings such as these would typically call for onboarding or gradual skills development, but the findings of this thesis suggest barriers to upskilling or learning (Petersen et al., 2017). However, I found that providing CYP with examples of what they could achieve, interactive digital activities, and more facilitator support can help mitigate these challenges and improve the quality of their contributions.

### 7.2.2.2 Power Hierarchies

Prior literature has identified power imbalances as a key challenge in user involvement (Iversen and Brodersen, 2008; Hourcade, 2015; Heard, 2023), mainly when CYP work alongside adult designers and researchers. This thesis extends this discussion by discussing power hierarchies within CYP groups themselves. In the workshops (Chapter 5), older or more confident participants frequently dominated discussions or design decisions, while younger or less experienced participants adopted passive roles, which was less engaging and de-motivating to those young people. Khaled and Vasalou (2014) discussed how designers and researchers should facilitate more open methods to allow more ‘passive’ roles to contribute. These findings mirror child-computer interaction research, which notes that group composition can influence participation dynamics (Fails, 2012; Raman and French, 2021). But, group composition was another factor that impacted engagement and power hierarchies, where groups of 3 or more led to participants feeling left out or excluded (see Chapter 5). Chapter 6 described how these power dynamics and hierarchies may impact contributions and engagement of CYP, suggesting how power hierarchies are always going to be present but facilitators, designers or researchers need to be more aware of group composition, leaning on experts, such as teachers, to advise on how best to manage CYP in the design of games.

### 7.2.2.3 Time and Resource Constraints

Another challenge identified in this research was the practical constraints of time and resources, which significantly impacted the depth and sustainability of CYP involvement. The broader literature often assumes that long-term engagement is desirable and feasible (Sanders and Stappers, 2008; Simonsen and Robertson, 2013). However, findings from this thesis challenge this assumption, revealing that in the context of applied game design, many CYP engagements are short-lived, occurring within one-off workshops or brief informant/consultation sessions. Chapters 4 and 6 summarised that while these short-term engagements can yield valuable insights, they can struggle to provide CYP with the opportunity to develop a deep understanding of the design process. This, paired with the potential barrier of learning new skills, can present an uphill battle for facilitators to conduct inclusive methods with CYP.

These time constraints are often exacerbated by logistical challenges such as school timetables, ethical requirements, and funding limitations, which make sustained engagement difficult to maintain (Cassidy et al., 2015; Coyle and Doherty, 2009; Hourcade, 2015). Unlike traditional participatory design projects, which may allow for extended collaboration over months or even years, applied game development cycles often necessitate rapid iteration, leaving limited room for long-term co-design partnerships with CYP. This raises questions about the feasibility of ‘deeper’ participation and the trade-offs between short-term involvement for quick feedback versus sustained engagement for meaningful design contributions.

## 7.2.3 How could we Improve CYP Participation in Applied Game Design?

The findings of this thesis suggest at least two considerations overlooked in prior research towards the design of applied games with young people, namely structured guidance and

embedded reflection.

### 7.2.3.1 Structure Guidance when Involving CYP

This thesis suggests that participatory approaches to applied game design should balance creative freedom with structured facilitation to ensure engagement and productive outcomes. In practice, this could involve scaffolded design activities where CYP are gradually introduced to complex decision-making rather than being expected to contribute meaningfully from the outset. The findings of this thesis also suggest that role-based design approaches, where CYP progressively move from testers to informants to co-designers, may be more effective than expecting full co-creation from the start. By structuring engagement in a way that aligns with CYP's developmental age and experience of design methods, participatory methods can ensure that young people remain engaged and can contribute rather than feeling overwhelmed or uncertain how to contribute.

### 7.2.3.2 Embedding Reflection

An issue identified in chapters 3 and 4 was the lack of structured reflection within design processes. While the literature has shown the importance of iterative feedback to enhance engagement and agency (Sanders and Stappers, 2008; Jiang et al., 2017), findings from the systematic review concluded that many studies involving CYP fail to incorporate meaningful reflection steps into the process. As a result, CYP can be left unsure of their impact towards a product or service, as outlined by Read and colleagues (Read et al., 2013a), and facilitators of design methods are assuming the involvement of CYP was necessary and beneficial to the goal of the study. This supports existing critiques that user involvement design methods risk becoming extractive rather than empowering without clear feedback structure, as outlined by Raman and French (2021). To address this, I suggest that participatory approaches to applied game design should incorporate structured reflection phases at key points in the design process. These could take the form of debriefing sessions or reporting back as reported by Read et al. (2022b), where CYP can see how their contributions have shaped the design, or interactive “show-and-tell” activities where facilitators present tangible examples of how CYP feedback has been implemented (Durl et al., 2017; Thabrew et al., 2018b). Embedding reflective cycles into participatory processes ensures that CYP feels valued and develops a sense of ownership over the game design process.

## 7.3 RQ2. What Factors Impact CYPs' Participation and Engagement in Applied Game Design?

Broader reviews of applied games for mental health discussed the acceptability, feasibility, factors and considerations which could impact participant engagement (Halldorsson et al., 2021b; Bevan Jones et al., 2022). Though Chapter 3 identified some speculative observations of what factors may affect the design process, these were rare among the large sample (47) of studies. Given the growing interest in applied games for mental health (Lau et al., 2017;

Griffiths et al., 2017; Johnson et al., 2016) and the related requirement of involving CYP in the design of health services/products (Maheu-Cadotte et al., 2018; Read et al., 2013a; Saiger et al., 2023), designers and researchers need to consider how CYPs involvement is best designed for. Therefore, the interviews and workshops sought to understand the prevalent factors that impact CYP’s participation.

### 7.3.1 CYP Preference Shift from Paper to Digital Interaction

Paper prototyping has been widely regarded as a standard method and activity for co-design and participatory methods. Paper prototyping offers creative freedom, is accessible (Gulliksen et al., 2003), and saves time/money (Hourcade, 2015; Martens et al., 2018). However, our findings suggest that paper prototyping is less engaging for CYP, challenging the prevalent use of this approach. Despite its purported benefits, CYP—notably boys aged 10-14—displayed notable resistance to paper-based tasks, requiring encouragement from facilitators to engage in activities such as sketching, completing paper booklets, or brainstorming on sticky notes. Instead, participants strongly preferred digital tools, favouring typing over writing and interactive design over ideation. In some cases, CYP became disengaged or reluctant to complete tasks that did not involve technology.

This shift of preferences aligns with broader trends in digital literacy and technology integration in educational and recreational settings (Adams et al., 2019). CYP are often positioned as “digital natives,” accustomed to using tablets, smartphones, and interactive learning platforms, having grown up with technology from an early age (Prensky, 2001; Janschitz and Penker, 2022; Halldorsson et al., 2021b). Research on digital engagement has demonstrated that young people develop digital fluency early and often perceive traditional methods—such as handwriting or manual drawing—as less efficient, less stimulating, and even frustrating compared to their digital counterparts (Hourcade, 2015). This preference for digital over paper-based interaction has also been noted in educational research, where studies indicate that students engage more actively with digital tools in classroom settings, benefiting from real-time feedback, gamification, and multimedia interactivity (Merchant et al., 2020).

While prior research has largely framed digital tools as supplementary to traditional participatory methods, the findings of this thesis suggest that digital tools may actually be more effective than paper-based methods in engaging CYP in the design process, at least for specific populations. This contradicts studies that argue for the continued use of paper-based methods as an ‘engaging’ method of interaction. For example, Malinverni et al. (2014) suggests that non-digital methods encourage deeper reflection and more unstructured creativity, allowing CYP to explore ideas without the constraints of predefined digital templates or software limitations. However, the findings from this thesis indicate that the very absence of structure in paper-based methods may hinder engagement among CYP, as many participants struggled to organise their thoughts or stay motivated when using paper-based materials. On the other hand, digital creativity can be very open-ended with games such as *Minecraft* (Mojang Studios, 2009) where there are few constraints placed upon the player and paper prototyping can be very structured, as demonstrated by Abbas and deMajo (2025) in their kit.

Furthermore, literature on participatory design with CYP often discusses that physical materials foster collaborative and social interaction (Bekker et al., 2010). Activities such

as sticky-note brainstorming, sketching, and storyboarding surfaced in Chapter 3, and are frequently recommended as effective co-design techniques due to their tactile nature, which can promote shared exploration and discussion (Fails et al., 2013; Jessen et al., 2018). However, the workshop findings suggested that CYP did not instinctively engage in these collaborative interactions when working with paper-based materials. In contrast, digital co-design activities facilitated greater interaction, as participants were more likely to contribute actively when using shared platforms such as Google Docs, online whiteboards, or digital prototyping tools. This suggests a need to rethink traditional participatory methods and explore whether collaborative digital tools can be a more natural and engaging medium for young people.

### 7.3.1.1 Drawbacks to Digital Tools

Despite the potential advantages of digital interaction, drawbacks must be acknowledged. One key concern is the risk of distraction, as digital tools, especially those with internet access, can lead to off-task behaviour. In some workshops, facilitators noted that participants occasionally deviated from the task, exploring unrelated websites or engaging in off-topic discussions using laptops. This aligns with existing research indicating that digital tools can enhance engagement but must be carefully structured to prevent overstimulation and distraction (Alves and Hostins, 2019b; Kang et al., 2021). Additionally, the reliance on digital tools may inadvertently exclude some participants with lower digital literacy or lack access to technology outside of structured settings. Moreover, laptops or tablets can be mainly used for individual interactions, resulting in less social cohesion, which may lead to a lack of discussion or debate in co-design sessions. While most CYP in the workshops strongly preferred digital methods, future research should consider inclusivity and ensure that digital approaches do not create barriers for those less comfortable with technology.

### 7.3.2 Group Dynamics of Co-designing with CYP

This thesis suggests that standard design processes involving critique or feedback ("crits") are often ill-suited for co-design with children and young people (CYP). While interaction can foster creativity and motivation, it also introduces risks when participants lack the tools to give constructive feedback. CYP are generally unfamiliar with structured critique practices. As observed in the workshops, feedback was often vague, overly critical, or dismissive, leading to digressions, conflict, or disengagement. Some participants dominated group discussions, while others, particularly those who were shy or less confident, were hesitant to share their ideas or had their contributions dismissed. This dynamic not only hampered individual engagement but also reduced the overall productivity and inclusivity of the design sessions. Although prior work has acknowledged the need for scaffolding in participatory design with CYP (Fails et al., 2013), few studies have critically examined how group-based critique practices may alienate or disempower young participants.

One strategy that emerged as effective in workshops was using smaller, more intentionally composed groups. By separating more boisterous participants from those who were quieter or less confident, facilitators were better able to create environments where all voices could be heard and valued. This approach allowed for more balanced participation and reduced the likelihood of disruptive dynamics derailing the session. Yet, despite the central role

of group dynamics in shaping participation, this issue is notably underexplored in existing literature on co-design with CYP. While collaboration is often assumed to be inherently beneficial, this research shows that collaborative activities can undermine the inclusiveness and effectiveness of co-design processes without careful attention to group composition and facilitation strategies.

The findings of this thesis contrast with existing participatory design literature, which often emphasises the benefits of group collaboration. Many studies argue that larger, diverse groups encourage creativity, shared knowledge, and co-construction of ideas (Romero et al., 2018; Barendregt et al., 2016a). For example, Khaled and Vasalou (2014) described offering a platform or space to each participant (they offered different ways to contribute via talking or drawing, etc.), but this involved larger groups of young people. Instead, separating young people can be more beneficial in allowing shy participants to voice their suggestions from a facilitation perspective. Participant engagement is more affordable when participant groups are smaller. Though the systematic review suggested groups of participants greater than 20 and large teams of stakeholders working together, ensuring everyone can cooperate and communicate cohesively (Saiger et al., 2023) is challenging. There has been little discussion on the ideal composition of co-designing games with young people; a consideration based on the findings of this thesis is to consider smaller groups of participants. This aligns with education and linguistics research that has suggested pair working to be more productive and less distracting compared to smaller groups (Tomlinson and Allan, 2000).

The findings of this thesis suggest that smaller groups—or even individual sessions—are often more effective than larger participatory design settings when working with CYP. While traditional participatory design literature has sometimes advocated for larger group collaboration (Sung and Hwang, 2013), CYP engagement in this thesis indicates that peer influence, social pressure, and facilitation challenges can hinder participation in large groups.

### 7.3.3 Expectations and Goal Management

An assumption in participatory design with children and young people is that openness, flexibility, and creative freedom lead to greater innovation, engagement, and learning opportunities (Kazdin and Rabbitt, 2013; Hart et al., 2020). Studies have suggested that minimising constraints allows young participants to explore ideas freely, fostering autonomy and intrinsic motivation (Fails et al., 2013; Hourcade, 2015). However, the findings from this thesis suggest that greater creative freedom and flexibility can hinder engagement rather than enhance it.

In the early workshops, unstructured tasks frequently resulted in convoluted ideas, over-complicated solutions, and difficulty maintaining focus (see Chapter 5). When given entirely open-ended briefs, many participants struggled to generate concrete concepts, with some CYP losing interest or becoming distracted. Meanwhile, imposing time constraints and structured guidance significantly improved participation. CYP were more engaged when working toward clearly defined goals, as these provided a sense of direction and progress.

One of the key methodological contributions of this thesis is the “breadcrumb approach” described by a participant in Chapter 4, where small, achievable goals were gradually introduced throughout the co-design process. This method provided incremental guidance,

allowing CYP to stay on track while maintaining creative agency. Rather than presenting an entirely open-ended task initially, facilitators introduced steps sequentially, giving CYP clear objectives while encouraging creative problem-solving. This approach resonates with differential learning theory in education, which argues that gradual support structures enhance engagement or that providing different levels of learning can enhance knowledge development (Anderson and Algozzine, 2007; Tomlinson and Allan, 2000). In contrast to fully unstructured co-design sessions, CYP may struggle with decision paralysis or uncertainty about expectations; a breadcrumb approach could ensure clarity without rigidity.

### 7.3.4 Familiarity with Process and Involvement

A factor influencing young people’s participation in co-design is their familiarity with the process and the tasks assigned. Unlike adult professional designers, who may be accustomed to abstract design thinking and iterative development, CYP often approach participatory activities with expectations shaped by their educational experiences. The findings of this thesis suggest that presenting overarching goals in the same way as one would to adults can be overwhelming for CYP. Instead, structuring tasks similarly to school-based activities, with clear steps and defined objectives, helps CYP feel more confident and engaged in the process.

Familiarity plays a significant role in expectations management, as young people are more likely to participate effectively when they understand the task assigned (Hourcade, 2015; Havukainen et al., 2020). Participatory design studies have noted that CYP are more confident contributors when the tasks align with their existing skills and experiences (Fails et al., 2013; Khaled and Vasalou, 2014). However, familiarity can also introduce confusion when CYP incorrectly assume they understand a concept, leading to misaligned expectations and suboptimal outputs. For example, in the workshops conducted for this thesis, CYP claimed to understand concept maps but instead produced mind maps—two related but distinct representations of information. Similarly, some participants misinterpreted the concept of social anxiety, equating it with general shyness. While these misunderstandings may seem minor, they directly impacted the quality of game design outputs, as participants’ interpretations shaped the mechanics and narratives they developed. This positions the need for precise scaffolding and clarification of key concepts to ensure that CYP’s contributions align with research goals and objectives.

Beyond expectation management, familiarity significantly influenced CYP’s confidence and level of engagement. CYP tended to hesitate, disengage, or be uncertain when presented with unfamiliar or abstract tasks. This was particularly evident in early workshop sessions, where CYP struggled with brainstorming broad design solutions. However, engagement levels increased noticeably when the task was framed around familiar activities. This finding contrasts with some co-design literature, which assumes that CYP thrive in open-ended, exploratory environments (Druin, 2002; Muller and Druin, 2002). While some research suggests that providing CYP with free creative space fosters innovation (Malinverni et al., 2014), this study found that many participants preferred structured, familiar tasks to engage meaningfully. This aligns with education and developmental psychology studies, which indicate that structured learning environments often lead to greater confidence and participation among CYP (Kangas, 2010; Loparev et al., 2017).

The participatory design literature suggested CYP have novel ideas which expand their creativity and problem-solving skills (Fails et al., 2013; Vallentin-Holbech et al., 2020). However, the findings of this thesis suggest that unfamiliarity with a task or process can act as a barrier to participation rather than a catalyst for innovation. For example, Druin (2002)'s cooperative inquiry model argues that CYP should be empowered as design partners by allowing them to explore and shape the design process freely. While this model has been influential in HCI and participatory design, the findings of this thesis suggest that CYP may struggle with full creative autonomy unless they have a foundational understanding of the task. In contrast to these prior assumptions, the research supports the idea that incremental familiarisation and scaffolding are essential for meaningful engagement in co-design.

### 7.3.5 Increasing Comprehension

Across all three studies, there was clear evidence that CYP's comprehension of game design and anxiety disorders significantly influenced the quality and depth of their contributions. Prior research has emphasised that more informed participants are better equipped to consider technical possibilities (Bossavit and Parsons, 2016b), express confidence in their contributions (Bossen et al., 2016), and understand the ethical implications of their participation (Read et al., 2013b; Hourcade, 2015). The findings from this thesis align with and extend these claims by demonstrating that CYP's understanding of game design principles and anxiety-related concepts directly affected their ability to produce meaningful and coherent game prototypes.

However, this study also reveals challenges in evaluating comprehension. Many participants overestimated their knowledge, particularly in game design, assuming that familiarity with playing games equated to understanding game development. This aligns with concerns raised in prior literature about the gap between game literacy and game creation (Khaled and Vasalou, 2014). Additionally, misunderstandings of anxiety-related concepts sometimes led to inaccurate or overly simplistic representations in game mechanics, proposing the need for more structured guidance during co-design activities.

Furthermore, while prior research has suggested that co-design itself can improve participant comprehension over time (Ward et al., 2022), the findings of this study challenge this assumption. CYP demonstrated limited conceptual development throughout the workshops, with learning fatigue, fluctuations in engagement, and misaligned expectations about game design processes serving as key barriers. This suggests that rather than assuming comprehension will emerge naturally through participation, co-design sessions may require explicit learning interventions, such as structured onboarding, scaffolding techniques, or embedded educational components.

Future research should investigate the effectiveness of various comprehension-building strategies in co-design settings, examining how structured educational components, facilitator involvement, and interactive learning methods can enhance CYPs' conceptual understanding and engagement. Additionally, measuring long-term comprehension retention post-workshop could offer further insights into how participatory design experiences shape young people's knowledge beyond the immediate session.

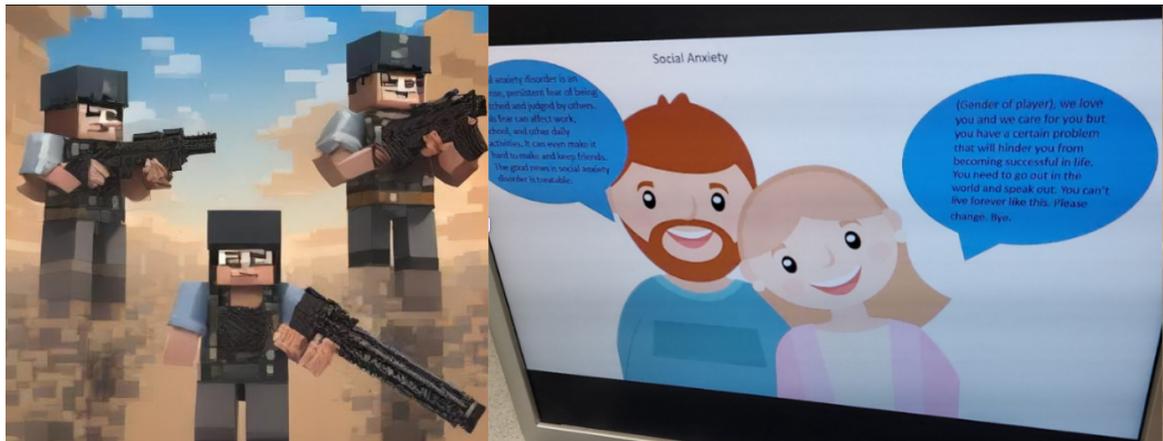


Figure 7.2: Left Image: CraftMine - a parody of *Minecraft*. Right Image: Mr Anxiety Solver - Participant literate in anxiety

### 7.3.5.1 Participants Informed about Mental Health Co-Designed *better* Applied Games

The study identified that participants with a deeper understanding of game design or mental health produced outcomes more aligned with the workshop’s objectives. These participants could integrate the mental health themes into their game designs more effectively, rather than simply replicating existing commercial games. In particular, those who were more knowledgeable about mental health but had limited experience in game design created more novel and purposeful game experiences that focused on the mental health goals rather than replicating familiar mechanics. This aligns with findings from Bossavit and Parsons (2016b), which suggested that participants who are more informed about a domain find it easier to consider technical possibilities and contribute meaningfully.

Figure 7.2 illustrates a comparison between two games designed in the workshops: CraftMine, a parody of *Minecraft* (Mojang Studios, 2009) developed by two participants with limited knowledge compared to *Mr. Anxiety Solver*, a game designed by a participant with a strong understanding of anxiety. *Mr. Anxiety Solver* demonstrates a greater focus on applied game design, incorporating mechanics that reflect real-world anxiety experiences. This suggests that comprehension of the subject matter—whether game design or mental health—significantly impacts the depth and quality of the co-designed games.

Conversely, participants who were highly familiar with gaming but had little understanding of mental health often engaged well during co-design but struggled to incorporate meaningful representations of anxiety into their designs. Previous literature has debated whether co-design can produce novel solutions. Still, this study challenges that notion by showing that CYP were often more inclined to emulate existing games rather than create original applied game experiences. This could indicate a lack of investment in the co-design goals or highlight the broader challenge of designing meaningful applied games, a difficulty even experienced game designers face. Applied games are often critiqued for the superficial application of the domain content, which was evident in some participant-created games (see Figure 7.3).

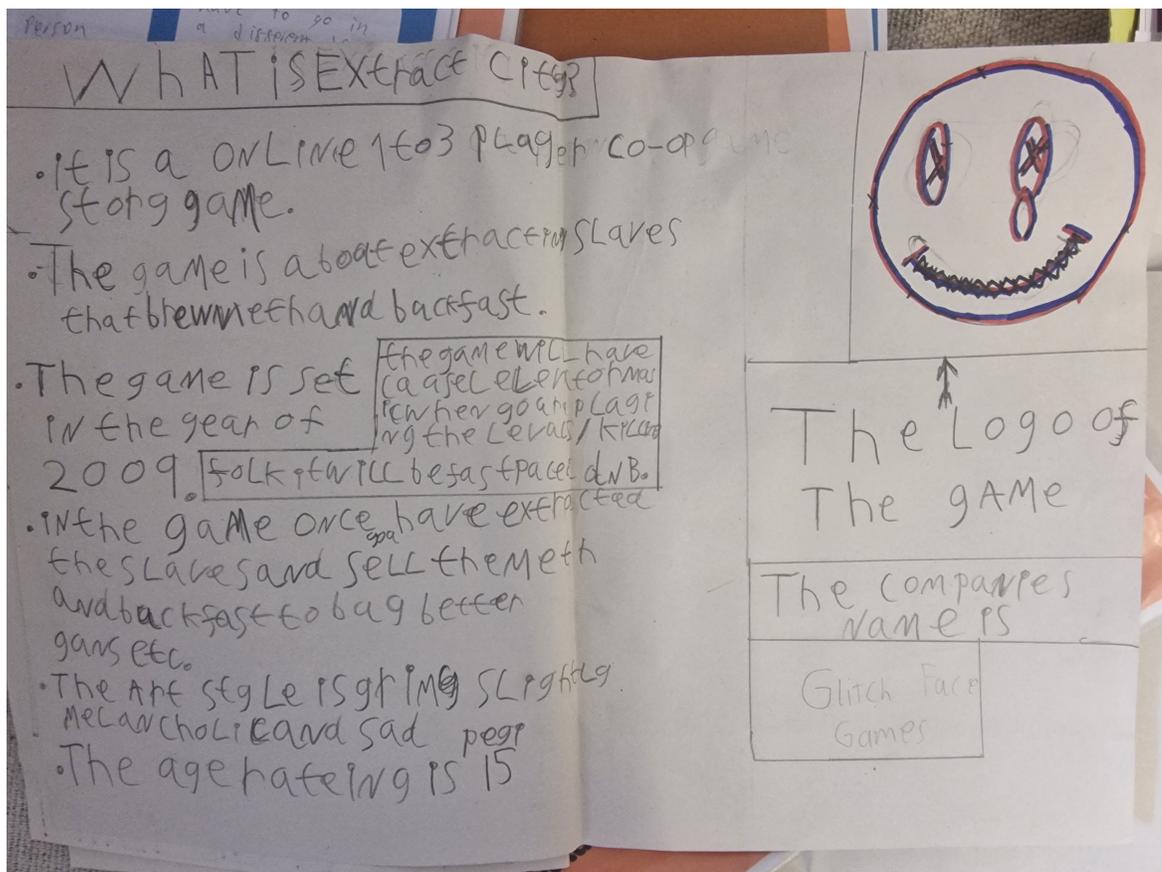


Figure 7.3: *Extract City* a prototype developed by two participants in Workshop 4

### 7.3.5.2 Game Literacy does not Equal Game Design Literacy

In Chapter 4, interviews with practitioners who had facilitated participatory methods with young people revealed a key issue: the grammar of game design is not widely understood by the general public, including children and young people. Unlike other media, such as film, where there is greater public awareness of production processes, game design remains an area where understanding is limited. This aligns with prior literature on game literacy, which suggests that while young people are proficient in playing games, they often lack an understanding of the underlying design principles, mechanics, and development constraints (Tekinbas and Zimmerman, 2003).

The workshops in chapters 5 and 6 further demonstrated this disconnect. While CYP displayed high literacy in game consumption, expressing preferences for game genres, mechanics, and themes, they struggled to deconstruct and articulate how these elements functioned within game design. This supports the previous research gap between playing and designing games, where players may develop an intuitive sense of mechanics but lack the formal vocabulary or analytical skills to break down the game's structure (Malinverni et al., 2014).

A significant challenge in educating and informing CYP about game design was the presence of preconceived assumptions. The perception that game development is quick and easy has been noted in broader discussions around game design literacy (Sicart, 2021). This misconception

may stem from the increasing availability of consumer-facing tools such as level editors, sandbox environments, and modding platforms. Tools like Minecraft's Redstone (Mojang Studios, 2009), Super Mario Maker (Shigeru Miyamoto, 1985), and Roblox Studio (Roblox Corporation, 2006) allow players to create and modify content within existing frameworks, which may reinforce the idea that game creation is a straightforward process. However, there is the argument that these tools may also reveal how hard it is to make new or novel games outside of these tools' restrictions. While these tools lower the barrier to entry and can be valuable for fostering an interest in design, they also provide a curated and constrained experience that does not reflect the complexity of full-scale game development.

This thesis challenges the notion that exposure to these design processes naturally leads to a deeper understanding of game design. Despite their experience with player-driven content creation, workshop participants struggled with core design concepts such as balancing mechanics, playtesting, and iteration. This suggests that while game literacy through play is valuable, it does not necessarily translate into design competency without explicit instruction and scaffolding. Prior research has indicated that structured educational interventions, such as guided design exercises or mentorship from experienced developers, are necessary to bridge this gap (Malinverni et al., 2017; Thabrew et al., 2017).

While prior studies have emphasised the benefits of co-design in fostering creativity and engagement (Druin, 2002), the workshops stress a critical limitation that without sufficient game design comprehension, CYP often replicated familiar game genres rather than innovating new mechanics or approaches. This suggests that co-design methodologies must account for domain-specific knowledge gaps and incorporate educational components that enhance participants' conceptual understanding.

### **7.3.5.3 Evaluating CYP's Comprehension of Game Design and Mental Health**

In terms of evaluation, Chapters 5 and 6 recognised the challenge of capturing comprehension in CYP. Comprehension was difficult to measure in the sampled population and the employed methods, as participants struggled to engage or weren't engaged. Concept maps initially presented a high-level insight into capturing and understanding knowledge, as formerly conducted by Besterfield-Sacre et al. (2004) with students. However, concept maps were unworkable with CYP aged 10-14, whether completed digitally or on paper. The task was neither engaging nor easy to understand, as CYP struggled to discern what was relevant and what wasn't.

Additionally, interviews and focus groups provided only some insight into what CYP comprehended. The most effective method to learn about game design comprehension was through informal discussions of what games they played and why. This was also much more comfortable and easier for participants to discuss than mental health literacy. When it came to evaluating mental health, there was surprisingly more understanding of mental health issues compared to game design. This could be attributed to the growing concern in schools or the prevalent discussions that occur on social media.

#### 7.3.5.4 Is Co-design Effective at Improving Comprehension?

Across our studies, we found that co-design methods were not particularly effective at improving comprehension. Chapter 5 outlined how four different approaches—flashcards, presentations, facilitator involvement, and self-guided learning—were used to inform participants about mental health concepts. However, all methods faced similar challenges of disengagement and limited adherence. This contrasts with prior literature, which has often positioned co-design as an engaging and effective means of fostering learning through active participation (Druin, 2002; Read et al., 2013b). While participatory design has been shown to empower young people and provide opportunities for creative exploration (Fitton et al., 2016), the findings from this research suggest that engagement in co-design, particularly in the context of applied game design, does not necessarily equate to deeper conceptual understanding, particularly when multiple new learning demands are placed on participants.

CYP engagement was noticeably higher when interactive elements such as laptops and games were incorporated into the exercises. Providing CYP with digital tools to explore existing games and solutions during ideation did lead to new ideas and a more direct application of concepts related to social anxiety, despite also introducing potential distractions. This aligns with research suggesting that digital mediums can enhance learning engagement (Hourcade, 2015; Fitton et al., 2016). However, the effectiveness of these approaches in fostering sustained comprehension remains questionable. While participants demonstrated enthusiasm for making a playable game, their expectations were often misaligned with the realities of game development as noted above, this could also be a misunderstanding of developers not realising how complex design processes are to young audiences.

One key issue observed in these studies was learning fatigue. Participants had to engage with multiple demands, learning game design principles, understanding mental health concepts, and adapting to a new collaborative environment, all within a limited timeframe. An external factor that may have contributed to these findings is the novelty of the co-design experience itself. Nearly all participants had never participated in a co-design workshop, let alone one focused on applied game design and mental health. The unfamiliarity with the process may have overshadowed potential outcomes, as participants were focused on navigating the new experience rather than deeply engaging with the specific mental health content. This suggests a need for further research into how prior exposure to participatory design affects learning outcomes.

Prior literature and expert interviews in Chapter 4 suggest that onboarding, sensitising stages, or introductory sessions can help prime participants for co-design activities by providing foundational knowledge before engagement (Dindler et al., 2005; Fitton et al., 2016). However, this approach raised concerns about whether such preparatory steps merely train participants to provide expected responses rather than fostering genuine understanding (Muller and Druin, 2002). The findings from this thesis indicate that there may be some resistance among CYP (aged 10-14) to engaging with new knowledge in a structured manner, mainly when topics are abstract or require sustained effort to grasp.

Notably, this research did not identify prior studies that specifically measured and evaluated CYP's comprehension of game design or related domains and its impact on co-designed outcomes. While earlier research has suggested that informed participants can contribute

more meaningfully to design processes (Bossavit and Parsons, 2016b; Bossen et al., 2016; Hourcade, 2015), the extent to which comprehension directly influences the quality of co-designed outputs remains underexplored. Future studies should consider developing more robust methods for assessing comprehension and its impact on the effectiveness of co-design.

## 7.4 RQ3. What Constitutes ‘Successful’ Participation in Designing Applied Games?

Prior literature has mixed discussions on what entails ‘good’, ‘successful’, ‘meaningful’ or ‘genuine’ participation. ‘Good’ participation of children and young people has described how co-design processes consider trusting relationships (Alves and Hostins, 2019a) between stakeholders and young people, sense of empowerment or feelings of competence (Bossavit and Parsons, 2016a; Durl et al., 2017; Kostenius et al., 2018), overcoming challenges (Kostenius et al., 2018), or establishing an equal power structure for participants to collaborate (De Jans et al., 2017). In addition, Benton and colleagues described that ‘successful’ participation relies upon children feeling involved and comfortable contributing, with the measure of success attributed to the highest level of involvement children can be offered (Benton et al., 2012).

There is also an uncertainty about the relationship between stakeholders and young people. Including facilitators and designers facilitated CYP’s easier involvement in the workshops. Empowerment and competence were briefly discussed in chapter 6, suggesting that methods on ‘how’ to empower CYP are unclear. However, power structures were visible between participants and stakeholders, such as teachers. The conclusions of this thesis suggest that achieving an equal power structure is not feasible with the involvement of CYP. Still, there are exercises to reduce power imbalances and offer time and space for CYP to contribute. Building upon Benton et al. (2012) and colleagues’ definition, a measure of success could be children feeling involved and comfortable, but with the caveat that the highest level of involvement should not be the measure of success. Finally, there was the recurring mention of how ‘deeper’ participation is better (Vallentin-Holbech et al., 2020), where the more involved CYP are, the more successful involvement is.

As suggested in Chapter 6, children’s roles in co-design need to be reconsidered, especially when multiple disciplines and contexts (e.g., game design, mental health, and collaboration) are involved. Asking young participants to engage deeply across these domains can be overwhelming, particularly if they are not intrinsically motivated to learn. Instead of assuming that deeper involvement is always preferable, I recommend that researchers and designers focus on three key aspects:

- CYP enjoyment and engagement from a user experience perspective – Prior studies have described how participation is most meaningful when young people enjoy the process and feel intrinsically motivated (Fitton et al., 2016; Foss et al., 2013). A successful co-design experience should ensure that CYP find the activities engaging, playful, and aligned with their interests.
- Understanding of contribution and its impact – Research has emphasised that young participants should understand how their input is used and valued (Read et al., 2013b).

Clear feedback loops and transparency about how their contributions influence the final design can enhance their sense of agency and participation.

- Reflection on why CYP participation matters – Participation should not be treated as an end but as a meaningful process where CYP understand their role and impact within the project (Fitton et al., 2016). Future co-design studies should capture whether participants felt their involvement was valued and whether it influenced the outcomes in a way that aligns with their expectations.

### 7.4.1 What should Constitute ‘Successful’ Participation?

Though this thesis did not originally set out to define good participation within co-designing with young people, some components can contribute to the discussion of participation. Given the involvement of children and young people within the workshops, there are key components to what *success* can mean. These are summarised in the following three headings: CYP involvement, quality of outcome, and facilitating co-design.

#### 7.4.1.1 Involvement of CYP

A key finding from this research challenges the concept that ‘deeper’ participation is inherently more beneficial, as discussed in chapter 2. Prior literature has often emphasised maximising youth engagement through active participation, co-creation, and shared decision-making (Druin, 2002; Fitton et al., 2016). However, the interviews and workshops conducted in this thesis suggest that CYP’s roles as validators, testers, and informants may be more appropriate, particularly in short-term participation contexts.

Reflecting back on the hierarchy suggested in Chapter 2 and referenced here as Figure 7.4, we can consider that ‘deeper’ participation is what I have positioned as involvement. With prior literature focusing on the involvement of CYP as a factor for success, it has paid little attention to the interaction and action that occur during the process of that involvement. As I discuss below, the duration of involvement can influence the impact of participation and therefore the experience.

The duration of involvement is an essential factor in determining the depth of participation. The interviewees in this study, who had experience facilitating participatory design with young people, often described short-term engagements (ranging from a few hours to a couple of days), similar to the duration of the workshops in this thesis. Under these constraints, expecting CYP to assume equal co-designer roles and contribute profoundly to all aspects of game development may be unrealistic. Instead, their role as validators and informants aligns with existing research on participatory design stages, where different levels of engagement are appropriate for different design phases (Hourcade, 2015; Bossen et al., 2016).

This finding suggests a significant limitation in the study: the lack of comparative analysis on how participation changes with longer-term involvement. While deeper participation may be more beneficial when CYP have extended time to develop their skills and understanding, further research is needed to assess how the depth of engagement impacts learning outcomes,

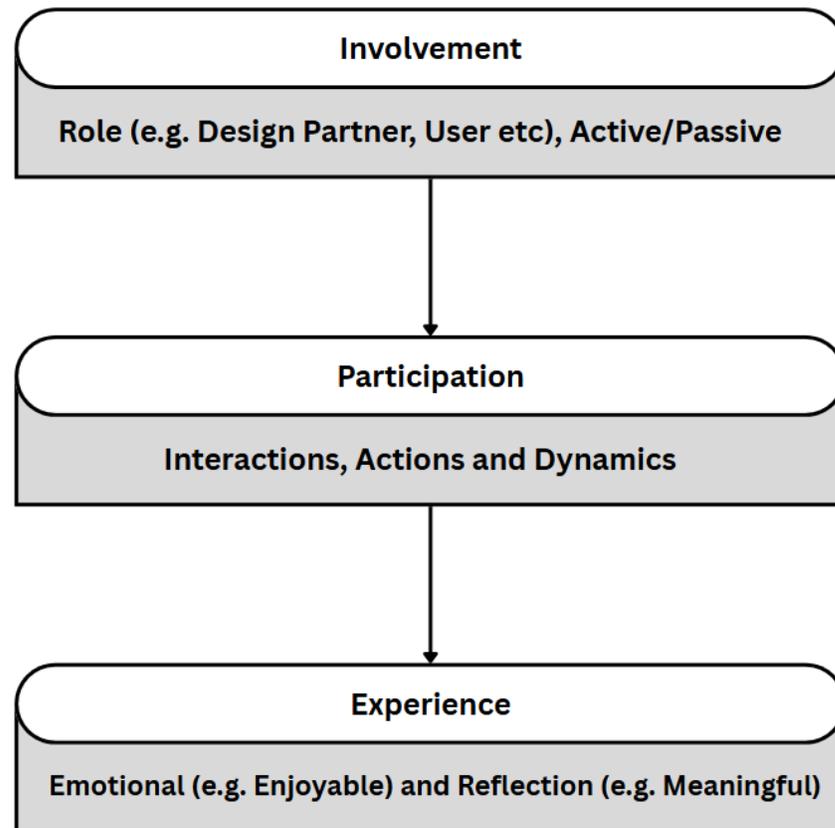


Figure 7.4: Hierarchical illustration of involvement, participation and experience as a lens for designing with end-users (Own Image)

design contributions, and overall experience. This presents a compelling area for future work, particularly examining whether long-term participation fosters greater ownership, comprehension, and impact on game development outcomes.

#### 7.4.1.2 Quality of Outcome

As described in Chapter 3's systematic review, the most frequent goal among co-design studies with young people was to design, develop, or test a game or similar intervention (Saiger et al., 2023). With this objective in mind, much of the existing literature evaluates participation's success based on the quality of outcomes, whether measured through engagement, feasibility, or effectiveness. Prior research described how young people can play a significant role in improving or iterating upon existing ideas (Leitão et al., 2019), as well as validating design decisions at different stages of the development process. These contributions are often assessed based on feasibility, whether the co-designed game or intervention is practical and implementable, and whether it effectively meets its intended purpose. In the field of applied games, various studies have framed the quality of outcome in terms of

- Engaging potential – the extent to which the game sustains user interest and motivation

(Cheng et al., 2018; Fleming et al., 2017)

- Adherence to therapeutic or educational objectives – whether participants continue using the game as intended in an intervention setting (Paracha et al., 2019)
- Wider societal impact – how the game influences mental health awareness, behaviour change, or broader community engagement (Waddington et al., 2015)
- Alignment with participant needs and preferences – the extent to which the game is tailored to the intended audience, particularly in participatory design settings (Schepers et al., 2018a)

Although these perspectives offer useful ways to evaluate co-design goals and outcomes, this thesis focused less on the final game quality and more on the participation process. However, if successful participation is partially reflected in achieving the central challenge of applied games—producing a cohesive experience that balances entertainment value with an applied context—then the results of this study suggest significant challenges. Within the workshop setting, only a small subset of participants successfully created a prototype, meaningfully considering game design principles and mental health concepts.

This raises an essential tension within participatory game design research: Should the quality of participation be measured primarily by the final product or by the engagement fostered through the process? On one hand, if the outcome quality is used as a primary metric, then much of the participation in these workshops could be considered unsuccessful, as most CYP struggled to create coherent, viable game prototypes. On the other hand, expecting CYP to grasp and integrate applied game design, mental health principles, and broader design research within a limited time frame may have been an overly ambitious goal.

The results of this thesis extend the discussion on ‘successful’ participation. First, the findings reinforce concerns about the challenges of integrating complex interdisciplinary knowledge in co-design processes with young people. Studies in participatory design have inferred that young people often require scaffolding to effectively contribute to game development (Read et al., 2013b; Loparev et al., 2017; Gennari et al., 2017) and that their ability to meaningfully engage with both the design and thematic content of a game is influenced by their prior knowledge and experience (Schepers et al., 2018a; Bossavit and Parsons, 2016a).

Furthermore, this research challenged the assumption that participatory co-design always resulted in high-quality outputs. Prior literature often positions participatory design as improving design outcomes by incorporating diverse perspectives (Bossen et al., 2016; Druin, 2002). The findings suggested that under certain conditions, participants are asked to engage with multiple unfamiliar domains simultaneously, and the quality of the final product may not necessarily reflect the quality of participation. Instead, the results suggested that participation should be evaluated based on factors beyond the final game quality, such as engagement, reflection, and conceptual understanding.

One potential explanation for these challenges is the broader issue of misalignment between young people’s expectations and the realities of game development. As discussed in Chapter 6, many CYP entered the workshops with assumptions about game design that did not align with the complexities of actual development. This mirrors findings from previous studies on game literacy versus game design knowledge, where young people often struggle to deconstruct

game mechanics beyond surface-level interactions. Moreover, as prior literature suggests, the rise of player-friendly content creation tools (e.g., level editors, modding tools) may contribute to a simplified perception of game development. While such tools can encourage engagement, they may also lead to unrealistic expectations when transitioning into full-fledged game design processes.

#### 7.4.1.3 Facilitation of Co-design

Facilitation of co-design has impacted participation through how CYP are involved (Cosma et al., 2015) in the design of games. As discussed in Chapter 3, various methods and approaches exist for involving young people in design processes, but there is often inconsistency in their application, with methods overlapping or being used interchangeably. Prior research had suggested ‘good’ participation as a key factor in the success of co-design workshops, where success has been evaluated based on several measures, frequently including:

- Enjoyment and engagement – whether participants and stakeholders found the process enjoyable and meaningful (Kirby, 2004; Pratt, 2022)
- Effectiveness of contributions – the degree to which participants provided insights that shaped design outcomes (Terlouw et al., 2021)
- Suitability of the co-design approach – whether the chosen methods aligned with participants’ capabilities, expectations and the project goals (Barendregt et al., 2016b; Bowler et al., 2021)

The findings from this thesis suggest that ‘good’ participation is shaped not only by these established factors but also by elements that are less commonly discussed in HCI and co-design literature. Specifically, the thesis presents the significance of activity design, interaction preferences, group dynamics, and participant behaviour in determining the success of co-design facilitation.

As discussed in chapter 6 Children’s behaviour can impact the facilitation of co-design, yet this remains an under-explored issue in HCI and participatory design research. This thesis found that CYP could act as motivators, energising others in their group, or conversely, they could become distractions, making facilitation more challenging. Disruptive behaviour is an inevitable part of working with young people, yet few studies explicitly discuss how facilitators manage behavioural challenges in co-design settings. The absence of literature on managing behavioural disruptions, particularly in literature around co-designing games, suggests a potential oversight in practice led research—while studies often focus on structuring activities to maximize research output (All et al., 2012; Anacleto et al., 2012; Marti et al., 2016), they rarely address how to handle moments of disengagement or disruption that naturally arise in group settings.

Prior research on co-design facilitation has focused more on encouraging participation than managing obstacles to it (Malinverni et al., 2017; Gonsalves et al., 2019). For example, studies have emphasised the role of scaffolding techniques (Gennari et al., 2017), mentor involvement (Romero et al., 2019), and structured activities in helping young participants contribute

meaningfully to design processes (Bossen et al., 2016). However, this research suggests that managing group behaviour is an equally important facilitator of good participation, as disruptive interactions can reduce the quality of engagement for the entire group.

Another key finding relates to changing interaction preferences among young people, particularly in response to the prevalence of digital technology. As aforementioned in addressing RQ2, there is a shift in preferences. Traditional co-design methods often involve physical artefacts such as paper prototyping, sketching, and hands-on creative exercises (Stålberg et al., 2016; Soysa et al., 2018). Prior research has identified the benefits of incorporating digital tools into co-design, particularly in making participation more engaging and interactive (Ward et al., 2022; Pavarini et al., 2020) as described in chapter 4. Facilitators of participatory methods have noted that using familiar digital interfaces can lower barriers to learning and increase motivation among young participants. This thesis concludes that young people's expectations for participation may be shifting due to their increased familiarity with digital environments, suggesting that successful co-design facilitation should accommodate these preferences and critically examine whether traditional engagement methods remain effective in contemporary participatory design.

#### 7.4.2 Summary on 'Successful' Participation

In summary, the three areas discussed as 'good' participation appear to be interlinked. Where prior research has focused more on outcome quality, equal consideration should be given to how CYPs are involved and how effective specific facilitation approaches are at supporting participation. Within the context of short-term involvement, this thesis suggests that 'shallower' participation roles are more suitable for young people. Quality of outcome requires evaluation and reflection, where researchers should consider whether outcomes are novel, feasible, engaging and achieve the goals set out for co-design.

### 7.5 RQ4. How to consider CYP participation within co-designing games?

I originally set out to understand '*What are the implications of a specific factor (for example, CYP's comprehension) on games produced?*' but after narrowing down, I ended up positioning the last question on how to consider CYP participation, collating the experience and analysis from each study conducted and predominantly reflecting on Chapters 5.2.5 and 5.6 regarding the design and analysis of the workshops. The design based research approach to workshops provided a iterative process of design and reflection. Together with the analysis, there are the following contributions on how to consider the participation of CYP in co-designing applied games, 1) Considering playful co-design phases for comprehension, 2) Protocol for designing games with CYP in short instances and 3) the use of digital tools to navigate behaviour and cohesion.

### 7.5.1 Playful Co-Design Phases for Comprehension

Despite the challenges to measuring comprehension, there is still some validity to how CYP's comprehension does impact the outcome games. Though I struggled to gather consistent and in-depth data on comprehension, there were insights to take away from the iterative workshops design. Playful or gameful approaches to comprehension were successful. For example, the use of *Pitch it* to provide context and understanding of game design through a card game was beneficial in two aspects. Firstly it demonstrated a feasible paper prototype, and secondly, it provided a fun and collaborative activity to learn about game design terminology. By further focusing on playful interactions like *Pitch It*, I believe there would be less formal scaffolding required in order to upskill CYP.

This begins by meeting children and young people (CYP) where they already are, as experienced game players with existing knowledge to contribute. Rather than imposing formal onboarding processes that feel "school-like," using informal icebreakers like "favourite game" discussions to spark enthusiastic debates. During these conversations, researchers should explore new ways to record comprehension, however ethnographic field notes can capture the natural "grammar" of game design that CYP already use when describing mechanics, narratives, and experiences. This approach establishes their existing knowledge as the foundation, validating their expertise and creating a baseline from which to build on.

By using playful tools themselves as the primary mechanism for building comprehension. Rather than relying on traditional instructional methods like flashcards or speaker presentations, which lack interaction and practical application, this approach introduces formal design concepts through games and hands-on activities that feel like play rather than learning. Tools like the "Pitch It" card game exemplify this, serving dual purposes by demonstrating feasible paper prototypes while providing fun, collaborative activities for learning game design terminology. Through providing informal methods to learn specific elements, such as a game mechanic, a goal, or defining context like anxiety, within bite-sized time-frames accessible to CYP, particularly boys aged 10-13. The structured comprehension phase delivers building blocks gradually through interactive, playful activities rather than passive instruction.

### 7.5.2 Protocol for Designing Games with CYP in Brief

Chapter 3 discussed the systematic review where there was uncertainty on the duration of involvement. With no clear direction on the benefits or downsides on duration of CYP's involvement during the design of an applied game. Therefore, the suggestion of this thesis is that in short term involvement (whether this is dictated by study duration or CYP's time), there's a need for a protocol in co-designing with CYP in short-term involvement. Therefore, I propose a **"Constrained Design Scaffolding Framework" from the experience of conducting workshops and lessons learned into the following phases:**

**Phase 1: Structured Onboarding and "Breadcrumb" Goal Setting** This phase mitigates decision paralysis by introducing information in small, digestible sections. Instead of presenting a broad design brief, facilitators provide a "skeleton" framework of objectives that offers clear direction without overwhelming choices. "Boundary objects" such as existing prototypes or playable examples anchor participants' ideas within realistic constraints, using a

“show, don’t tell” approach to demonstrate what is achievable within, for example, four-hour sessions. Participants are guided through progressive role transitions, from validators to testers to informants to designers, building familiarity with game design “grammar” before being asked to create. This scaffolded approach creates safety by positioning early activities as low-stakes exploration rather than high-pressure creation, ensuring young people feel comfortable with the fundamental concepts and terminology of game design before contributing their own ideas.

**Phase 2: Component-Based Ideation** This phase prevents participants from defaulting to commercial game ideas (e.g. emulating Minecraft) by deconstructing games into components. Facilitators and designers can utilise tools such as post-it note brainstorming sessions organized around four simplified components: Rules (mechanics), Themes (subject matter), Experience (aesthetics and feeling), and Goals (what players achieve). These I simplified in Chapter 5.2.5. This reframes ideation as recombination of components rather than wider complex game design, making the creative task more manageable. To steer towards originality, tools like Pitch It, BAFTA games idea generator, or custom constraints can motivate creativity. Deliberately pairing unfamiliar elements with the applied context, such as “a racing mechanic combined with managing anxiety” disrupts anchoring to popular entertainment games by making direct emulation more challenging. Rather than viewing these bizarre combinations as obstacles, I suggest we reposition them as creative starting points that push participants beyond familiar territory. Alternatively, there is the option to introduce existing prototypes or as a suggestion from a facilitator in Chapter 4, removing the mention of games entirely, to prevent that anchoring.

**Phase 3: Focused Prototyping (“Getting One Thing Right”)** This phase prevents feature creep and mitigates some challenges of managing expectations by directing participants to select one mechanic or rule and refine it thoroughly before adding complexity. Using the mantra “make one thing work really well,” facilitators actively redirect attention away from cosmetic features like skins, weapons, or customization options that don’t serve the core applied purpose. Clear “done” criteria help participants recognise when their prototype is ready for evaluation rather than endlessly adding features. Digital tools here can help match participants’ comfort levels and increase engagement, such as Google Slides, Twine, or Inklewriter, over paper-based prototyping if digital interaction keeps young people on task. Professional engines like Unity are avoided to maintain focus on design thinking rather than technical implementation. The tools should be simple enough that technical barriers don’t derail the creative process while still providing the digital interaction that participants find motivating.

**Phase 4: Embedded Reflection and Pitching** This phase ensures outputs remain fit for purpose while channelling enthusiasm into productive evaluation rather than disruptive behaviour. Structured “show and tell” pitch sessions allow each prototype to be presented and evaluated against the four “F’s” framework: Fun (is it engaging?), Feasible (can it be made?), Fit for Purpose (does it address the applied goal?), and Freshness (is it original?). This evaluation framework keeps reflection focused, collaborative, and productive while documenting which prototypes warrant further development. Social scaffolding during this phase is essential for managing group dynamics. Facilitators organise feedback in smaller groups or pairs to address power imbalances and ensure quieter participants have structured opportunities to contribute. Techniques like round-robin sharing or written feedback first

### Constrained Design Scaffolding Framework

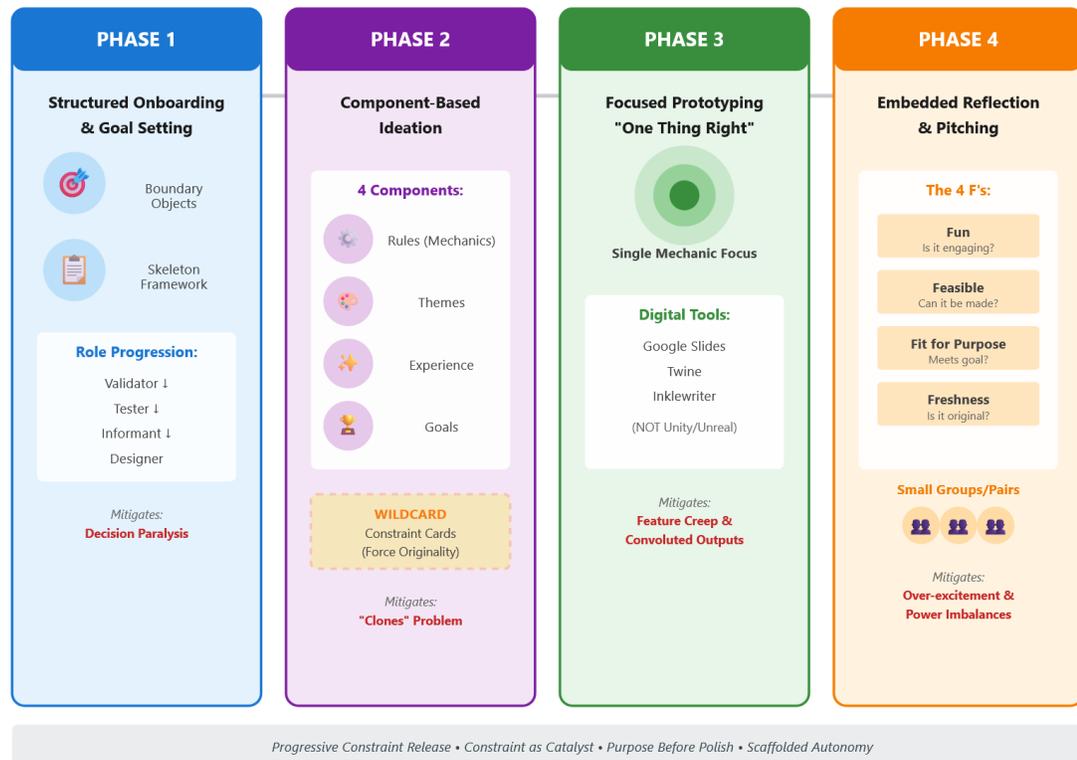


Figure 7.5: Constrained Design Scaffolding Framework for reflection when designing a study with the involvement of CYP in co-designing games

help diverse voices be heard. Managing and educating constructive critique that balances encouragement with honest evaluation can help improve group dynamics as well as managing over-excitement by channelling energy into these structured reflection activities rather than allowing it to become disruptive.

Figure 7.5 provides a working example of how the framework may be adopted into the study design of designers, facilitators or researchers conducting co-design or participatory methods with CYP.

## 7.6 Recommendations for Designers, Researchers and CYP

The following section details the wider implications for designers, researchers and young people involved in the co-design of games. Each section presents an overview of this thesis's impact on specific stakeholder groups.

### 7.6.1 Implications for Designers

When considering the design of games with young people, this thesis identified six high-level implications for designers conducting co-design with young people. These include: small design teams, use of familiar surroundings, suitable game-making tools, leading by example, supporting feedback & critique, and approaching onboarding differently.

**Small Design Teams** The workshops conducted as part of this thesis suggest that smaller design teams are productive and easier to facilitate. Both designers and facilitators can easily foster communication, particularly when working with shy participants. Though there were few female participants across the workshops, those who did attend found it easier to communicate and contribute when not partnered with boys (Khaled and Vasalou, 2014). Keeping CYP in pairs allowed for a more balanced power dynamic and kept participants engaged.

**Use of Familiar Surroundings** The interviews in chapter 4 and the workshops briefly described how the environment can impact young people's confidence. Across the four different locations, a formal setting (such as a university) can be intimidating to young people, as it pushes expectations on behaviour and how they 'should' act. Compared to code clubs and schools, these environments are specifically tailored for young people and provide a more comfortable and familiar space in which to participate. Designers should consider the environment for co-design and how it may impact CYP confidence in participating.

**Suitable Game Making Tools** Where previous research can assume CYP have high literacy in games, there is a lack of specificity. The implications of this thesis suggest that children can have a high level of literacy in the games they play and enjoy, but this does not equate to a comprehensive understanding of game design (Khaled and Vasalou, 2014). Presenting CYP with complex game development tools does not seem feasible with limited involvement in co-design. However, given CYP's preferences for sandbox or games with level editors, designers could consider utilising existing games to co-design games. Though this brings additional technology requirements, it could produce ambitious solutions and provide engaging activities for young people (Ward et al., 2022). On the other hand, it could also distract from co-design goals and hamper stakeholder collaboration.

**Leading by Examples** The systematic review presented two primary goals for CYP involvement: to ideate new solutions or to improve/iterate upon an existing prototype. From conducting the workshops, it can be suggested that designers consider providing an existing prototype or similar examples of what can be achieved through co-design. This thesis's sample of young people was unfamiliar with prototypes and their expectations for a 'one-day' workshop. Managing expectations via examples can help manage confidence and provide a manageable goal for CYP.

**Reflect upon Activities** Designers conducting activities with young people, such as paper prototyping, game-play evaluation, post-it activities, etc, should endeavour to be more reflective of their appropriateness and practicality. An insight from Chapter 3 was how so few studies detailed explicit reflection or evidence on how practical the activities

were at either engaging or achieving their purpose. Reflecting on what activities are appropriate for the end-user can help improve participant engagement.

**Supporting Feedback & Critique** Young people may not have been taught how to receive feedback or give critique in a design environment. Children struggled to receive and give feedback throughout the workshops described in Chapter 5.2.5. This often led to ideas becoming inflated, children becoming upset or disengaged, or issues in cohesion. In addition to providing a common language or set of grammars as described in Chapter 4, additionally designers need to consider equipping participants with the skills to critique.

## 7.6.2 Implications for Researchers

Considering the increasing interest in co-designing games for mental health (Halldorsson et al., 2021b; Bevan Jones et al., 2022), chapter 3 highlighted how there were few considerations or factors to help inform researchers on conducting co-design with young people for the design of games. To summarize, the findings of my studies suggest that researchers consider the role and reason for CYP's involvement, adjust expected outcomes, use transparent methods, and explore data collection methods.

**Role and Reason for CYP's Involvement** A prevalent finding across the background research and the first two studies was how we as researchers are not transparent about the Chapter 5, I attempt to reflect on involvement. Studies suggest that children's participation in co-design may still be somewhat 'tokenistic' (Ward et al., 2022) as their participation is still largely under-reported. This may stem from researchers not understanding the reason for CYP's involvement. Though the design of digital tools for health highlights the importance of co-design (Bevan Jones et al., 2022; Halldorsson et al., 2021b)

**Transparent Methods** Alongside careful consideration of CYP's role and involvement, few studies have reflected upon the design process involving CYP. In chapter 5, I try to reflect upon the methodological approach and activities implemented. From the workshop evaluations, I understood that CYP found ideation challenging, but prototyping was much more engaging and familiar. In the future, researchers should reflect upon how well the methodological approach was facilitated: a) the goals of co-design, b) the impact on CYP, and c) the outcome quality of the product or service. Doing so could help support future CYP involvement and address what is acceptable and accessible to CYP (Halldorsson et al., 2021b; Bevan Jones et al., 2022).

**Explore Data Collection Methods** Across the three studies in this thesis, there is clear uncertainty on how to evaluate CYP's participation (or participant engagement) in the co-design of games. Chapter 4 suggested that co-design practitioners rarely examine participation, and the workshops struggled to evaluate CYP's comprehension of domain contexts. Though concept maps, interviews and focus groups were limited within the scope of this thesis, researchers need to consider suitable approaches to gather data with CYP, given the lack of interest in paper-based methods. For example, the ethnographic field notes effectively noted interactions and dynamics between participants but presented additional facilitation challenges to small research teams.

### 7.6.3 Implications for Young People

Children and young people's involvement in the design of applied games has implications for their involvement. Considering they are key stakeholders in designing games appropriate for their age group, CYP's participation has a few implications: new experience, pride and accomplishment, and changes to more playful and accessible roles.

**New Experience** Despite finding that CYP often relied on their own knowledge and weren't interested in upskilling or learning, there is the implication of a new experience. Across the workshops, participants expressed they had not participated *in a workshop like this before*. Although the current curriculum outlines user design, it is likely not being put into practice. Therefore, their involvement in co-design presents a new experience and may upskill them in more 'soft skills'. In addition, they are made aware of design roles and challenges which may pique interest in learning more. Involving CYP in the design of games may present numerous challenges to involving them and producing viable outcomes. Still, offering CYP from low-socioeconomic backgrounds an experience they would not traditionally encounter is another implication for their involvement.

**Playful and Accessible roles** RQ1 above has widely addressed this implication, but to add, whatever role or level of involvement CYP are involved in, children require a cognitively less demanding role. Considering what is being asked of co-designers and the upskilling of knowledge, children need more developmentally age-appropriate roles. These roles must also be playful, but those aged 10-14 need to avoid being demeaning. Young teenagers, particularly boys, aren't interested in 'childish' activities but are likely not equipped or confident to handle complex tasks. Where paper-based activities aren't enjoyable to young boys, their expectations involve game-making tools or using computers/mobile technology. For example, in Workshop 3, children struggled to focus on the task when the physical activities weren't enjoyable, until the digital tool *inklewriter* was introduced. The narrative game engine introduced a playful method for contributing to the workshop and provided its own in-built tutorial on how to create content. In addition, the *inklewriter* engine allowed young people to switch and play with their creations, resulting in much more immediate feedback and interaction. Children could tangibly see and interact with their creations almost immediately after creating content. Similarly, the use of *Google Slides* in workshop 2 was playful and co-operative for pairs of children. They were familiar with the tool, finding it accessible and easy to use for collaboration.

## 7.7 Limitations

While this thesis provides valuable insights into co-design participation with CYP, several limitations must be acknowledged. These limitations relate to literature scope, study design, participant demographics, methodological constraints, and broader applicability.

### 7.7.1 Scope of Literature Review

One limitation is the impossibility of including all relevant literature. The systematic review was comprehensive but not exhaustive, as it relied on observations and available sources within the domains of human-computer interaction, education, health, and design. There may be additional studies that could support or challenge the findings of this research but were not identified due to search constraints or indexing issues. However, efforts were made to ensure inclusivity and representativeness in selecting literature across multiple disciplines. In addition, there is the inherent bias of myself as the sole screener of papers, where multiple authors would ensure less bias and more agreement on the classification of studies.

### 7.7.2 Study Design and Duration Constraints

The findings of this thesis are primarily based on short-term, in-person workshops (one to two days in length). While these settings provided rich insights into group dynamics and participation factors, they do not account for how participation may evolve over longer periods (e.g., weeks or months). This was discussed in Chapter 3 where studies could go on for greater than 6 months. Different factors may emerge in longer engagements, or existing factors may shift in prominence. This raises the need for longitudinal studies to assess how sustained participation affects comprehension, engagement, and design outcomes (i.e. applied games).

Additionally, the study employed design-based research (DBR) as its methodological approach. While DBR offers transparency in documenting iterative design processes, it is highly context-dependent and can vary across researchers and facilitators. Other methodological approaches might yield different insights into co-design participation factors.

### 7.7.3 Participant Demographics and Representation

Another limitation is the demographic composition of participants, which may influence the generalizability of findings. Most participants were aged 12–14 and from low-socioeconomic backgrounds, which may not fully capture the experiences of younger children, older adolescents, or those from different socioeconomic, cultural, or educational backgrounds. With more time and resources, the study could have included additional age-specific groups to examine how participation factors vary across developmental stages. However, the initial aim was to sample different age ranges and understand whether co-design methods were accepted across broader age groups, as few studies had commented on the variability of methods in relation to developmental age. Future research should explore how participation dynamics change when engaging different age groups, genders, neurodiverse individuals, and youth from diverse cultural backgrounds.

#### 7.7.4 Participant Recruitment Bias and Social Desirability

Another limitation is the potential for participant self-selection bias. Recruitment for workshops 1, 2, and 3 was conducted via interest forms and *Eventbrite*, meaning participants likely had a pre-existing interest in games or mental health. This may have influenced their engagement levels and motivation, leading to a higher likelihood of positive participation experiences. In addition, parents and caregivers in workshops 2 and 3 may have put their children forward without clear insight into their participation.

In contrast, workshop 4 involved a pre-existing Computer Science class, which included participants who were not inherently interested in co-designing applied games. This variation presents a broader issue in participatory game design research: how to involve diverse users beyond those who are already interested meaningfully. Future studies should deliberately recruit participants with varying interest levels to assess how engagement differs across intrinsically and extrinsically motivated groups.

#### 7.7.5 Contextual Application Beyond Mental Health Games

While this thesis focuses on co-designing mental health games, the identified participation factors may extend to other domains, such as the design of broader health-based interventions, education tools, or social impact games. However, the specific challenges faced in mental health game design—such as the need for sensitivity in discussing mental health topics—may not translate directly to other areas. Additionally, these findings may have limited applicability to adult co-design participants. Since CYP have different cognitive, social, and communication abilities compared to adults, the participation factors observed in this research may not apply similarly to adult co-designers.

#### 7.7.6 Behavioural and Facilitation Challenges in Co-Design

An under-explored limitation in the HCI and design literature is how group behaviour and facilitation challenges impact co-design. CYP's behaviour within workshops can significantly influence participation outcomes, yet existing literature rarely addresses the difficulties of managing disruptive or disengaged participants. I observed the following facilitation challenges:

- Behavioural disruptions (e.g. distractions, lack of focus, disengagement).
- Peer group influences (e.g. some children dominating discussions while others remain passive).
- Changing interaction preferences (e.g. preference for digital engagement over traditional prototyping).

## 7.8 Future Directions

The focus of this thesis was exploring how we can co-design applied games with and for young people around the context of mental health. With this aim in mind, there are two areas of future research that I believe future research could explore, 1) exploring different methods, CYP involvement and impact of tools when it comes to co-designing with CYP, and 2) considering how we approach the design, grammar, and challenges to applied game design.

### 7.8.1 Further Co-Design with Children and Young People

**Exploring Different Methods and Approaches** Simonsen and Robertson (2013) described no ‘right’ way to conduct participatory design. This thesis argues that there should be considerations, factors or recommendations to support the successful participation and engagement of end-users in the design process. To that end, a clear area for future work is evaluating alternative methods and approaches to involving CYP in the design of applied games. The process whereby I reflected upon each iteration of the workshops promoted reflection as a designer and on the methodological approach. Further research that involves children in the design process could provide a broader lens on how effective specific methods and approaches are, just by reporting back and reflecting on what worked and what didn’t.

**CYP Involvement** Future literature searches could explore the various phases of development when CYP is involved. As outlined in Chapter 3, it was unclear in the studies when CYP were involved in the development process, although there was a suggestion for involving them in the early conceptual stages. By exploring how CYP are involved in these stages, we can understand their impact on the design process and whether we are efficiently involving CYP at stages where their contributions significantly affect the design process. Not to mention what preferences CYP prefer to be engaged in. The CYP involved in the workshops I conducted were a small population, mostly between 10-14 years of age, male and from low socio-economic backgrounds in the North of England and Scotland. These preferences for involvement are likely to vary between demographics and over time. Additionally, there is a growing number of activities and techniques to involve children and young people in the design of games. Still, there is little evaluation on whether these activities or techniques effectively garner desired engagement, results, or outcomes. The review identified over 45 activities, which professionals in Chapter explored 4, and alternative activities experienced in the workshops. A reflective process should consider how suitable these activities and methods are to CYP and whether they support involvement.

**Impact of Digital Tools on Co-Design** Despite the previous prevalence of physical tools and paper prototyping in prior literature, the outcome of this research suggests CYP today are more receptive, engaged and motivated when digital tools, such as laptops, are involved during co-design. However, we do not discuss the benefits and detriments of using digital tools in co-design. From the workshops, I discussed how laptops are limited to a single user, which may hinder social discussion and cohesion required for certain co-design aspects. On the other hand, digital tools were something CYP found more accessible compared to writing and drawing. A source of future research should

consider the impact digital tools have on participant engagement, successful co-design and the influence it has on the co-design process.

### 7.8.2 Designing Applied Games

**Different Design Approach** The motivation for this research stemmed from a case study on designing applied games to support young people with mental health challenges. Prior research had outlined how end-users should be considered in the design process, ensuring the outcome (applied game) is rooted in users' preferences and needs (Halldorsson et al., 2021a; Bevan Jones et al., 2022). The result of this thesis presents one method via participatory methods, with various factors and considerations that need to be considered. Given the argument throughout this thesis is how challenging applied games can be, research should consider what methods can achieve the design of applied games without the need for too much upskilling and comprehension of key content areas. It's possible that a different design approach, such as ethnography, could provide insights into needs and requirements for designers, without needing to involve and upskill end-users.

**Improving the Grammar of Game Design** Something described by participants in Chapter 4 was that CYP, and most people in general, lack a general understanding of how games are made compared to other media, such as TV and film. Although this may seem like an unusual area of future work, there is something to be said about how game design is becoming more accessible through open-source tools, game engines, and built-in level editors. Over time, the knowledge of how games are designed and made may become more widespread. However, potential factors are working against this. Game companies often guard their design processes closely, resulting in less transparency of how games are made. Games can still be seen as a negative experience in some media outlets, leading to consumer concern. That said, an interesting branch of future work could explore how CYP and other end-users learn about game design to understand better how game design is communicated and what's missing when designing applied games with them. This could also be extended to other content areas such as mental health.

**Investigate Other Factors** The workshops I conducted suggested comprehension and understanding of mental health, seemed to improve the quality of applied games produced. However, it was challenging to evaluate CYP's comprehension and its impact on their solutions. There is merit in exploring deeper comprehension or the methods for assessing CYP's understanding, but additional factors identified from this research could also be examined in further detail. For example, managing expectations was discussed throughout the thesis, where some CYP had specific expectations about designing applied games, and expectations of what design means. It would be interesting to examine how expectations affect participant engagement and motivation and how much they impact participants' contributions during the design of applied games. This could extend outside of participatory design to examine how even designers' expectations of what an applied game should be influence the design or decisions behind an applied game.

## 7.9 Concluding Thoughts

The co-design of applied games with young people exists within a spectrum of techniques and approaches; yet, many remain underreported, unexamined, or lack structured reflection on best practices. Both literature and practitioner perspectives reveal divergent understandings of what constitutes successful participation, why it matters, and how to assess engagement effectively. This research contributes to these discussions by offering a critical lens on the assumptions, tensions, and practicalities of involving young people in the design of applied games. There are three main contributions of this thesis which are; shorter targeted roles are more achievable for CYP, increased participation does not equal high-quality games, and CYP preference for Digital over Paper Interaction.

### **Short, Targeted Roles are More Achievable for CYP**

The findings challenged the notions of participatory and co-design methods, where ‘deeper’ participation is often assumed to be inherently better. In practice, this research has demonstrated that short-term, structured roles (e.g., testers, validators, and informants) are often more effective and familiar to CYP, especially when engagement is constrained by time and the experience of the contexts involved. This reality suggests that successful participation should be measured by the depth of the role and alignment with participants’ capabilities, interests, and circumstances.

The thesis challenges the prevailing assumption that “deeper” participation, where CYP act as full “design partners”, inherently leads to better outcomes or more meaningful involvement. Empirical findings suggest that CYP are often more comfortable and productive in “shallower” roles, such as validators, testers, or informants, rather than high-level decision-makers. Deeper involvement often requires a formal “grammar” of game design and a deep comprehension of the applied context (e.g., mental health) that many young people lack, leading to convoluted ideas when they are given too much creative freedom.

The suggestion of this thesis is to adopt a structured, task-oriented participation, where CYP provide feedback on existing concepts or complete specific tasks. This was found to be more confidence-inducing and feasible within the time constraints of short-term workshops/participation. Consequently, the research argues for a pragmatic approach to participation that balances the depth of the role with the participants’ actual readiness and existing literacy. Therefore the thesis proposes the “Constrained Design Scaffolding Framework” as consideration when designing a study that involves CYP in co-design. Breaking down the steps to involving CYP into four phases of structured onboarding, component-based ideation, focused prototyping, and embedding reflection.

### **Increased Participation Does Not Equal High-Quality Games**

A contribution of this thesis is the decoupling of engagement from comprehensions, challenging the idea that participation naturally leads to learning. The findings of this thesis suggest that while co-design is effective at driving engagement, making the process enjoyable and interactive, they were ineffective at improving understanding of game design principles or mental health literacy. Though there is the limitation in addressing how we design informal approaches to driving comprehension, nevertheless this thesis observed instances of learner fatigue

when CYP were expected to navigate both game design, mental health and design contexts simultaneously. Instead of acquiring new skills, CYP often relied on existing knowledge and replicated existing games rather than innovating on the central goal of workshop.

The findings suggests that “successful” participation can exist without deep learning, as participants can be fully immersed and motivated by the act of making without grasping the underlying systems. Therefore, the thesis suggests that researchers should not treat co-design as a guaranteed vehicle for education or upskilling and instead deliver small, manageable sections of information to support the design process.

In contributing to the broader literature on co-design with CYP, I emphasise that meaningful participation is not simply a matter of including children in design activities but requires careful attention to developmental preferences, social dynamics between children, and facilitation. Emotional and behavioural responses, especially in exciting contexts like game design, require proactive behavioural management strategies, drawing from practices in education and youth work.

One of the main insights of this thesis is the tension between game literacy and game design literacy. Outlined by (Khaled and Vasalou, 2014), I believe there is an assumption that children who play games are experts at games in general. While CYP are often highly knowledgeable about the games they play, they struggle with the underlying mechanics and design principles, often because these aren’t established grammars known to the public. The findings reflect a mismatch between CYP expectations (potentially informed by entertainment gaming and sandbox tools like *Roblox* (Roblox Corporation, 2006) or *Minecraft* (Mojang Studios, 2009)) and applied game development’s complex, multi-disciplinary nature. These experiences could mislead CYP expectations where they expect digital tools over paper tools, and have flawed expectations on how ‘easy’ it is to make applied games. Applied games are purpose-driven, for education, health, or behaviour change, and require content knowledge, design thinking, and iterative evaluation. These are difficult to convey in short-term workshops.

This gap in understanding presents a barrier to deeper engagement in co-design for applied games. It raises questions about whether better scaffolding of CYP comprehension can help involve them in the complex interdisciplinary design process. This research supports more constrained and guided design formats, where CYP contribute through structured tools and prototyping tasks that match their abilities, while still capturing their lived experiences and preferences.

### **CYP Preference for Digital over Paper Interaction**

The shifting expectations of technology among CYP, such as a preference for working with digital tools over traditional paper-based methods, suggests that facilitation strategies must evolve to align with how contemporary CYP engage with creative and technical work. This thesis indicates a significant shift in interaction preferences, challenging the traditional reliance on paper prototyping as an accessible and engaging co-design tool. While paper-based methods are frequently cited in literature (See Chapter 3) as inclusive and low-cost, many CYP, particularly boys aged 10–14 in my experience, found these activities “unengaging,” “boring,” or “childish”.

Instead, participants demonstrated a strong preference for digital tools, such as laptops,

collaborative software like Google Slides, and browser-based narrative engines like Inklewriter. This preference is driven by the fact that CYP are often established “digital natives” who expect game design to involve high-fidelity, interactive “in-engine” experiences similar to the sandbox tools found in Minecraft or Roblox. Although digital tools occasionally presented technical frustrations or distractions, CYP were visibly more enthusiastic and focused when using them compared to completing paper workbooks. Ultimately, we must consider and accommodate these digital expectations to maintain participant motivation, as the lack of technology can lead to disengagement.

### **Broader Implications**

Beyond methodological concerns, there is a broader social issue: the role of design as a vehicle for exposing young people to new ways of thinking and problem-solving. The experience of participation itself may hold greater significance than the final game designs, particularly for young people who have had limited exposure to collaborative, creative problem-solving environments. Many of the participants in these studies had never engaged in co-design before, and their involvement offered a rare opportunity to think critically, experiment with new ideas, and see themselves as active contributors to a creative and technical process. Instead, participants had to be guided via constraints to present and deliver on the research goals.

In guiding CYP to deliver on research goals, this thesis also learned that CYP, and likely other participants of co-design need to be given feedback, regardless whether the feedback is about success or failure. A barrier in the workshops was CYP’s unfamiliarity with critique or feedback, both giving and receiving. The suggestions from this thesis suggest cohesion through more informal discussion can help with this, but educating and training CYP to give critique is a goal in its own right. This creates another challenge when it comes to assessing the success or failure of an applied game. The wider literature has not broadly discussed how the process for designing an applied game facilitates feedback and reflection. In particular, what is the measure of success if an applied game takes ten hours to reach a learning outcome but the player gives up in two hours? In the capacity of this thesis, I utilised the four F’s framework to assess the outcome quality of game ideas produced but there are too few rigorous methods to assessing the success of an applied game, which would of course vary on its purpose.

### **Conclusion**

In conclusion, this thesis challenges the idealised rhetoric of co-design, offering a more nuanced, pragmatic perspective that accounts for barriers to engagement, shifting technological preferences, and the need for structured facilitation. Rather than assuming that deeper participation is always better, effective participation should be measured in terms of feasibility, alignment with young people’s abilities, and the broader experiential value of engagement. Future work should continue exploring how co-design can balance practical constraints with its transformative potential, ensuring that young people are included and supported in ways that make their contributions meaningful and sustainable. This thesis demonstrates that successful short term co-design/participation with young people is achieved by involving them as constrained informants, providing structured phases, and facilitating informal and playful activities to drive engagement.

## Appendix A

# Table of Involvement from Systematic Review

<b>Authors</b>	<b>User</b>	<b>Tester</b>	<b>Informant</b>	<b>Design Partner</b>
All et al.			X	
Alves & Hostins			X	
Al-Wabil et al.	X	X	X	X
Anacleto et al.				X
Anthony et al.			X	
Aufegger et al.			X	X
Benton et al.				X
Benton & Johnson			X	
Bonsignore et al.			X	X
Bossavit & Parsons			X	
Cassidy et al.				X
Cheng et al.			X	
Christie et al.		X	X	
Cosma et al.			X	
De Jans et al.				X
Durl et al.				X
Eriksson et al.			X	X
Gennari et al.			X	
Gonsalves et al.			X	
Kang et al.	X			
Kangas			X	X
Khaled & Vasalou			X	X
Kostenius et al.				X
Lee et al		X		X
Leitao et al.			X	X
Malinverni et al			X	
Martens et al.				X
Marti et al.	X		X	
Metatla et al.			X	
Nouwen et al.			X	X
Patchen et al.			X	X
Pavarini et al.			X	
Pollio et al				X
Porcino et al.	X			
Powell et al.				X
Rötkönen et al.			X	
Raynes-Goldie & Allen		X		
Regal et al.	X	X	X	X
Romero et al.			X	
Soysa et al.			X	
Stalberg et al			X	
Sutton et al.			X	
Terlouw et al.			X	X
Triantafyllakos et al			X	X
Vallentin-Holbech et al.			X	X
Vasalou & Khaled			X	
Waddington et al.			X	
Werner-Seidler et al.			X	
Zhu et al.				X

## Appendix B

# Characteristics of Studies from Systematic Review

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Authors	Self-Label	Druin's Taxonomy				Capacity of involvement for primary end user	Study Goals	Activities
		User	Tester	Informant	Design Partner			
All et al.	codesigners / informants			X		Not Stated	Design a game with participants, Determine Features and Functionality,	(Focus) Group Discussion, Interviews (with end-users), Introductory media (presentation, movie etc), Map Task, Game ideation and discussion, Scenario Based Tasks, Blank template task
Alves & Hostins	null			X		Informant, co-designer, playtester and end user	Design a game with participants, Determine Features and Functionality,	Low-fidelity Prototyping, Scenario Based Tasks, Timeline (narrative design), Game-play Evaluation, Existing Games (demonstration or play), Existing Games (demonstration or play), Storyboarding, Paper Prototyping, (Focus) Group Discussion, Problem Solving, Brainstorming, Role-play (or simulation)
Al-Wabil et al.	validation	X	X	X	X	Co-designer	Determine Features and Functionality,	Interviews (with end-users), Gaze-Plots, Eyetracking Games
Anacleto et al.	null				X	Informant	Determine Features and Functionality,	Surveys or Questionnaires, Paper Prototyping, Timeline (narrative design), Brainstorming

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Anthony et al.	Informant			X		Co-designer and Informant	Understand needs of end-user, Develop skills,	Surveys or Questionnaires, (Focus) Group Discussion
Aufegger et al.	informant			X	X	Co-designer	Understand perceptions and concerns, Determine Features and Functionality,	(Focus) Group Discussion, Surveys or Questionnaires, Timeline (narrative design)
Benton et al.	Informant				X	Informant	Understand perceptions and concerns, Design a game with participants,	Existing Games (demonstration or play), Feedback Session, LEGO team building, Paper Prototyping, Surveys or Questionnaires, Storyboarding, Visual Schedules
Benton & Johnson	null			X		Co-designer	Examine Involvement, Deliver content or skills development,	Visual Schedules, Surveys or Questionnaires, Paper Prototyping, Feedback Session
Bonsignore et al.	codesigner			X	X	Informant	Design a game with participants, Explore methodology,	Storytelling, 'Snack-time' Icebreaker, "Question of the day", Design Challenge, Sticky Notes, (Focus) Group Discussion, Game-play Evaluation, Scenario Based Tasks, Surveys or Questionnaires, Peer Interviews, Wireframe designs
Bossavit & Parsons	users and informants, designers, testers			X		Validation	Examine involvement, Design a game with participants,	Existing Games (demonstration or play), Visual Schedules, Surveys or Questionnaires, Free-Play, Paper Prototyping, Game-play

APPENDIX B. CHARACTERISTICS OF STUDIES FROM SYSTEMATIC REVIEW 195

								Evaluation, Presentations, Playtesting
Cassidy et al.	informant				X	Not Stated	Feedback on end-product, Examine involvement, Understand perceptions and concerns	Design Packs, Role-play (or simulation), Low-fidelity Prototyping
Cheng et al.	Informant?			X		Informant	Feedback on end-product, Determine Features and Functionality,	Interviews (with end-users), Preference Elicitation, Existing Games (demonstration or play), Paper Prototyping, Interviews (with end-users)
Christie et al.	informants		X	X		Co-designer	Understand preferences, Feedback on end-product, Determine Features and Functionality	Playtesting, Interviews (with end-users)
Durl et al.	informant / codesigner				X	Validation	Understand needs of end-user, Examine involvement,	Existing Games (demonstration or play), Surveys or Questionnaires, Sensitization session, Paper Prototyping, Card sorting task
Eriksson et al.	playtesters				X	Informant	Explore methodology,	Playtesting, Interviews (with end-users), Free-Play, Playtesting
Gennari et al.	co-designer			X	X	Informant	Design a game with participants, Examine involvement,	Existing Games (demonstration or play), (Focus) Group Discussion, Icebreakers, Surveys or Questionnaires, Interviews (with end-users)

APPENDIX B. CHARACTERISTICS OF STUDIES FROM SYSTEMATIC REVIEW 196

Gonsalves et al.	informants / codesigners			X		Co-designer	Determine Features and Functionality, Understand needs of end-user, Understand preferences	(Focus) Group Discussion, Playtesting, Existing Games (demonstration or play), Storyboarding, Paper Prototyping, (Focus) Group Discussion
Kang et al.	Developer and motivators			X		Co-designer and Informant	Explore methodology,	Existing Games (demonstration or play)
Kangas	player/ playtester	X				Validation	Develop skills, Design a game with participants,	Scenario Based Tasks, Role-play (or simulation), Free-Play, Existing Games (demonstration or play), Blank template task, Feedback Session
Khaled & Vasalou	Co-designer/informant			X	X	Co-designer	Explore methodology, Examine involvement,	Brainstorming, Role-play (or simulation), Paper Prototyping, Storyboarding, Introductory media (presentation, movie etc)
Kostenius et al.	Informant			X	X	Not Stated	Explore methodology,	(Focus) Group Discussion, Brainstorming, Movie creation task, Feedback Session, Logbooks (or taskbook, or Diaries)
Lee et al.	informant				X	Co-designer and Informant	Facilitate context discussion,,	Existing Games (demonstration or play), Interviews (with end-users), Storyboarding, Q & A, Paper Prototyping, Blank template task
Leitao et al.	user, as a tester, and as an informant		X		X	Informant	Explore methodology, Examine involvement,	Surveys or Questionnaires, Free-Play, Low-fidelity Prototyping, Paper Prototyping, Brainstorming

APPENDIX B. CHARACTERISTICS OF STUDIES FROM SYSTEMATIC REVIEW 197

Malinverni et al	co-designer/validation			X	X	Co-designer	Develop skills, Design a game with participants,	Introductory media (presentation, movie etc), Visual Templates, Existing Games (demonstration or play), Paper Prototyping, Role-play (or simulation), Storyboarding
Martens et al.	codesign / informant			X		Informant, co-designer, playtester and end user	High Quality Product, Understand preferences, Feedback on end-product	Playtesting, Free-Play, Interviews (with end-users), Paper Prototyping, Logbooks (or taskbook, or Diaries)
Marti et al.	co-design				X	Informant	Design a game with participants,,	Storytelling, Cultural Probes, Storyboarding, Map Task, Paper Prototyping, 3D Modelling activity
Metatla et al.	co-design	X		X		Co-designer and Informant	Understand perceptions and concerns, Examine involvement,	Activity Sheets, Paper Prototyping, Role-play (or simulation), Low-fidelity Prototyping, (Focus) Group Discussion, (Focus) Group Discussion
Nouwen et al.	co-designers			X		Co-designer and Validation	Develop skills, Examine involvement,	Interviews (with end-users), Playtesting, Logbooks (or taskbook, or Diaries), Interviews (with end-users), Introductory media (presentation, movie etc), Sensitization session, Assignments or Homework, Paper Prototyping, Low-fidelity Prototyping

APPENDIX B. CHARACTERISTICS OF STUDIES FROM SYSTEMATIC REVIEW 198

Patchen et al.	informants			X	X	Informant	Feedback on end-product, Design a game with participants, Determine Features and Functionality	(Focus) Group Discussion, Playtesting, Brainstorming, User Stories (personas), Paper Prototyping
Pavarini et al.	co-researcher			X	X	Co-designer	Design a game with participants,,	Role-play (or simulation), Peer Interviews
Pollio et al.	null			X		Informant	Design a game with participants,,	Storyboarding, Existing Games (demonstration or play), Toolkit (game design), Paper Prototyping
Porcino et al.	inclusion/validation.				X	Co-designer	Design a game with participants, Explore methodology,	Q&A
Powell et al.	validation	X				Informant	Determine Features and Functionality, Develop skills,	Interviews (with end-users)
Rötkönen et al.	informant / codesigner				X	Playtesters	Create Guidelines,,	Existing Games (demonstration or play), Playtesting, Existing Games (demonstration or play)
Raynes-Goldie & Allen	Codesigner			X		Informant, co-designer, playtester and end user	Develop skills, Design a game with participants,	Playtesting, Feedback Session, Storytelling, (Focus) Group Discussion
Regal et al.	Informants		X			Informant	Design a game with participants, Develop skills,	Building Blocks, Game design Workshops, Brainstorm

APPENDIX B. CHARACTERISTICS OF STUDIES FROM SYSTEMATIC REVIEW 199

								ing,Interviews (with end-users)
Romero et al.	null	X	X	X	X	Informant	Develop skills,Determine Features and Functionality,	Existing Games (demonstration or play),Game design Workshops,Pitching (idea or prototype),Feedback Session
Stalberg et al	codesigner/informant			X		Informant	Determine Features and Functionality, Design a game with participants,Examine involvement	Interviews (with end-users),Paper Prototyping,Storyboarding
Sutton et al.	codesigners			X		Co-designer and Informant	Understand perceptions and concerns,Design a game with participants,Improved User Experience	(Focus) Group Discussion,Introductory media (presentation, movie etc),Sticky Notes
Terlouw et al.	ideation			X		Co-designer	Design a game with participants,Develop skills,	Brainstorming,Paper Prototyping,,Existing Games (demonstration or play),Sticky Notes
Triantafyllakos et al.	co-designer			X	X	Co-designer	Design a game with participants,Explore methodology,	Playtesting,Surveys or Questionnaires
Vallentin-Holbech et al.	co-designers/informants			X	X	Informant	Design a game with participants,Understand preferences,	Feedback Session,Role-play (or simulation),Introductory media (presentation, movie etc),Flow-charts,(Focus) Group Discussion,(Focus) Group Discussion,Playtesting,I

APPENDIX B. CHARACTERISTICS OF STUDIES FROM SYSTEMATIC REVIEW 200

								Interviews (with end-users), Storyboarding
Van Geit et al.	informant			X	X	Informant	Explore methodology,	Interviews (with end-users), Brainstorming, Surveys or Questionnaires, (Focus) Group Discussion, Sticky Notes, Storyboarding
Vasalou & Khaled	informant			X		Co-designer and Informant	Determine Features and Functionality, Create Guidelines, Examine involvement	Interviews (with end-users), (Focus) Group Discussion, Role-play (or simulation)
Waddington et al.	informants			X		Co-designer and Informant	Explore methodology, Examine involvement, Facilitate context discussion	Playtesting
Werner-Seidler et al.	informant			X		Co-designer	Understand preferences, Design a game with participants,	(Focus) Group Discussion, Low-fidelity Prototyping, Icebreakers, Existing Games (demonstration or play), Mind Maps, Sticky Notes, Playtesting
Zhu et al.	codesign				X	Playtesters	Improved User Experience, Design a game with participants,	Low-fidelity Prototyping, Icebreakers, Existing Games (demonstration or play), Mind Maps, Sticky Notes, Playtesting

## Appendix C

# Topic Guide for Interviews with Facilitators

Open with a general introduction and a reiteration of the research: “I am exploring how we as designers and researchers approach the involvement of children and young people in the design of digital interventions (e.g., games, apps, etc.).”

### C.1 General Warm-up Questions

- Can you tell me a little about your role and experience working with children?
  - What approach or method would you call the involvement of children
  - Can you tell me how you were involved in the process?
  - What did you enjoy most?
  - What did you enjoy least?
  - What were some barriers to involving children in the process?

### C.2 Substantive Questions

#### CYP Involvement

- Can you tell me how CYP were involved?
- What was the purpose of their involvement?
- What outcomes or materials were produced?
- Was there any reflection or evaluation of their contributions?
- From your perspective, did you use any measures to gauge engagement or enjoyment?  
Or did they seem comfortable in the design process?

- Was there anything that didn't appear enjoyable or challenging?

### **Engagement and Motivation**

- What methods or strategies were used to engage or motivate CYP?
  - What worked well to keep CYP engaged?
    - What didn't?
  - What improvements would you suggest to others involving CYP in the design process?
- ### **Access and participation**
- What steps were taken to make the process accessible to young people?
  - How would you improve the contributions from CYP in the design process?
  - Were there any instances where CYP appeared disinterested or left out? What did you do to address this?
  - How would you describe CYP participation in your process as a success?

### **Closing comments and Questions**

- Was there anything else you'd like to add regarding the involvement of CYP in a design process?
- Do you have any questions about the research?

## Appendix D

# Open Science Framework

In line with the findings of this thesis, I have endeavoured to share *what* I have done with wider research. In doing so, I have set up an **Open Science Framework** repository to store the following:

<https://osf.io/mfv8e/>

- **Interview Codebook** - There is an Excel file with the references to quotes and codes used as part of the analysis.
- **Workshop Codebook** - An Excel file with two pages, one to organise the Field Note reference and another with example codes.

# Appendix E

## Workshop Details

### E.0.1 Method of Analysis

By employing an iterative process, the results were evaluated and analysed in line with McKenney and Reeves methodology to approaching design based research. Their method presented an iterative process of designing, evaluating, reflecting, analysing and exploring potential next steps at each iteration. This methodology offered a structured approach to designing the workshops and exploring how comprehension and other factors may impact participation and the resulting games produced. Following this approach, I broke down each stage into phases, where the analysis and exploration was the phase I iterated and altered the workshops, which also served as a starting point, feeding in findings from prior research. Design and construction described how the workshops were facilitated and delivered, the recruitment, ethics, participants and data collection methods. Evaluation and reflection discusses the findings and key takeaways before moving into another iteration of analysis & exploration. The scope of the research questions were open to leave flexibility and freedom towards exploring potential factors to impact participation. The analysis of data is carried out in further depth in chapter 6.

### E.1 Results

In the following sections I describe each of the workshops where I present a summary of the workshops design and results. In each instance, I describe the high level design of the workshop, the key findings from its delivery and the main features that were analysed and explored in further iterations.

#### E.1.1 Pilot study

In total, 5 participants between the ages of 10-13 were recruited for the pilot workshop (3 male, 2 female). Parents also stayed to support their children. These participants were recruited via a private gaming shop that hosted after-school activities. All participants were

awarded £20 for their participation. Each participant and their parent or guardian were asked to read through a participant information sheet before signing a consent form. A slightly different participant information sheet was given to CYP to inform them of what their participation entailed, this version was more user-friendly to their age. These can be found in appendix X. With ethical approval, a time slot was found to suit all participants.

#### **E.1.1.1 Design and Construction**

The design of the pilot reflected the procedure set out in section X, where participants would be first introduced to the context and purpose of the workshops. It was in this time focus groups were used to gather comprehension of game design and mental health before moving onto icebreakers. For icebreakers, the pilot study made use of a card game "Pitch it" designed to help support comprehension of game design. Pitch it was a short game designed to help convey a paper prototype but also provide guidance and definition of game design terms. Participants had 1 hour to ideate solutions where they had access to paper materials, storyboarding and existing games to generate solutions. During the workshop, participants were asked to complete the worksheet designed after the fun toolkit Read and MacFarlane (2006). Participants also had 1 and half hours after ideation to conduct prototyping, developing their idea further into a mock up or playable prototype. Towards the end of the workshop, participants were asked to complete paper-based surveys and answer questions regarding their comprehension of game design and mental health.

#### **E.1.1.2 Evaluation and Reflection**

In total, there were four paper-prototypes produced. Each participant mainly chose to work by themselves, where collaborative exercises were not well received. Participants were shy and nervous to share or discuss their ideas with other participants. The data collected by the paper-based survey had mixed responses, though participants were happy to fill them out. It didn't give a true insight or explanation into whether they were engaged. Whereas the worksheet produced from Read et al.'s work had some success, participants were able to articulate their preferred activity and the fun it gave them. However, understanding what activities were preferred wasn't the goal of the research, and participants didn't explain too much as to why they were engaged. What was missing was context or information to help guide participants in designing applied games around anxiety. Some of the participants had a grasp of anxiety, associating anxiety with stress and causes related to peer pressure or feeling overwhelmed. However, I did not provide much scaffolding to help guide participants and I spent a great deal of time discussing how their games addressed anxiety. They happily designed the entertainment side of the game, but due to their lack of comprehension around anxiety, they struggled to not 'tack on' the anxiety implications later.

#### **E.1.1.3 Analysis and Exploration - Key Findings**

The key findings from this workshop indicated paper prototyping, such as writing and drawing, was preferred by participants over other activities such as existing games and storyboarding.

Thus we had an insight into how to engage CYP. Furthermore, we understand that without proper scaffolding and direction, CYP struggled to ideate games that involved anxiety disorders in their designs. The worksheets inspired by Read et al. provided an indication of what activities were preferred but participants commented little on why they preferred a specific activity, this also did not answer what impacted comprehension. Where I used the paper-based surveys, there could be potential to use short surveys to gain a high-level insight into whether CYP was engaged during specific phases of the workshop. Perhaps the largest takeaway was to have the materials and facilitation of the workshop reflect the core research question, as the methods employed in this pilot addressed different research questions.

### **E.1.2 Workshop 1 - York**

In total, 6 participants were confirmed to participate in Workshop 1 in York, 3 male and 3 female between the ages of 16-17. I endeavoured to keep the age groups close to avoid developmental age differences. Two of the male participants shared their preferences on games and interest in game design prior to the workshop. Hosted in the University of York, a seminar space was organised which provided a large space, tables for discussion and interactive whiteboards to work with. A time slot of 10am til 2/3pm was organised with participants, where a lunch break was scheduled and provided for participants.

#### **E.1.2.1 Design and Construction**

The overall delivery of the workshop was planned in stages. The first stage was onboarding, pre-data collection and icebreakers. The onboarding phase was partly conducted via recruitment, gathering demographic information and initial insights into what CYP knew and what they were interested in. The ideation phase involved the use of Pitch it and giving participants time and space to create solutions. The design of the prototyping session was to afford the most time for prototyping and iterating on designs. After the time allocated to ideation, or when participants had an idea they were passionate about, participants were given a short onboarding session on how to prototype and what they can prototype. From there, participants had the remainder of the session to work on their prototypes. During this time I would intend to go around and discuss participants ideas, offering guidance and support.

#### **E.1.2.2 Evaluation and Reflection**

Although all 6 participants confirmed to participate, on the day of the workshop, the three female participants did not turn up. The workshop was just under 4 hours and with breaks, participants seemed content with the duration of the workshop. In this time, three prototypes were produced. Though participants were initially restrained to participate, the icebreaker after pre-data collection, was highly successful in relaxing participants and framing the goal of the workshop. Pitch it enabled idea generation and created a more informal space.

The workshop at York managed to produce three concepts, the first was a VR game concept but lacked any relation to anxiety. The second was “Sam: the Socially anxious ant” a

2D platformer/metroidvania game where players helped other insect with anxious related problems to progress”. Though accurate to the goal, they found their concept boring and lacking any entertainment. It was then they proposed “Social Night” (I named it as they didnt), which was a 3d game. You assume the role at a social event, such as a house party or nightclub. Using social deduction, it tries to deliver graded exposure through gameplay. This prototype was drawn on a whiteboard before role played out. Judging by the participants reaction and excitement, this was something they were proud of and happy to play.

Data collection took longer than estimated, where the digital concept maps took just over half an hour to complete. However, the icebreaker activity using Pitch it was highly successful. The session for ideation was shorter than planned due to the time taken for the pre-data collection. However, the Pitch it activity had already given them some ideas they could adapt for designing games to help with anxiety disorders. The handouts (see figure X) weren’t used by participants, instead they opted to rely on their own knowledge of anxiety disorders, which was predominantly knowledge of FOMO and social anxiety. Participants drew up an idea individually before coming together and working in a team, which seemed to work better. It was interesting to note that participants utilised paper to write out ideas and revisited specific ‘rules’ cards from Pitch it to help describe how their game played.

Having a lunch break allowed participants to relax and this generated informal conversation around game design and game playing. Outside the formality of the workshop, participants seemed to have a greater comprehension of game design concepts compared to having to recall and record comprehension via a concept map. After the break, participants were given the rest of the workshop to prototype. Despite an introduction to prototyping, participants did initially struggle with where to begin. I had to provide more guidance and education at this point to hel communicate the types of prototypes that could be produced. Providing steering gave momentum to the participants where they opted to use a whiteboard to describe roles and a level layout (see figure X). Presenting the solution at the end of the workshop was an appraoch to examine whether participants understood the purpose of their game and whether each participant comprehended how their game addressed anxexity.

To close the session, participants completed the post-data collection, which involved another concept map, surveys and worksheet. The paper based surveys didn’t work too well as similar to the pilot, participants just scored each item highest and there was little room to ask why the workshop was engaging, or what specific parts of the workshop were engaging to them. Even though the paper based surveys were partnered with the fun toolkit worksheet, these were also neglected and offered little exploration of what was engaging or preferred by participants. The concept maps did seem to engage participants to some level, drawing out participants comprehension on game design and anxiety disorders. However, the digital format via Miro took a long time for participants to get used to. They made repeat mistakes and found the tool ‘fiddly’ as they were not familiar with it. Furthermore, they appeared to confuse concept maps with mind maps, despite the initial onboarding instructing the difference. Finally, when participants were asked to complete the post-data collection concept map, there was a lack of engagement given they had already completed the same task 3 and half hours prior. (insert image of maps?)

### **E.1.2.3 Analysis and Exploration - Key findings**

The participants had an existing comprehension of anxiety treatment methods helped them produce the game idea they ended up with. In addition, their knowledge of factors to impact social anxiety helped design goals in their game. As for game design comprehension, their existing knowledge of games they had played, such as Among us, just required the correct terminology on the mechanics of those games. Taking a game and breaking it down helped communicate game design comprehension.

In conducting the workshop, the user of large collaborative tools such as whiteboards, were great to use with groups and gave participants freedom to interact with the space they had. In addition, Pitch it worked as a both an icebreaker and tool to inform participants about game design. Having a break also helped relax participants and create a more informal atmosphere which led to insights on their game design comprehension. However, the attrition of participants was concerning, with 50% of participants not turning up, it left the three remaining participants to work in a group of three. Working in a group of three was functional as the participants knew each other, but there was imbalance in the collaboration, with one participant writing and drawing more than the others.

Reflecting upon the data collection methods, digital concept maps were too time consuming, where prior training may have been necessary to help participants understand a) the technology and b) how to complete a concept map. With the continued use of the paper based surveys adopted from Naibert and colleagues Naibert and Barbera (2022), I found that the surveys were limited in the data that could be inferred on engagement. Researcher notes and observations were a more reliable data collection method for exploring engagement.

Upon analysing the workshop design, ideation appeared to be easier than prototyping. The prototyping was initially a challenge to the three participants where they were confused as to how to develop their idea further. Providing examples and context can help guide participants here.

Finally, the facilitated space was not ideal. As commented by professionals in chapter X (interviews), the environment and space for participatory design workshops can impact the success of participation. Though the seminar space was neutral and I had introduced game design elements, the location on campus made for a formal environment. This seemed to affect participants initial confidence and some of their ideas. In addition, another facilitation challenge was providing accessible technology. Prior arrangements for laptops and wifi connections were arranged which weren't fulfilled.

### **E.1.3 Workshop 2 - Stirling**

The recruitment for Stirling Workshop was approached differently. Given the setting and space of workshop 1 was too formal. I contacted code clubs in surrounding areas to whether these workshops would be of interest. I circulated an advertisement via these code clubs and an eventbrite link. The link included a participant information form but also allowed parents and guardians to deliver consent forms on arrival. In total, 20 participants signed up for the workshop. The code club offered to help support this larger number where staff had

volunteered to help run the workshop for larger numbers.

### **E.1.3.1 Design and Construction**

Given the key takeaways of the workshop in York, I was keen to improve the facilitation but also the design of the workshop. I endeavored to keep the onboarding and introductions at the start of the workshop as this helped frame the goal of the workshop to participants. In addition to the introductions, I added an icebreaker activity where participants take a few minutes to note their favourite games and why they like them. The main change for this workshop was revising the design of the worksheets. They had not worked in the York Workshop, but had some success in the pilot. Given what I had learned. I expanded the worksheets into booklets, providing information and guidance to participants (see figure X for worksheet, appendix x for booklet). The booklets were designed to follow the process of the workshop but also as the data collection method. Three booklets were used where two served as data collection (see appendix X), these contained examples of a concept map that could be completed by participants.

Once participants had completed introduction and pre-data collection, participants would be guided through ideation. As Pitch it had worked quite well in both previous workshops, I included it as a possible ideation tool. In addition, I also included an additional ideation step involving post-it notes. Post-its had been described as a tool in chapter X (systematic review) where researchers had employed them for brainstorming (ref) or for voting (ref). I employed post-its as the former, where participants would brainstorm game design and anxiety concepts. This would provide an idea of the groups comprehension in those contexts, as well as providing a starting point for ideation. With the alternative ideation steps, I also amended how I communicated prototyping. Given the 16-17 year old participants of Workshop 1 were unaware of how to approach prototyping, I organised a few slides to showcase what could be prototyped in the time they had. I included images of the two prototypes designed by Workshop 1 as reference.

### **E.1.3.2 Evaluation and Reflection**

Through the Eventbrite link, a total of 20 participants between the ages of 10-13 signed up for the workshop at Stirling. However, on the day, only 11 participants turned up. This was a significant attrition and again, female participants who had signed up did not turn up. All the participants were male and expressed an interest in both games and mental health. One of the participant's parents noted their child was autistic and if any help was needed, to call for them. The majority of the participants had experience playing games such as Fortnite and Pokemon. In total, there were four game prototypes were co-designed with participants.

In total, the workshop lasted just over 4 hours with a short break. Participants were happy with the duration of the workshop and even expressed a desire to stay another 4 hours and work on their prototypes more. The facilitation at Stirling was a much more appropriate space, with a more relaxed atmosphere, child friendly space, and access to technology. In addition, the greatest help was the two volunteers of the code club who helped facilitate the workshop. With their assistance, they were able to provide guidance to CYP given the larger

number of participants.

The introductory session and data collection of favourite game and why was highly successful way to break the ice and open a dialogue around game design. The data collection using the orange booklets (pre-data collection) was much quicker than Workshop 1, where some participants completed the data collection faster than others, I moved them onto the next task. To gently introduce participants to ideation, I had tables (groups of 4 or 5) try to play together with Pitch it. I divided the deck of pitch it into 2 and gave the participants a quick tutorial in how the game plays. In one group, two participant didn't engage with Pitch it at all and expressed a desire to play a game they already knew.

Given workshop 1 presented some initial challenges to coming up with solutions, I utilised the post-it brainstorming session to engage participants and come up with;

- Goals for a mental health game
- Rules for games (mechanics or constraints to the game)
- Art/theme style for game
- Character/entities for a game
- Experience the game creates

By taking time with each component, the post-it brainstorming exercise allowed participants to work at their own pace and once complete, I had a group sample of data on what CYP knew about game design and mental health. Participants were then encouraged to take one from each component, they were free to work in groups or individually. One challenge I observed was participants picking their own components rather than exploring the other options. After components were picked, participants were given time to come up with ideas around their components. There were a couple of participants that struggled with ideation around the components selected but with some collaboration and constraints, they were able to engage. At the conclusion of the brainstorming activity, most participants or participant groups had an idea of a game to help with anxiety disorders.

After a break, participants were asked to begin prototyping. Firstly, I demonstrated the various types of prototypes they could produce and showed them examples of what was produced in workshop 1 and the pilot. There was a noticeable difference in how participants took to prototyping compared to workshop 1. With examples, participants expectations were addressed and they actively began prototyping. Group sizes were also an issue during prototyping with larger groups of 4+ having an imbalance in team cohesion, therefore larger teams were split into pairs. The use of laptops presented some challenges to prototyping, firstly there was issues of connectivity to wifi, where the delay in getting connected proved distracting. Secondly, some devices were better than others, causing frustration or errors when loading applications. Finally, there were limited applications available for participants, in addition to hardware such as mice, this limited what participants could do. However, despite these difficulties, participants genuinely seemed more engaged to work with laptops than with the paper booklets.

Towards the end of the prototyping session, I handed out the purple booklets and asked participants to take 5 minutes to complete the data collection. Once participants realised the purple booklets were similar to the orange ones, there was distinctly less effort and enthusiasm to fill it out. Toward the end of the workshop, each participant presented their idea to the rest of the workshop. The volunteers and I asked questions to prompt further discussion on how their game worked and how it helped with an anxiety disorder. Though there were participants nervous to present, an added confidence booster was the participants who wanted me to present with them, in two instances, the pairs wanted me to present their idea but then took over to correct me or add more details to what I was saying. This suggested a growth in confidence and comprehension. The showcase and presentation was highly effective in capturing comprehension from the participants as they were describing the game design and anxiety disorder in their prototypes

### **E.1.3.3 Analysis and Exploration - Key Findings**

The main difference in data collection in workshop 2 was the addition of the booklets. Data collection via the booklets was much quicker than the computer-based method in workshop 1. In addition, the examples I had attached to each concept map helped direct participants on how to fill out the data collection booklet. The additional data collected around the games they played and why was also a useful insight. Where the blue booklet had a space for recording ideas, the majority of participants used the booklet as a reference and chose to ideate and prototype outside the booklet. This wasn't an issue, and it led me to believe the booklet was better as a reference and data collection rather than keeping participant constrained to the booklet.

Regarding the booklets and data collection, the concept maps were met with some success. The first concept maps were filled out but again, participants were reluctant to complete the later post-data collection materials. At analysis, the concept maps for mental health and anxiety were much more detailed compared to game design. A challenge to completing the later concept maps could be due to the engagement of prototyping or the reluctance to complete an activity they've already done.

The handouts that were used in workshop 1 were not utilized at all in this workshop. Despite their additional inclusion in the booklet, participants favoured to use their existing knowledge when addressing the mental health aspects in their game ideas. However, with the access to laptops, participants did use these to help research how their game could help with anxiety disorders such as general anxiety and depression. The access to laptops was a mixed success, where they provided a lot of engagement to participants but required a lot of maintained support with some devices requiring connectivity and support to help use them.

In workshop 1, the older participants aged 16-17 seemed more comfortable with ideation than prototyping whereas with this age group, they seemed more comfortable with prototyping than ideation. There were challenges to problem solving and generating a solution. However, after a solution was co-designed with myself and volunteers, participants were much more confident in their ability to prototype the game idea. This may be due to demonstrating various prototypes and managing expectations. Finally, the showcase and presentations at the end were beneficial to capturing the end-product and learning participants comprehension

about applied game design.

### **E.1.4 Workshop 3 - Edinburgh**

The recruitment for this workshop was similar to workshop 2, utilising code clubs and eventbrite to manage expression of interest. In this instance, there were 12 participants signed up to the event after circulating advertisements between the code club and social media. Again, there were volunteers on hand to support if needed.

#### **E.1.4.1 Design and Construction**

Based on the key findings of workshop 2, there were a few changes made to the design of this workshop. Firstly, I revised how the data collection would be handled, giving participants the first concept map back to annotate any changes or knowledge they learned as a result of the workshop. Secondly, I amended how I communicated the mental health context of the workshop. The handouts had not met much success so I opted to provide an onboarding stage with discussion to help participants learn about how to raise awareness or what tools and techniques can help people with an anxiety disorder. Another main change was to try ensure laptops were available, even to share between a pair of participants.

With the success of the showcasing and presenting, I opted to encourage this before the end of the workshop so that any feedback or changes could be made before drawing the workshop to a close. Finally, with the challenges to recording the audio of larger groups, I endeavored to provide a conference microphone to each participant group.

#### **E.1.4.2 Evaluation and Reflection**

Workshop 3 suffered the most significant attrition where 12 participants had signed up, only 6 turned up. However, of those 6 young people, 3 arrived without parental consent. This was also the first workshop with a female participant. These participants returned to the other activity of the code club. Of the three remaining participants, all of them talked about their experience in scratch coding. Their parents stayed to participate, the first first workshop since the pilot to do so. The facilitation space was a large table and again, access to laptops was provided.

The introductory session was much more challenging with workshop 3 participants. Managing behaviour was a challenge, where all 3 participants were talking over each other and overexcited. Though there wasn't a shyness, there was a struggle to convey the purpose and role of the workshop to the participants. To try and focus the participants, Pitch it was used to try gather the participants into a cohesive group and work together on generating possible solutions. The parents and guardians played along but in most cases, answered on behalf of their children who appeared disinterested.

In an effort to engage participants, I provided constraints on generating a game idea to address anxiety and gave each participant the booklet to draw out an idea they had. One

of the participants embraced this challenge but the other two participants were disengaged to participate. The oldest participant of 12 produced an idea that lacked any context of anxiety disorders. They were disinterested in designing an anxiety game and asked to leave the workshop. The remaining two participants eventually generated a game idea with support from myself and parents on helping someone who's anxious.

The prototyping session was fraught with arguing between the last two participants, arguing over their ideas. It took significant behaviour management to have them focus and develop their ideas. As both participants expressed experience in scratch coding, laptops with scratch were supplied. Both participants struggled to produce anything in scratch without myself or a parent creating the code for them. As a result, I suggested inklewriter as a prototyping tool to create a narrative game. This was by far the most engaging component of the workshop. The browser based narrative game completely changed the environment with both participants working cohesively and asking questions on how to add features and content. When it came to the post-data collection and presenting, participants could not be persuaded to complete either of these.

#### **E.1.4.3 Analysis and Exploration - Key Findings**

Overall, the workshop at Edinburgh was challenging. There were significant challenges to recruitment, retention and behaviour management. However there are a few key findings that can be drawn from the results. Firstly, the use of laptops is predominantly more engaging than paper based methods. In particular, the use of a simple browser based engine, inklewriter, grabbed the attention and produced prototypes. However, none of the prototypes produced related to anxiety disorders or mental health. With the challenges of managing behaviour, it was difficult to communicate with participants and co-design a solution to address anxiety.

Workshop 3 also suffered significant retention with two participants dropping out. The first was disinterested in designing a game for anxiety, therefore steps need to be taken to ensure participants are aware of what they are signing up for. The second participant to drop out was the female participant, they struggled to cope with the level of noise at the code club where there were other events on. This suggests more time should be taken at recruitment to ensure a facilitated space can accommodate participants.

#### **E.1.5 Workshop 4 - Ayr**

The final workshop was conducted at a secondary school. This was the first workshop to be conducted on school time. The school asked pupils of computer science for their interest, producing 18 participants aged 13/14. As this workshop was to be hosted during school time, the workshop was split across two days, an introduction and ideation session and a prototyping and evaluating stage. Given the challenges of workshop 3, I did not make significant changes to the design of the workshop.

### **E.1.5.1 Design and Construction**

The design of workshop 4 was packaged to include a few more onboarding sessions where there would be a break of a couple days between phases of the workshop. In addition, I removed the used of pitch it in this workshop. Pitch had some challenges with workshops 2 and 3, and given the larger number of participants, the brainstorming post-it exercise seemed more appropriate. The only other change was to the format of the showcase and presentation of ideas. I included a group voting to co-evaluate each idea presented. This would challenge participants to defend and discuss their prototypes and rate them based on their feasibility, fun, freshness and fitness (fit for purpose) (REF).

### **E.1.5.2 Evaluation and Reflection**

This school-based workshop provided key insights into the challenges and opportunities of engaging young people aged 10–15 in co-design activities around anxiety-themed game development. The first day was devoted to ideation, yet without the presence of a teacher, participants exhibited limited attention and focus, requiring intensive one-to-one facilitation to maintain engagement. While initial data collection using booklets encouraged some reflection on favourite games, the format was perceived as unengaging, and a few participants expressed disinterest or responded inappropriately.

Concept mapping revealed a limited understanding of game design, extending only to superficial features such as coding or animation. Furthermore, several participants struggled to grasp the concept of anxiety, which impeded their ability to incorporate it into game ideas meaningfully. Despite this, breaking down games into components, rules, goals, themes, and experiences resulted in several promising design discussions. As ideas began to take shape in paired work, the reintroduction of anxiety concepts prompted participants to evaluate or adapt their game ideas. Notably, two girls developed a particularly novel design that thoughtfully engaged with anxiety, despite contributing minimally to earlier mapping activities. At the same time, another participant iterated on a solo design to embed mental health relevance.

The second day of the workshop, which focused on prototyping, benefited significantly from the teacher's presence. Participants behaved more constructively, and the provision of multiple prototyping formats (e.g., posters, PowerPoints, mock screenshots) enabled most groups to produce tangible design artefacts. Compared to the ideation stage, prototyping was more task-oriented and less cognitively demanding, and many participants responded well to this structure. However, some groups did the bare minimum, suggesting a need for clearer expectations or motivational strategies. Those who were fully engaged presented thoughtful design outcomes, some of which explicitly addressed anxiety through game mechanics or narrative framing.

While the idea of presenting designs in front of peers proved intimidating for some, the class-wide vote and structured pitch format encouraged participation and fostered peer feedback. The exercise also revealed that some entertainment-focused designs lacked a clear, unique selling proposition (USP), highlighting the need for further scaffolding in distinguishing original ideas from existing games.

### E.1.5.3 Analysis and Exploration - Key Findings

The presence of a teacher had a clear positive impact on participants' behaviour and engagement. In workshops where the teacher was absent, maintaining attention required intensive one-to-one facilitation, underlining the value of a familiar authority figure in structured co-design activities.

Many participants showed limited understanding of both game design concepts and the topic of anxiety. This lack of foundational knowledge hindered early ideation, with some unable to differentiate between game elements or define anxiety in a meaningful way. As a result, facilitator guidance was crucial in scaffolding their design process.

Compared to open-ended ideation, structured, task-oriented activities such as prototyping were more successful in maintaining focus and productivity. Participants responded better when given concrete goals and examples, suggesting that scaffolded processes are more effective than abstract brainstorming for this age group.

A recurring challenge was the mismatch between participants' expectations and the realistic scope of the workshop. Many anticipated building complex, 3D games similar to commercial titles like Minecraft or Roblox, and expressed disappointment when introduced to simpler 2D or paper-based prototyping. This reflects a broader lack of understanding about how professional games are developed and highlights the need for clearer expectation-setting.

Despite these limitations, participants demonstrated creativity and problem-solving skills that were not necessarily tied to their understanding of either anxiety or game development. Some generated compelling ideas based on intuition or personal experience, affirming the potential of co-design methods to elicit valuable contributions from young people, regardless of their technical background.

However, behavioural issues occasionally disrupted the workshop environment, with some participants submitting inappropriate content during ideation tasks. This highlights the need for firmer ground rules, improved supervision, and more clearly communicated expectations in future iterations.

Presentation anxiety emerged as a barrier during the final stage of the workshop. While many participants were willing to discuss their ideas informally, the prospect of presenting to peers discouraged engagement. Alternatively, lower-pressure methods for sharing and evaluation may be more inclusive.

Finally, gender dynamics and modes of participation played a notable role. While female participants were fewer in number, they often produced the most thoughtful and anxiety-focused game concepts. Similarly, some individuals thrived when working alone, suggesting that flexible grouping and attention to individual working styles can help support deeper engagement.

## Appendix F

# Expression of Interest for Workshops

**Participants Required**

Eligibility Requirements:

- 18+ years old
- Participated in co-design, participatory design, collaborative workshop etc with children or young people
- Able to share your experience of a collaborative project you participated in (not under NDA)
- Zoom or other video calling software installed
- You can spare 45-60 minutes, thank you!

*How do we better deliver user involvement methods, like co-design, with children and young people?*



Figure F.1: Example of one of the Posters and web images used to recruit participants to studies. QR codes removed.

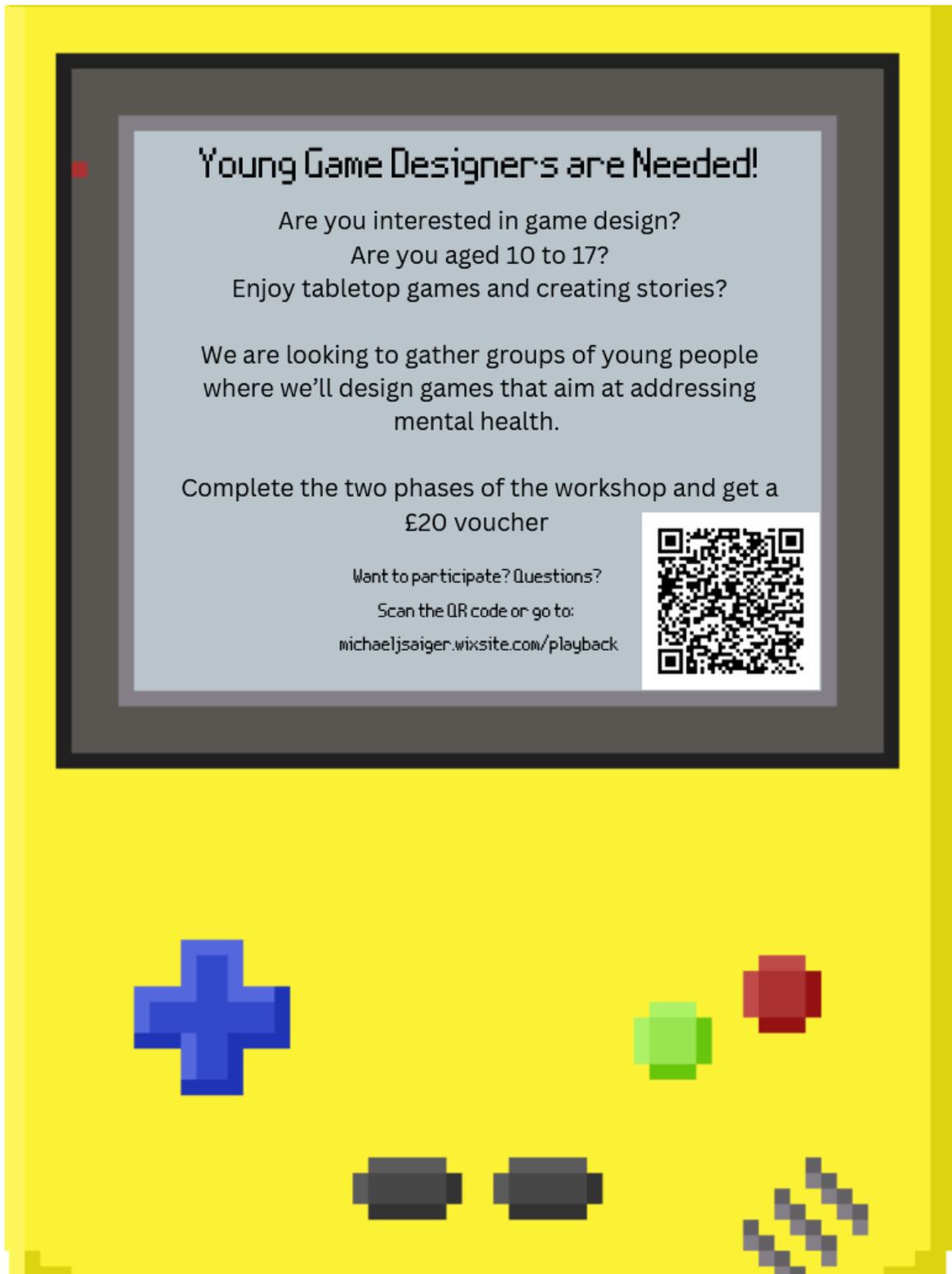


Figure F.2: Another Recruitment poster circulated amongst code clubs and schools

# Appendix G

## Playback - Website for reporting back

This appendix provides reference and images to the co-design work conducted with young people. Read et al. (2022b) described that ethical involvement of CYP should consider reporting back to young people, in addition to being up front and honest about the purpose of research. Each participant was made aware of the website, and follow-ups with each workshop site were also given a link to the website in case CYP wanted to reference the work they had participated in.

Website at <https://michaeljsaiger.wixsite.com/playback>

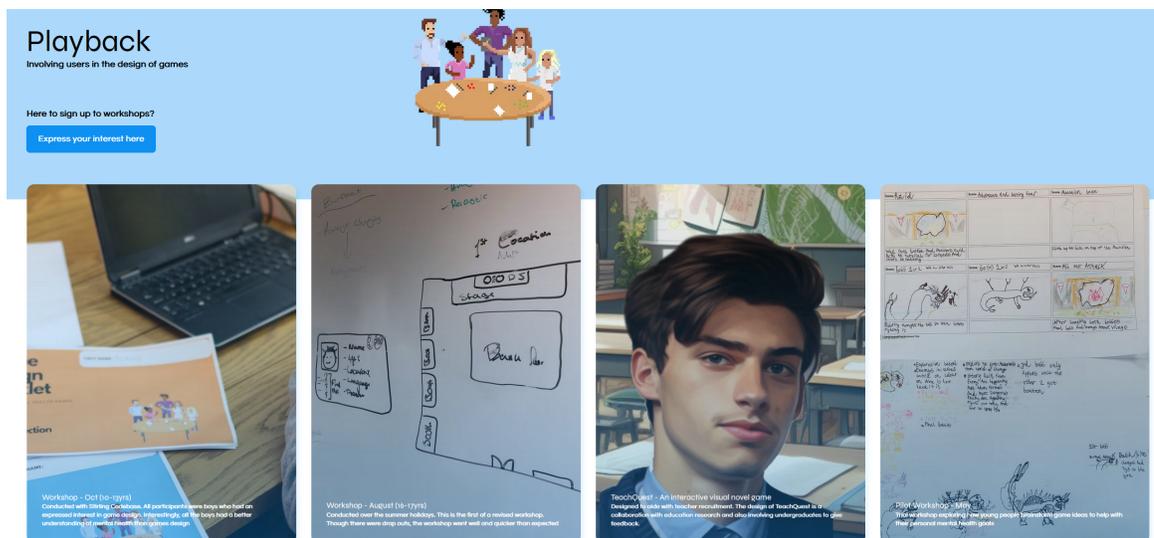


Figure G.1: Website reference image

## Appendix H

# Participant Information and Consent

## Exploring children and young people's engagement and comprehension during the design of a game around anxiety problems

### [Participant Information Sheet](#)

#### What do you know about game design? Or anxiety problems?

- We are looking for young people to partake in game design workshops to design a game that addresses anxiety problems
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Discussing and designing game ideas in relation to anxiety problems
Learn about game design and anxiety problems
Express what you like about participating
Workshops are in two parts, both about of 2-3 hours in length
Run by a Games researcher
Available to host at a friendly local gaming store, school or university grounds.

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5. The workshop will last between 2 and 3 hours with breaks, after which we will arrange the next workshop for a suitable date with the possibility of additional workshop sessions in the future if you wish to participate.

6. After concluding your participation in the workshop, you may be asked some final questions on your experience

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**Are there any advantages or disadvantages of taking part?**

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I have received satisfactory answers to all of my questions	
I have received enough information about the study	
I understand my participation in the study is voluntary and that I am free to withdraw from the study:- <ol style="list-style-type: none"> <li>1 At any time/up to 8 number of weeks post-study</li> <li>2 Without having to give a reason for withdrawing</li> <li>3 With withdrawal, I can request that my data not be used in any future use and will be destroyed.</li> </ol>	
I understand that my participation will be audio-recorded.	
I understand that any artefacts (e.g. paper prototypes, designs) may be recorded via photography.	
I understand that any information I provide, including personal data, will be kept confidential, stored securely and only accessed by those carrying out the study.	
I understand that any information I give may be included in published documents but all information will be anonymised.	
I agree to take part in this study	
Participant Signature .....	Date
Name of Participant	
Researcher Signature .....	Date
Name of Researcher Michael Saiger	

## Exploring children and young people's engagement and comprehension during the design of a game around anxiety problems

### [Participant Information Sheet](#)

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# Appendix I

## List of Prototypes

This appendix summarizes all the prototypes developed by children and young people during the workshops.

### I.1 Workshop 1 Prototypes

#### I.1.1 House Party

Together with participants A, B, and C, House Party was a game about tackling social anxiety through exposure therapy-based steps. The goal was gradually working through more challenging social tasks through a social deduction game. Players would be tasked with learning a shared interest (generated on a card) from another player or non-playable character (NPC).

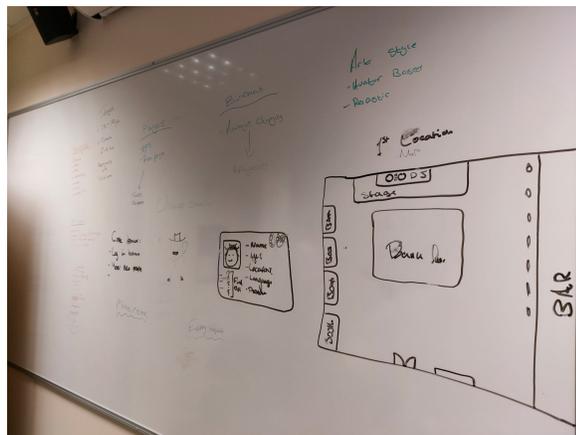


Figure I.1: Prototype of *House Party* which was a combination of role-playing and whiteboard prototyping

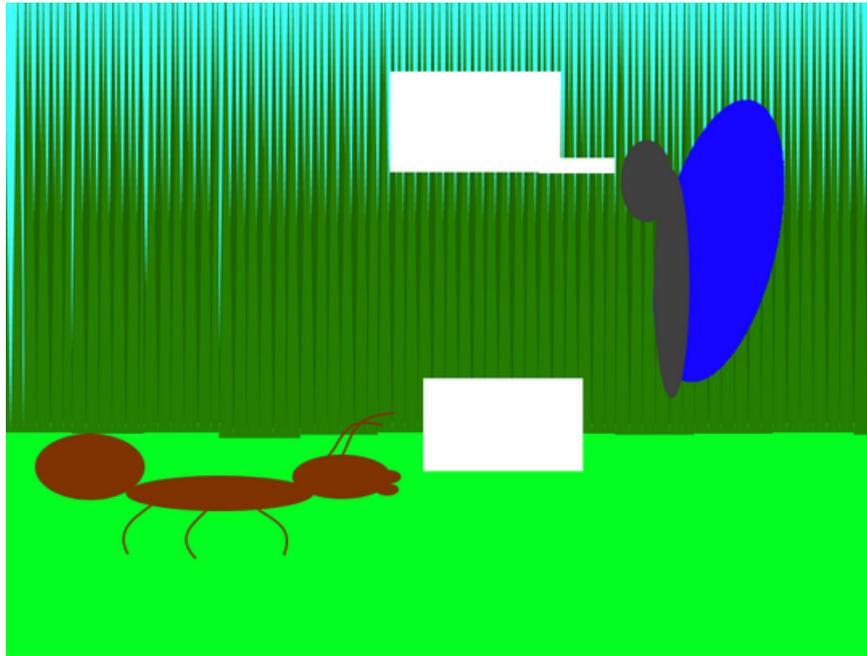


Figure I.2: SAM the socially anxious ant mock screenshot designed by participants A, B and C.

### I.1.2 SAM the Socially Anxious Ant

Made by participants A, B and C together. SAM was the second prototype the group of participants attempted to make. Though they created an overall narrative and screenshot, see I.2, they did not find the game entertaining, nor something they would likely play. The game featured a 2D platformer where you learned social skills from different insects.

### I.1.3 Unnamed Airport Games

All three participants made this game by playing the Pitch it icebreaker. Participants enjoyed creating an 'airport' simulator whose goal was to manage the anxiety of passengers and flights throughout a busy airport. This was seen as a strategy game, but participants struggled to provide evidence that the game could support anxiety in young people their age. Though significant interest was in the gameplay side of things, participants naturally moved on towards a new idea.

## I.2 Workshop 2 Prototypes

### I.2.1 Back To Earth

Participants E and G designed a combat game around the goal of achievement and overcoming anxiety and loneliness. The goal of the game was to work together and overcome challenges

## Characters\main characters

At the start of the game you get the choice of male or female the name of the female is bobbie and the name for the male is bobby with a character creator and you get to choose a role between 5 different characters archmage archer warrior engineer captain and there is a messenger bear that flies



Figure I.3: Caption

co-operatively. Players could not complete levels without the help of specific skill of other classes. The participants described it below: *"There are parts of the game that you can't do without help. You won't win without making friends with other people that are other classes. The goal is to help with concentration. You're playing with people that you don't know and develop friendships. There is no communication to those people playing the game, you have to talk to people in the game using actions. (similar to journey). Messenger bear is a pet that can help players when they are stuck. It can go get help when the player is confused. If you're not doing so well in class and concentrating. Um to make better friends, it gives you options and pop ups to help build up relationships."*

### I.2.2 Factory Odyssey

Participants A + B designed a similar game to *Back To Earth* after originally being part of the same group. Their interpretation was that anxiety was impacted by sleep, so the main mechanics of the game was a day/night cycle to affect the player's character. The game would become significantly harder if played late at night and easier during the day, promoting the player to sleep at night rather than gaming.

Description given by participants: *So we wanted to make a day night cycle that basically like, you need this to put the character to sleep and stuff. and and it would be a day, night cycle where and the characters could be fatigued. And and this could make help. People have better sleep. Because the light in the game would go dimmer and less things they can do if they play late at night. and because, like these are all 5 different people. So we thought about helping people subtly. So everything like that we would make into implement subtle things because something I thought about was if somebody gave me a game and said, Oh, yeah, here's a game to improve your mental health, and maybe we'll play for 1 h, and then I'll put it in like my games library. But I won't actually play it. But if I have a game which I have like, it's like a really cool Pvp game. Everything like that, I mean, like there could be like tons of like people who would actually play it.*

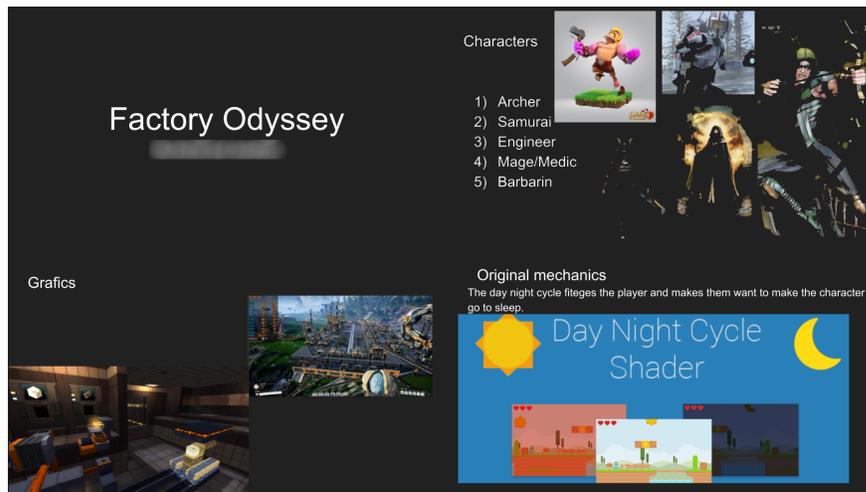


Figure I.4: Factory Odyssey in Google Slides

### I.2.3 You Will Always Have Family

The player is a necromancer with no memory of what happened. Their family are spirits who provide well-being and advice. Gameplay. Raise people from the dead to complete specific tasks. Tasks help you with your anxiety and depression, alleviating the 'cloudiness' in your mind. As you complete more tasks and take steps to combat depression and anxiety. You learn more powerful spells to raise more complex creatures to complete more tasks. The twist in their game was that you learned you killed your family. It was very dark, but the gameplay sounded fun, and they detailed how your character (left) and others would respond depending on their mental health.

Description by Participant: *So so my game is to kind of help people who are suffering from like anxiety, depression, and Ptsd and loss of loved ones. -It goes through story recovering from it (ptsd). The more he recovers, the more he can use, the more powers he will get from his mind, clearing up -that means he can go back through his family tree to talk to them for advice -He hired people. (referencing raise up people to earn money or help with therapy) So then we can pay for therapy.*

### I.2.4 The Dome

Participant C and D originally started working together, but cohesion issues resulted in both dropping off during the workshop. Participant C did have a grasp of anxiety problems and proposed a game called the 'Dome'. A 2d game where a player has a finite amount of time to stop a large impending dome from wiping out their town. The game was a balance of managing the impending doom and the player character 'Bob' who would 'pass out' upon becoming too anxious.

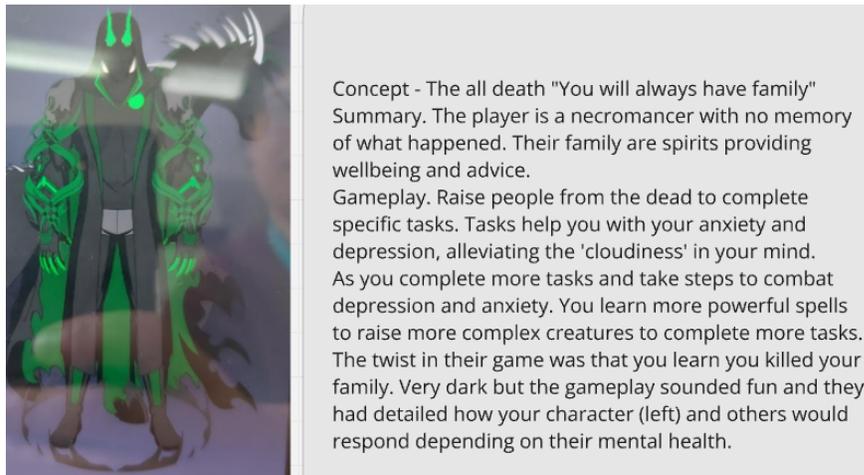


Figure I.5: Ai generated character for You will Always Have Family

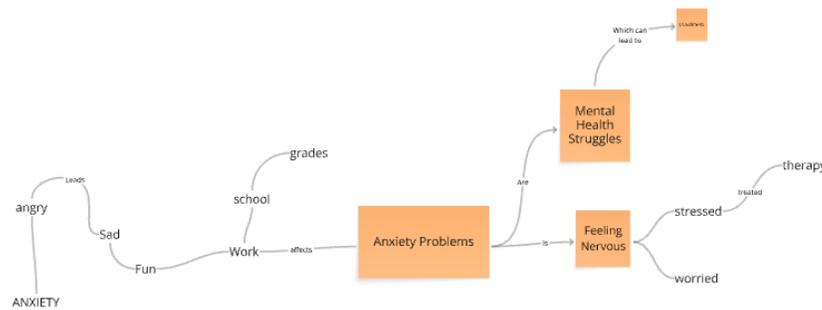


Figure I.6: Participant C's grasp of Anxiety from Concept Maps

### I.3 Workshop 3 Prototypes

#### I.3.1 X's Castle

Participant A and B initially attempted to collaborate on a shared idea but challenges to behaviour resulted in working by themselves. Participant A was introduced to Inklewriter and became much more engaged. After 2 hours, they ended up with a simple text-based adventure that involved them exploring a castle that was heavily inspired by creatures and features from *Minecraft*, there was little to no use of mental health in the design. The game presented three paths to explore the castle, with a number of loose ends where they had not completed the story thread.

#### I.3.2 Participant B - Minecraft

Participant B attempted to engage with the workshops but there were significant behavioural challenges to manage. The most the participants produced was a like-for-like clone of

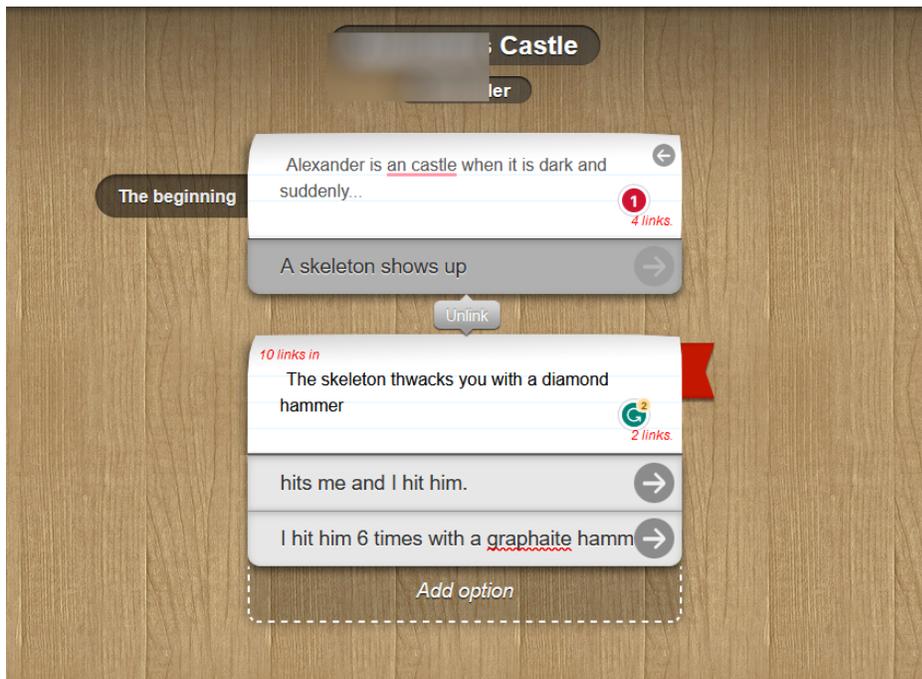


Figure I.7: X's Castle - An Inklewriter game

Minecraft, revolving around them playing as a 'mob' (entity) within the game.

### I.3.3 War Thunder Clone

Participant C designed a massively multiplayer game on paper before pitching and describing how they wanted to learn how to make 'War Thunder', an existing IP. Though they had a good grasp of game design, midway through the workshop, they became disinterested in refining the idea for an applied context and wanted to leave. The participant was given information on game design and development tools. This may be an example where the parent was more invested in the idea behind the workshop than the child.

## I.4 Workshop 4 Prototypes

### I.4.1 Craftmine

Two male participants created 'Craftmine' an alternative to *Minecraft*. The rest of the groups deemed this game unfit for purpose, as it featured no aspects related to mental health. The participants used AI image generation and sketches to develop the prototype. Despite co-design efforts to refine the idea, there was no interest in implementing mental health considerations into the design. Craftmine was pitched as a cross between *Minecraft* and *Call of Duty*.

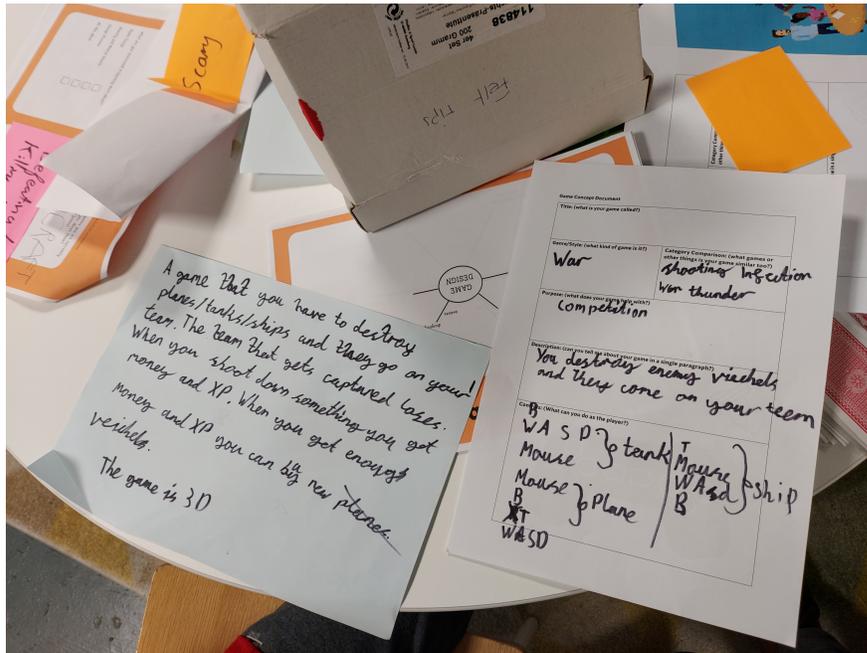


Figure I.8: Participant C from Workshop 3 produced a game that was designed to emulate an existing game 'War Thunder'



Figure I.9: Craftmine - Two participants from Workshop 3 created with AI image generator



#### I.4.2 Zombie Pulse

Two male participants proposed *Zombie Pulse*, a ‘*Call of Duty*’ inspired game. There was an initial idea behind working together to alleviate social anxiety through playing together and promoting cooperative rewards. Despite co-design efforts from teaching assistants and designers, this idea did not develop further than a *Call of Duty*-style game set in local areas.

#### I.4.3 Alienship

Two female participants, a teacher and a designer, helped co-design *Alienship*, though the initial design was all down to the young people. The game featured a multiplayer format where participants could not see each other but could see an alien. They all had specific tools to help capture and release the alien back to his ship. The idea was that each player needed to be social and communicate what tools they had and where they could see the alien so that they could corner it and catch it.

#### I.4.4 Untitled

Two to three participants co-designed a game over the two days, which was akin to *Rainbow Six Siege* and incorporated elements of anxiety. Their suggested game was rescuing people with severe mental health issues from a warzone. The teacher made an effort to challenge the idea on how this game would impact players from warzones. Additionally, the designer (myself) questioned how the rescuing element helped with severe mental health when it was assumed the ‘helping’ was more of an objective marker than a process. There were changes in the participants between workshops due to absences. The idea did not develop further from *Rainbow Six Siege*.

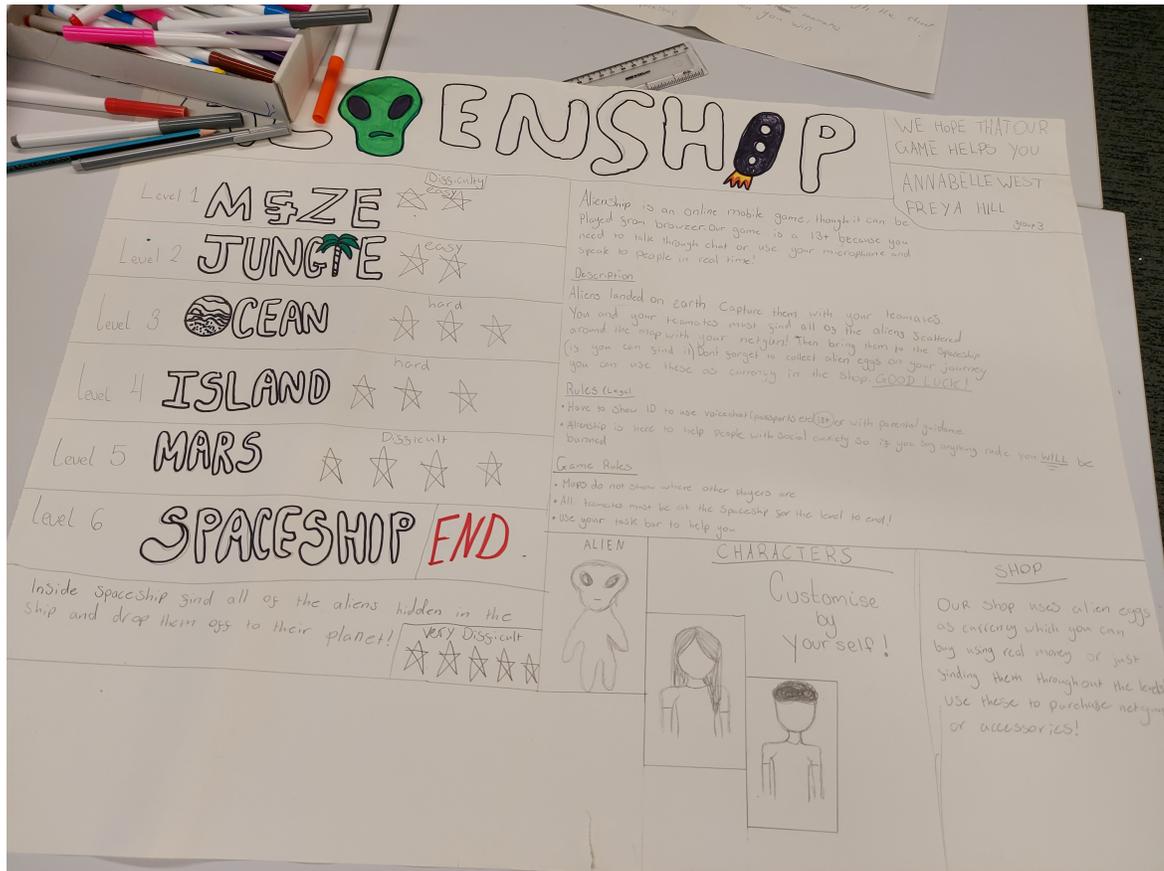


Figure I.10: Alienship designed by two female participants. Social Anxiety was the focus of the design

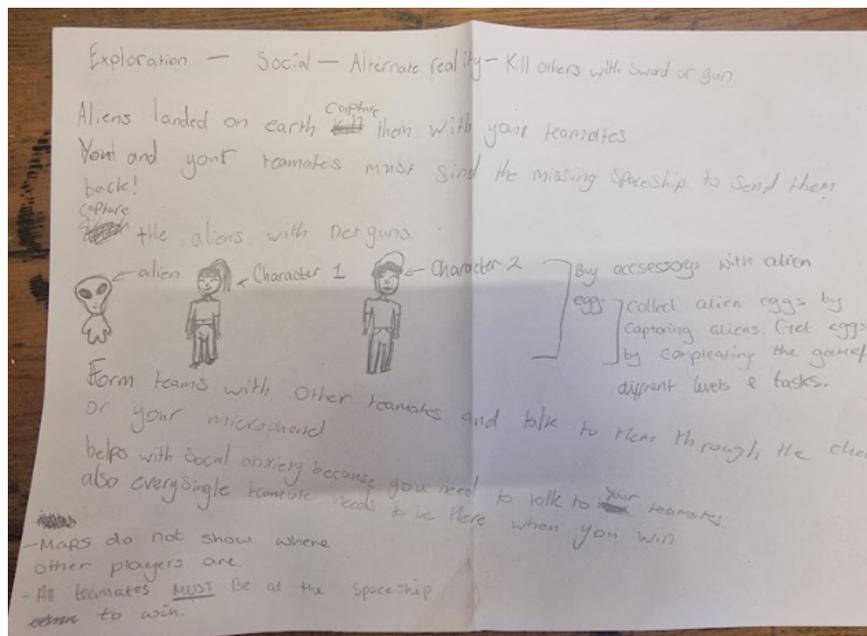


Figure I.11: More details on Alienship

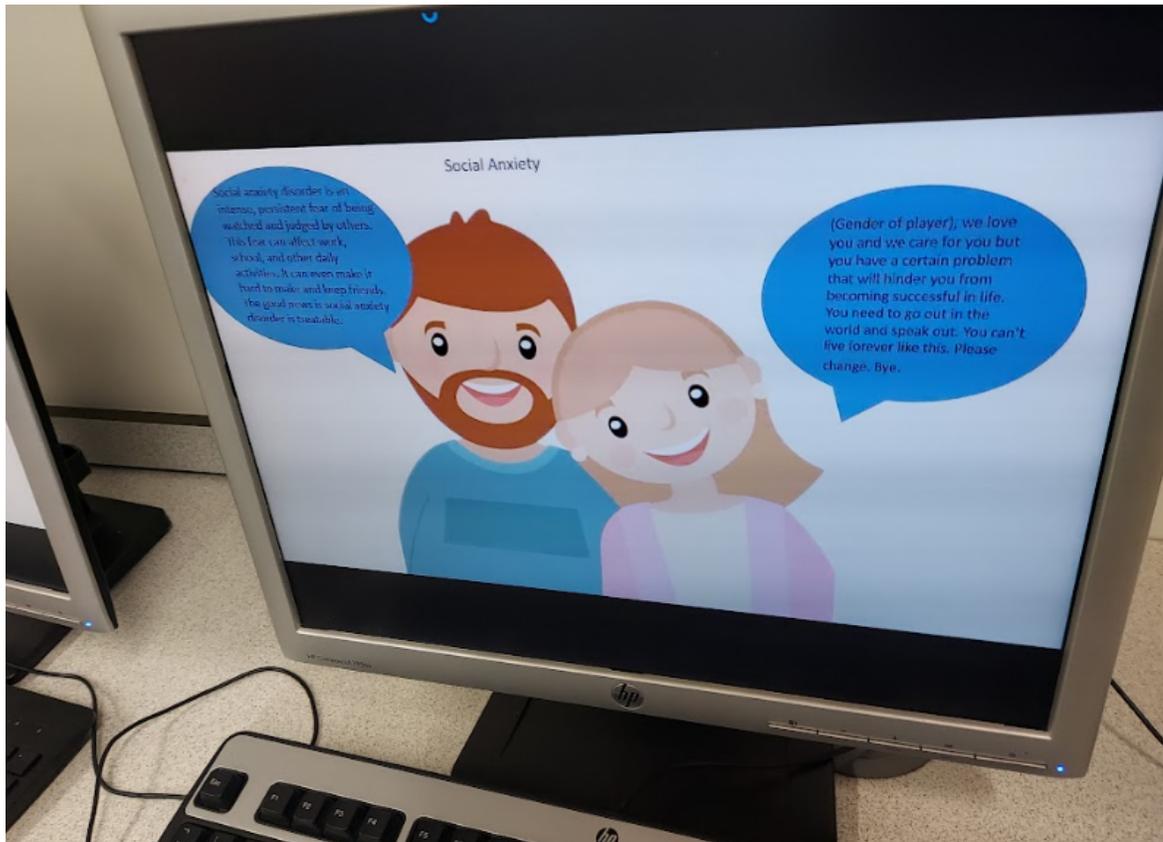


Figure I.12: Mr Anxiety Solver - A narrative game solving anxiety for friends, family, and characters.

#### I.4.5 My Anxiety Solver

Voted the best by all CYP in workshop 4. One participant co-designed a slide show for Mr Anxiety Solver. The initial idea was a narrative game with a map where you could visit characters and places in a fictional community (based on real world). With iterations and feedback, the game focused more on the dialogue and reward from helping people with anxiety problems.

#### I.4.6 Space Cats

Space Cats was co-designed with two neurodivergent boys, a teaching assistant and a designer. This was a 2D game where the player pilots a car around space, searching for lost cats and returning them to their anxious owners. The longer cats were missing the more anxious the owners became. Sadly there was not time for the participants to share and playtest with other groups.

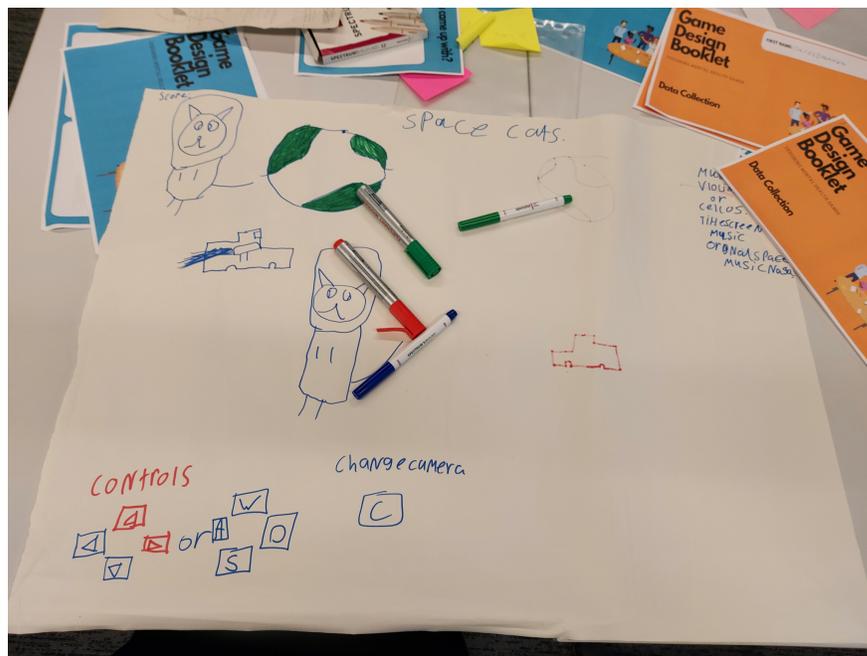


Figure I.13: Space Cats - Made by two neurodivergent boys

## Appendix J

### Pitch it

See full webpage for details on Pitch it at: <https://mikethingsbetter.itch.io/pitch-it>

For Reference, images below detail how Pitch It works:

# Ideation - Pitch it

It's time to come up with some ideas

### Idea Generation

Let's play Pitch'it, a card game to challenge each person to come up with game ideas.

**How it works:**  
Take the 'project brief' cards, shuffle them and stack them face down in the middle of players.  
Take the rule, art/theme and experience cards. Shuffle them and deal each player 5 cards.  
Oldest player goes first. Draw and read out a 'project brief card'. You are the client

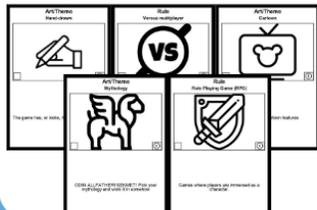
Now the other players must try come up with a game idea using a minimum of three cards in their hand.

For example, let's say this was the brief:

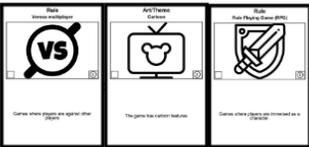


A game about the life of a cat

and this was our hand



We could pitch these three cards and suggest:



"A cartoon-style game where each player is a cat. The objective is to claim territory and treats from other cats. These treats allow players to unlock new abilities such as higher jumps and squeezing through small gaps"

Once every player has pitched their game idea. The player who drew the project brief card chooses an idea that they liked best. Awarding the brief card. The player to the left now takes a turn as the client

---

# Ideation - Pitch it

Additional ways to play

### Additional Rules

- 1) Kill your babies**  
If your hand leaves you with no ideas. Discard your hand and draw a new hand. If the deck run out. Shuffle the discarded cards into a new deck.
- 2) Iterate**  
After everyone has pitched their idea. You can choose to draw a random card and re-pitch your game with that new feature
- 3) Constructive criticism**  
After each person has pitched. Players can critique other players' ideas in an effort to 'sell' their game pitch best
- 4) Co-Design!**  
Instead of playing against each other. Groups draw a project brief and then each player draws a player card (either rule, art/theme or experience). As a group, try to think of ideas that best address your brief.

Feel free to mix and match these rules. Or if you come up with new ideas let me know! michael.saiger@york.ac.uk

### Applied Design

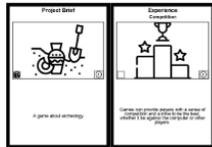
Change the 'Project brief' cards for challenging topics (or make your own). Players must try to design engaging solutions to applied contexts.



A game where sleep impacts the players' production  
A game about recycling water

### Experience Design

Take the experience cards out from the player cards deck. Shuffle them and place them next to the project brief. Now when a player draws a project brief they draw an experience too. Players need to design a game that addresses the brief and the desired experience.



A game about archeology  
Design your experience cards with a focus on the desired experience. Perhaps historians trying to discover tombs first?

Figure J.1: Example Instructions for Pitch It

## Appendix K

# Game Design Booklet for Workshops

# Game Design Booklet

FIRST NAME:

DESIGNING MENTAL HEALTH GAMES



## What makes up a game?

There are really four main components to making a game

### Goals

Goals or Objectives, in games focus the design. What is the purpose of the game?

For example, in most Super Mario games there are these goals

- Save the Kingdom - Mario has to save Peach and the Mushroom Kingdom
- Defeat Boss(es) - Mario has to defeat Bowser, and other enemies
- Collect Stars and coins - Mario collects stars to unlock new worlds



### Rules

Rules, or mechanics, are a key part in designing games. Games can have one, two, or many rules in the game.

For example, in most Super Mario games there are rules:

- Platforming - moving (often jumping) between platforms
- Lives - Mario only has so many lives to try each level
- Jumping - the main rule that determines how Mario can move and defeat enemies



### Themes

Themes can describe the setting of the world, how you see the game world, and The characters or story that takes place.

In Super Mario Maker games there are the themes:

- Fantasy - Mario is set in the mushroom kingdom
- Cartoon - The art style is cartoon
- 2D - In Mario Maker, the game is played from a 2D perspective



### Experience

Experience, or aesthetic, is what you feel from playing the game. This is challenging to design but is key to how your game may play

In Super Mario games there are experiences:

- Achievement - it's rewarding to complete levels
- Explorations - You can explore down pipes to discover secrets
- Sensation - the sound effects of collecting coins and jumps can be satisfying



# Ideation - What's in a game?

Credit to Biome Collective.

Using post-its or paper. Write down as many key elements you know associated with:

- Goals
- Rules / Mechanics
- Art/Theme
- Characters / entities
- Experiences

Think about the following from games you've played:

- e.g. for Goals
  - What is the objective of the game?
- e.g. for Rules
  - What rules or constraints do the games add?
- e.g. for Art/Theme
  - What does the world look like?
- e.g. for Experience
  - How do you feel when playing a game?

## Goals

- Save the Kingdom!
- Achieve a high score
- Help a friend in need

## Rules

- You can't attack
- Strategy game
- Limited lives

## Art/ Theme

- Set in Space
- Cartoon style
- 16 bit audio music

## Characters / entities

- Cowboys
- Cats
- Dogs
- A skilled Warrior

## Experiences

- A challenging battle
- Scared
- I can master the controls

# What are some ideas you came up with?

# Anxiety Concepts

To help you come up with game ideas that address anxiety. Here's some information and prompts to get you started

Now that you have come up with a few ideas. Can you generate game ideas that help address an anxiety problem? There are a few prompts below to help give you some ideas.

## General Anxiety



This means having regular or uncontrollable worries about many different things in your everyday life. Because there are lots of possible symptoms of anxiety this can be quite a broad diagnosis, meaning that the problems you experience with general anxiety might be quite different from another person's experiences.

- Goals:
1. Demonstrate symptoms to raise awareness
  2. Create steps to identify when a character experiences anxiety
  3. Showcase the broad experiences a character may have with anxiety
  4. Build a strong positive character into the game that has symptoms of anxiety

## Phobias



A phobia is an extreme fear or anxiety triggered by a particular situation (such as going outside) or a particular object (such as spiders).

- Goals:
1. Create a game that helps overcome a fear
  2. Raise awareness of the impact a phobia can have
  3. Create a world where a community has a shared phobia
  4. Create a villain to your game that's influenced by a phobia

## Fear of missing out (FOMO)

FOMO

Refers to the feeling or perception that others are having more fun, living better lives, or experiencing better things than you are. It involves a deep sense of envy and affects self-esteem.

- Goals:
1. Reflect and take pride in what the player has
  2. Promote self-esteem and achievement
  3. Demonstrate FOMO for Awareness
  4. Educate an audience on FOMO

## Social Anxiety



This means you experience extreme fear or anxiety triggered by social situations (such as parties, workplaces, or everyday situations where you have to talk to another person). It is also known as social phobia.

- Goals:
1. Inform the player about social anxiety
  2. Design a world that supports someone overcoming social anxiety
  3. Create a character that requires steps to approach the problem
  4. Reflect on social situations which trigger social anxiety for the player or another character

# Ideation - What's your idea?

Feel free to detail your idea below. How does your game idea help address anxiety problems? Grab more paper if you want to expand on your idea more!

For example.  
 What's the goal?  
 What are the main rules or mechanics of your game?  
 Who are the characters or entities?  
 What is the look and feel of your game?

## Prototyping - What is it?

Prototypes are a quick way of testing whether our game idea will work. They don't need to be perfect but they should help demonstrate the core idea of your game.

To start, think about one rule or mechanic of your game and how that works. Focus on making one part of your game really good before you add any more ideas.

There are several ways you can prototype, you can:

- Draw a screenshot of a key element of your game
- Create a storyboard of important moments in your game
- Create a paper prototype version of your game.
  - a card or board game?
- You can create a stop motion game with drawings and cut outs
- You can create a mock up with descriptions and annotations as to how it works
- You can role-play your game, have people play characters in your game
- Or if you have the tools, you can make a prototype on a computer too

When prototyping, think about if your game is:

- Fun
- Feasible (could it actually be made)
- Fit for Purpose (addresses anxiety)
- Freshness (is it innovative or has it been done before)



Credit to Biome Collective.

### Demo: a game!

1. Maria has to run and jump through levels in a whacky cartoony world to save the Prince.
2. In her way are Pumbas- if Maria touches a Pumba she will lose a life and start the level again.
3. Maria can collect bubble coins to get extra points. Some bubble coins are hard to reach!
4. Maria completes a level when she reaches the flag.



Presenting each element separately by cutting them out of paper or drawing them onto individual sticky notes makes it easy to introduce each element, and for you to move and interact with them.

# Prototyping - Examples

Here are some examples done by other young people in these workshops

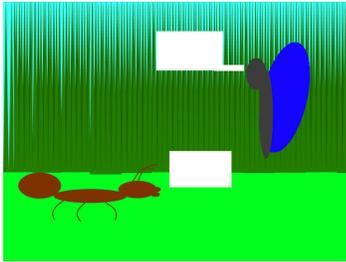
## Sam - Socially anxious Ant

Goal - Sam wants to return to the Ant colony but is anxious about all the other ants there and nervous what to say. The goal is to explore the undergrowth, learning how to approach social situations and helping other insects with their problems.

Mechanics - Exploration, Dialogue, Questing

Prototype - MS Paint screenshot and whiteboard details on characters and levels of the game

Designers - Two 16 year olds.



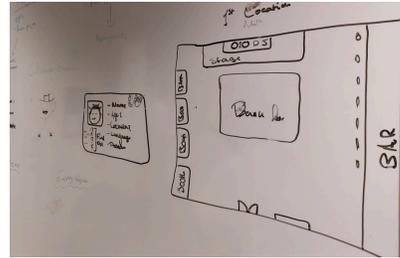
## House Party (they never named their game!)

Goal - The objective objective of the game is to overcome social anxiety and FOMO through social deduction. Find out details of people through choice dialogue options.

Mechanics - Social deduction, Dialogue, Mini-games

Prototype - Whiteboard design notes on audience, objective, rules and level ideas. Role-played how a the game would play

Designers - Three 16-17 year olds



# Prototype - What did you make?

Feel free to detail your prototype below. How does your prototype help address anxiety problems? What makes your prototype fun?

# Reflection on the workshop

Please tell us your honest feedback on how you found the workshop

What did you really enjoy about the workshop? Can you tell me why it was engaging to you?

Which did you least enjoy about the workshop? Can you tell me why it was not engaging to you?

# Next steps

That's it for this workshop but if you want to continue working on your game. Here are some suggestions.

Have you made a fun prototype? Want to see how it actually works as a video game? Here are some resources on next steps to making your game.



Godot Docs has resources for starting out in this engine. If you know Python its a good place to start



Unity Learn can give you a basic game, like a platformer, and build from there. Loads of free resources too.



Want to make a card game? Playing cards.io lets you upload card designs in a browser. You can change the mat, add dice, and spinners etc. Perfect for trying out a card game with friends.



Construct 3 has a free trial but it allows creation with blocks. No coding needed! Ideal if you struggle with programming.



GameMaker is free to download and again, no coding is necessary. Caters more to 2D games but a good place to start

Remember, if you do work more on your game. Focus on making one rule or mechanic work really well first. Then try out how other ones impact your game. Also try out creating your own art or audio. It can be very satisfying seeing your own work on screen.

If you want to follow where this research goes on games and anxiety. You'll see posts and updates of these workshops here:

<https://michaelsaiger.wixsite.com/playback>



# Game Design Booklet

DESIGNING MENTAL HEALTH GAMES

FIRST NAME:



## Data Collection

## About you

If it's okay with you (and your parent/guardian), please share some short details about you. It helps with research and future workshops

Gender:

Age:

What are you interested in learning more about?

- Game Design
- Anxiety and Mental Health
- Design Process
- All the above

What are your favorite games, or games you are currently playing? Can you tell me what you like about them? (video games, card games, or board games)



# What skills are you confident in?

With a pen, pencil or stickers, label where you believe your skills are.

- 0 = 'I don't know these skills.'
- 1 = 'I've heard of these skills.'
- 2 = 'I know the basics of these skills.'
- 3 = 'I think I have experience in this skill'
- 4 = 'I can do pretty well'
- 5 = 'I'm very confident with this skill'

Describe your skill in this area: Prototyping or Programming

Describe your skill in this area: Understanding mental health problems

Describe your skill in this area: Design & Problem solving

Describe your skill in this area: Creativity

Describe your skill in this area: Understanding game design rules

Describe your skill in this area: Collaborating

# Game Design Booklet

DESIGNING MENTAL HEALTH GAMES

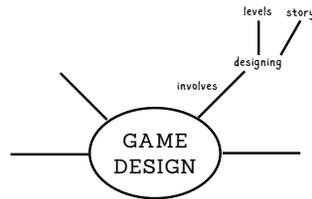
## Data Collection

FIRST NAME:



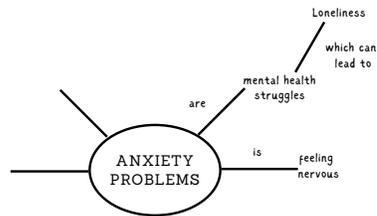
## Now what do you know about Game Design?

You've gone from an idea to prototyping your game. What do you know about game design now?



## And what do you know about anxiety?

Detail what you know about anxiety problems



# How confident are you in your skills now?

- 0 = 'I don't know these skills'
- 1 = 'I've heard of these skills'
- 2 = 'I know the basics of these skills'
- 3 = 'I think I have experience in this skill'
- 4 = 'I can do pretty well'
- 5 = 'I'm very confident with this skill'

With a pen, pencil or stickers, label where you believe your skills are.

Describe your skill in this area:

Prototyping or Programming

Understanding mental health problems

Design & Problem solving

Creativity

Understanding game design rules

Collaborating

0

1

2

3

4

5

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