A Framework to Democratise the Design of Educational Games on Social Issues during Game Jams

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A Framework to Democratise the Design of Educational Games on Social Issues during Game Jams

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Declaration of Authorship

I, Christina Myers, confirm that the research in this dissertation is my own work or that where it has been carried out in collaboration with, or supported by others, that this is duly acknowledged below and my contribution indicated. I attest that I have exercised reasonable care to ensure that the work is original, and to the best of my knowledge does not break any UK law, infringe any third party's copyright or other Intellectual Property Right, or contain any confidential material. I confirm that this dissertation has not been previously submitted for the award of a degree by this or any other university.

To my parents and Victor, for being unconditional sources of inspiration, love and support

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Related publications

- C. Myers, L. Piccolo, and T. Collins. *Co-designing cards on social issues for creating educational games.* In Proceedings of the 32nd International BCS Human Computer Interaction Conference - BHCI, 2018. http://oro.open.ac.uk/62141/

- C. Myers, L. S. Piccolo, and T. Collins. *Game jams as a space to tackle social issues: An approach based on the critical pedagogy.* In Proceedings of the International Conference on Game Jams, Hackathons and Game Creation Events, 2019. http://oro.open.ac.uk/59288/

Awards

- 'Academic Excellence Award: Executive Dean's Commendation', 2019, The Open University

- 'European Women in Games Hall of Fame award', 2019, Women in Games, WIGJ

- 'Women in Game Ambassador Honours', 2019, WIGJ / Google Women Techmaker Programme

- 'Diversity Start' 2019 Finalist Award - Develop: Brighton

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ABSTRACT

Game Jams are events organised to create computer games, usually taking place during weekends. These events have become a popular way to enable participants to experience processes and practices of game development as well as to offer multidisciplinary learning opportunities, accessed through the variety of skills involved in game design. However, these events tend to be attended predominantly by male game developers and present barriers to participation for more diverse groups.

This thesis investigates how to support diverse group participation in Game Jams, including people from different ethnicities, genders, ages, sexual orientations and who do not have any prior experience of designing games; and explores Game Jam participation as an opportunity to discuss social issues. To this end, a framework to democratise the design of educational games on social issues in Game Jams is proposed.

The framework consists of a process with structured resources and activities to enhance learning by supporting egalitarian participation and agency. It offers collaborative learning opportunities for groups to engage with a social issue, relying on storytelling and on the exchange of perspectives and experiences. It also provides support and access to research-based principles to design games for education, and egalitarian opportunities to acquire game development skills, considered relevant opportunities given the wide-spread use of games and increasing interest in games as engaging tools for online education.

The development of the framework is grounded in Critical Pedagogy, an educational approach providing principles and processes to democratise learning initiatives based on egalitarian participation and agency. Following a Design-Based Research methodology, the framework is developed through a case study on creating educational games on everyday sexism. A set of formative design studies are undertaken to co-design resources

and activities that enable participants to elaborate solutions to the social issue and create educational games themselves.

An evaluative study is then presented with the realisation of two Game Jams to assess and validate the proposed framework. The theoretical contributions of this work validate two new applications of Critical Pedagogy. The first one is to apply Critical Pedagogy to shape Game Jams to enhance learning through the active involvement of participants as equal learners and agents of social change. The second one applies Critical Pedagogy to democratise knowledge of design principles to create educational games on social issues. Lastly, access to a co-created tool for raising awareness of everyday sexism and insights on how to enable broad audiences to acquire games development skills are some of the practical contributions of this thesis.

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Chapter 1

Introduction

This thesis investigates how to democratise the design of educational games on social issues during Game Jams. Based on ideas of egalitarian participation and agency, the democratisation of technology enables the participation of broad and diverse audiences in design processes (Fleischmann, 2015). Democratising the design of educational games on social issues relies on enabling broad audiences to participate throughout entire processes of design, from the conceptualisation to the development of such games, which in turn requires facilitating multidisciplinary learning activities for potential participants (Iacovides et al., 2019). Designing educational games on social issues requires groups to discuss the social issue in question, which presents opportunities for collaborative learning about social change (Eberhardt, 2016). It requires understanding of how to enhance learning in games, which presents relevant learning opportunities given the increasing interest attributed to games as engaging and motivational tools for online education (Wouters and Van Oostendorp, 2017; Gee, 2005). It also has the potential to enable individuals to acquire skills in game development (Falcão et al., 2018). Acquiring such skills represents an attractive learning opportunity as about 2.4 billion people globally play video games on a weekly basis (Liao et al., 2020).

In a paper aimed at exploring participatory approaches to educational game design,

Khaled and Vasalou (2014) have argued that despite the increasing interest in the democratisation of educational game design, little is known on how to achieve it. Studies intending to involve novice groups throughout entire processes of educational game design have relied on the participation of experts. This is the case of the studies of Iacovides et al. (2019) who proposed a four-months competition where novice groups designed educational games on health issues together with game developers, and Falcão et al. (2018) who proposed a framework where novice groups are supervised and trained by experts to design educational games. Democratising educational game design needs to go beyond inviting experts by exploring how to, first, limit relying on the availability of and access to relevant experts, which can be considered a barrier to making educational game design open and accessible to broad audiences. Second, it needs to dispute potential hierarchical disparities that could emerge from relying on the involvement of experts by exploring how to facilitate egalitarian participation.

Critical Pedagogy is an educational approach used to raise awareness about social issues, which also provides insights on how to democratise educational initiatives by structuring educational activities as well as by facilitating collaborative learning, reflection and dialogue among groups (Freire, 1970). This thesis proposes to apply Critical Pedagogy to the processes of educational game design to encourage democratic participation, support critical reflection, endorse agency, facilitate egalitarian access to information, structure processes of learning and promote active engagement.

Collaborative learning in the field of game design is often coupled with Game Jams, which are events for designing games in a short period of time, usually during a weekend (Kultima, 2015). The biggest annual Game Jam, attended by 48,753 people in 2020, is called the Global Game Jam (GGJ) and anyone, without specific knowledge or skills, is welcome to join one of the local physical sites. The survey study of GGJ participants by Steinke et al. (2016) showed that in practice these events are mostly attended by

experienced game designers who have computer programming or game development skills. This is aligned with the study of Meriläinen and Aurava (2018) who interviewed first-time Game Jam participants showing that one of the reasons provided for non-attendance to such events is a perceived lack of skills in game development. The current format of Game Jams is based on inviting participants to design games the way they choose, implying that this format is mostly suitable and attractive to people who have prior knowledge of game development (Scott and Ghinea, 2013; Arya et al., 2013). As Game Jams tend to reflect the current picture of the gaming industry, where the majority of game developers are male, their current format contributes to issues related to diversity in participation and to enabling diverse audiences to access the learning opportunities such events offer (Arya et al., 2013; Kennedy, 2018).

This thesis contributes to a theoretical and practical understanding of how to democratise the design of educational games on social issues during Game Jams by structuring activities and providing resources to support the participation of broad audiences, including diverse and novice individuals. To the best of our understanding, this Ph.D presents the first framework for the democratisation of educational games on social issues.

Before continuing, a clarification regarding the terminologies used in this thesis is needed. First, the core idea of democratising educational game design is to be open to broad audiences, and as a result people participating in such initiatives will be called 'participants', who might be experienced in educational game design or not. The term 'groups' will be used for a group of participants, who, similarly, might have experience in educational game design or not. Second, a distinction will be made when groups are composed of experienced or inexperienced individuals in educational game design, using the terms 'experienced groups' and 'novice groups'. Third, designing educational games refers to the whole process from a blank page to the development of games. Development, on the other hand, is used to describe efforts undertaken to build a game with a game engine or

computer programming language. Lastly, diversity in this research is presented as the inclusion of people from different backgrounds, especially from different genders, ethnicites, ages and sexual orientations.

1.1   Barriers and Learning Opportunities

Research on the democratisation of educational game design is still in its infancy, especially during Game Jams and for designing games on social issues. Identifying the barriers to achieve democratisation reveals what learning activities need to be facilitated to support groups design educational games on social issues during a Game Jam.

Gaining familiarity and facilitating engagement with the educational topic of the game is a learning opportunity that democratising educational game design offers (Khaled and Vasalou, 2014; Iacovides et al., 2019). Studies in educational game design have suggested providing lightning talks, creating posters with information on the educational topics and inviting experts (Ramzan and Reid, 2016; Preston, 2014). However, these studies have not provided enough information about the resources applied to facilitate learning (e.g. their content or creation process), neither evaluations of their effectiveness. Elaborating how to create engagement with social issues through educational game design, while giving groups agency over how the issue is discussed and presented in a game, is a current challenge to the democratisation of educational games on social issues.

Current practices of educational game design are complex, especially in providing insights on how to merge educational approaches with gaming (Carvalho, 2017). To tackle this specific challenge, supporting conceptual models have been developed for experienced groups, they rely on presenting a variety of educational theories and game components and invite them to choose combinations for their games (Carvalho, 2017; Lameras et al., 2017; Arnab et al., 2015). Using such resources with novice groups presents risks, specifically

to disregarding how some educational approaches are better suited to certain educational topics as well as to lack providing information on why and how gaming could enhance learning. To support broader audiences, that include novice groups, principles illustrating information on how to facilitate learning through gaming are also used (Gee, 2005; Schrier, 2017). However, such principles are generic, therefore, require customisation to be applied specifically in the context of social issues. In addition, other practices of educational game design, such as the definition of games' objectives, prototyping and evaluation processes, are pillars of such design processes but have not been so far adapted or used in initiatives aimed at democratising educational game design.

Educational game design also encompasses the development of games. Game engines, used to lower the technical barriers of game development, have been gaining popularity over the last 15 years as tools that make game development accessible not only to game developers but also to broader audiences (Christopoulou and Xinogalos, 2017). In Game Jams, the most popular game engines are *Unity*, *GameMaker* and *construct*, which require knowledge in certain programming languages to be used, such as C#, GML and Java (Steinke et al., 2016). How to facilitate learning opportunities on game development during Game Jams to participants who might not have any technical skills or knowledge on game development at all is a topic where limited knowledge could be found in the literature.

1.2 Research Questions

Participating in Game Jams to design educational games on social issues is presented as an opportunity to facilitate multidisciplinary learning. However, in a typical Game Jam the participants are expected to make all the decision about how to design their games, suggesting that this format is mostly suitable to people who have prior expertise in developing games. This presents a barrier for diverse audiences to participate in Game

Jams and access the learning opportunities such events offer. In response to this problem, this thesis seeks to democratise educational game design on social issues by facilitating egalitarian participation and agency through supporting participants to build knowledge, develop skills and engage in collaborative discussions during Game Jams. This brings us to the central research question of this thesis which is presented in the following problem statement (PS). In order to solve the problem statement three research questions (RQ) are presented, each corresponding to a barrier previously introduced. To explore these questions, a framework for the democratisation of educational game design on social issues during Game Jams was created, applied and evaluated.

PS: How to democratise educational game design on social issues during Game Jams?

This thesis aims to advance understanding of the resources, activities and processes needed to democratise educational game design on social issues during Game Jams. To explore this question a framework is proposed, which is composed of a process with specific stages that each have objectives, activities and sets of resources. The design rationale of the proposed framework is based on the theoretical and practical knowledge that has been accumulated in the fields of educational game design, participatory educational game design and in Critical Pedagogy. Using Critical Pedagogy is considered relevant to facilitate agency, egalitarian participation and learning by both framing and sequencing stages of reflection, discussions, mutual learning and creation.

RQ1: What support do Game Jam participants need to engage with social issues?

This question looks for insights regarding resources and activities to create engagement with a social issue among Game Jams participants through the design of educational games. These resources and activities are used to facilitate critical reflection, enable

diverse participation in discussions, support collective learning and create game artefacts on a social issue.

RQ2: What resources and processes can be used to democratise educational game design practices?

This question explores ways to apply and adapt educational game design practices to be understood and used by broad audiences, that include novice game designers. These practices encompass access to information on educational game design, the definition of games' objectives, prototyping, reviewing ideas and evaluating games.

RQ3: What support do participants need to acquire game development skills during Game Jams?

This question explores the resources and activities that could be used to enable broad audiences to learn how to develop a game during a Game Jam. These include the games development environment, approach and resources needed.

1.3   Thesis Outline

This introduction provides an overview of the current state of Game Jam participation and the democratisation of educational game design on social issues is given. The main barriers to democratising the design of such games during Game Jams are presented, which suggests the relevance of developing egalitarian learning activities about a social issue, educational game design and game development. Given this, the problem statement is outlined and broken down into three research questions targeting at tackling each one of these barriers.

Next, the literature review, *Chapter 2*, presents the literature gaps and foundation of this research. First, the literature on Game Jams is reviewed, pointing directions to overcome

current barriers and relevant work towards democratising educational game design on social issues. Subsequently, lists, models, principles and processes for educational game design are reviewed before narrowing it down to studies aimed at merging participatory approaches with educational game design. Lastly, the educational approach of Critical Pedagogy is presented, which is used as a foundation to define how to democratise participation, knowledge and engagement.

Chapter 3 introduces the research methodology. The paradigm adopted, constructivist, is presented, followed by presenting the methodological approach, Design-Based Research, and how it has been applied. This chapter also introduces the case study chosen for this thesis which is the social issue of everyday sexism. The chapter then turns to introduce the studies carried out and the methods used in each study to collect and analyse empirical data.

Chapter 4, Formative design studies, presents the results and analysis of the data used to create two sets of resources and the initial version of the framework. The process of creating the resources and the results of the studies conducted to enable their validation are illustrated. The framework is then introduced before presenting the rationale adopted in each stage of the framework.

Chapter 5 presents the results and analysis gathered after applying the framework in two Game Jams where groups designed educational games on everyday sexism. This chapter presents the results on the intended objectives of the framework gathered through each of the methods used to collect data, namely questionnaires, group interviews, observation notes, group interviews and the created artefacts.

Chapter 6 presents a discussion of the research findings and provides evidence-based insights on how to democratise educational game design on social issues during Game Jams. In this chapter, each of the research questions and the problem statement are discussed.

Following this, a refined version of the proposed framework is presented, which implemented the insights collected during the two Game Jams.

The thesis is closed with *Chapter 7*, where concluding remarks are presented. The limitations of the work is reflected upon and the contributions of this research are presented, before offering suggestions for future work.

Chapter 2

Literature Review

This chapter reviews the current literature connected to the democratisation of educational game design on social issues. This chapter first presents the literature on Game Jams in *Section 2.1* to introduce the concept, critique it in terms of accessibility and inclusion, and review how they could be used to democratise educational game design on social issues. It then turns to review practices of educational game design and to provide insights on how to democratise these practices in *Section 2.2*. Following this, *Section 2.3* presents the literature on participatory approaches to educational game design and their potential to create learning opportunities for people involved in designing educational games on social issues. Finally, in *Section 2.4* Critical Pedagogy is presented and its application to democratise knowledge, facilitate agency and egalitarian participation, and create engagement with social issues are reviewed.

2.1   Game Jams

Game Jams are events for designing games in a short period of time, usually during a weekend (Kultima). As briefly introduced, the biggest annual Game Jam, attended by over 48 thousand people across 113 countries in 2020, is called the Global Game

Jam (GGJ) and it is open to anyone. This section first presents the literature on the outcomes of Game Jams (see *Section 2.1.1*) before exploring the participants' profiles that provide insights on the accessibility and inclusion of such events (see *Section 2.1.2*). This section then turns to review the tools used during Game Jams (see *Section 2.1.3*) and how such events are used for education and for creating engagement with social issues (see *Section 2.1.4* and *Section 2.1.5* respectively).

2.1.1 Outcomes

The outcomes of Game Jams are described as twofold: the games produced and the learning acquired by participants. Regarding the games, a study that surveyed 747 participants showed that while the majority of participants were satisfied with the games they designed during weekend-long Game Jams, only about half of the games were playable (Kaitila, 2012). Preston et al. (2012) echoed this by arguing that one-third to one-half of the groups participating in Game Jams usually complete a game. The main challenge to finish games during Game Jams is reported to be computer programming and using game engines (Zook and Riedl, 2013).

Game jams were described as "a safe space for experimentation" (Scott and Ghinea, 2013, p.3) as the short time invested to participate, usually a weekend, is considered of low risk. The potential of Game Jams to facilitate educational opportunities for their participants was illustrated in the research of Preston et al. (2012) and Arya et al. (2013). Preston et al. (2012) conducted a study, with results obtained from pre- and post- Game Jam surveys with over 150 respondents, indicating that Game Jam's participation is correlated with higher academic achievement, especially in computing-related topics. Arya et al. (2013) present results extracted from using pre and post-surveys during the GGJ 2013 that led the authors to describe Game Jams as successful learning experiences to acquire technical and interpersonal skills. They also present data on the most responded reasons for attending

a Game Jam, which was first to have fun and second to learn (including improving skills). This study was concluded by presenting directions for future work and recommended exploring how to shape Game Jams to facilitate targeted learning opportunities about specific skills or topics, which was used to shape the research questions of this thesis, especially RQ1 and RQ3.

2.1.2   Participants

Although Game Jams are open to anyone, it was found that the majority of Game Jams participants have some prior experience of game development. A study performed on participants who attended GGJ in 2019 showed that out of the 189 participants surveyed 15% of them did not work in game development or study this subject (Borg et al., 2019). This is aligned with the research of Meriläinen and Aurava (2018) that showed that one of the reasons for non-attendance to Game Jams is related to the lack of skills in game development. This represents a challenge to describe Game Jams as spaces that are truly open to anyone.

Another challenge is related to gender disparities, as Game Jams are attended mostly by males, for example, in 2013, 86% of the participants of GGJ were identified as male (Arya et al., 2013). These disparities reflect the current picture of the gaming industry where males form the large majority of game developers (Branson, 2018). Research has shown that these disparities contribute toward female participants reticence to attend Game Jams (Kennedy, 2018). The study of Kennedy (2018) presented an all-female Game Jam that was used to increase women's participation in such events and in the gaming industry. Initiatives intended to increase women's participation in Game Jams while not excluding men, which is seen as aligned to the ideas of this research as excluding certain groups goes against ideas of democratisation, include the research of Ferraz and Gama (2019). They studied the reasons for the lack of female participation in Game Jams and recommended

targeting females directly in the advertisement strategies of Game Jams.

Other indications, such as the participants' ethnicity, age and sexual orientation could also provide insights on the accessibility and inclusion of Game Jams. However, to the best of our understanding, no study capturing potential disparities in regards to such indications during GGJ or other Game Jams were found in the literature. This research intends to build on this by targeting the communication strategies, not exclusively to women, but to diverse audiences and by capturing wider indications on the participants' profiles.

2.1.3   Tools

Ho (2017) found that cards are the most used tool in Game Jams to evoke inspiration and support participants' contributions to group discussions throughout processes of game design. This is aligned with the literature on educational game design, which is represented by the following studies. Deng et al. (2014) presented cards that intended to make knowledge of tangible learning games accessible by translating "lengthy, dense, and jargon laden body of literature to design practice" (Deng et al., 2014, p.3). They evaluated the use of cards with groups of both experienced and inexperienced designers on the topics presented on the cards and found out that the inexperienced ones tended to request more textual information, and especially examples, to be able to use the cards and participate in group discussions. In a study presented by Flanagan (2009), cards were aimed at engaging diverse audiences to facilitate the creation of game ideas prioritising human values. One of their 'Challenge cards' (i.e. the social issue to be solved) targeted sexism and was illustrated as, "Description: Stereotype of a discrimination based on sexual roles. Strategy: Education, awareness, legislation" (Flanagan, 2009, p.1). Building on these studies, the research of Chow et al. (2016) applied cards that were based on illustrating questions to encourage reflection on everyday experiences related to mathematics and argued that

using questions to discuss everyday experiences were useful to encourage participation in discussions among groups.

In addition to cards, paper prototyping is also presented as a practice in game design that tends to be recommended (Kaitila, 2012). Games are often presented as stories that players modify with the decisions they make. Therefore, creating branching stories is described as a practice that connects the use of narratives to game design by using stories that reflect the branching structures of games (Dickey, 2005; Riedl and Young, 2006; Rouse III, 2010). Regarding their use during Game Jams, Zook and Riedl (2013) present research that explores the use of paper prototyping during such events. Their results show that relatively few participants use paper prototyping during Game Jams, which is explained by a lack of familiarity, experience or limitation in providing supporting information. Their results also show that the ones who did use paper prototyping described it as a beneficial practice for collaboration and game design.

Moving on to the use of game engines, which are used to develop games. Steinke et al. (2016) analysed data from GGJ 2016 and pointed out that the most popular game engines were, in order, *Unity*, representing 60% of the games developed, followed by *GameMaker* and *Construct*. This represents a barrier to involve novice groups in Game Jams as prior experience of game development and computer programming is needed to use such engines. This topic will be further described in *Section 2.3.3*.

2.1.4   Educational Game Design

Game Jams targeted at educational game design found in the literature rely on the participation of experienced groups. Preston (2014) presented an initiative to design educational games on public health during Game Jams, which relies on lightning talks, the participation of health experts and posters to present information on public health to game designers. The Game Jam participants' pre and post-survey responses showed a signifi-

cant increase in the levels of perceived awareness on the topic of health, which illustrates the potential of using Game Jams to raise awareness of educational topics. Ramzan and Reid (2016) also involved relevant experts when using Game Jams to enable game designers to design educational games on water pollution. The experts briefed the participants on the educational topic before giving them 48 hours to develop an educational game. As previously presented in *Section 1*, to apply such approaches to the democratisation of educational game design, it is needed to explore how to limit relying on the synchronised availability and access to relevant experts as well as to explore how to facilitate agency and egalitarian participation among groups, which was not explored in either of these studies.

As argued by Ramzan and Reid (2016), the number of Game Jams aimed at designing educational games is increasing but the literature on how to practically organise Game Jams to support participants to design such games is still very limited. The literature is even more limited in exploring how to integrate novice participants during such Game Jams. The only study found is the research of Iacovides and Cox (2015) that will be further described in *Section 2.3.2*, which, inspired by Game Jams, organised a four-month-long educational game design competition.

2.1.5   Game Jams on Social Issues

Game Jams were also illustrated as spaces that enable participants to discuss social issues while designing educational games. Shin et al. (2012) first presented Game Jams as an approach for collaborative development and learning, and pointed to the potential of Game Jams to discuss and raise awareness of social issues. Building on this, the research of Bayrak (2017) described Game Jams as spaces that could be used to discuss social issues, illustrating that their collaborative environments could be used to create curiosity, learning and awareness. The study of Eberhardt (2016) presented the 'Equal Pay Jam'

where participants discussed issues related to discrimination and inequalities in salaries. The author concluded that "the key learning from this Game Jam was that Game Jams are an interesting space to have conversations about difficult topics, but also that the design of a particular Game Jam space would highly influence what these conversations might be" (Eberhardt, 2016, p.2). The author illustrates that convening people and giving them a shared objective, which is to design a game, could contribute toward creating a promising environment to create engagement and discussions in social issues. Indications on how to frame Game Jams to evidence or facilitate this potential is, however, still to be explored.

2.1.6   Summative Remarks

Game Jams are illustrated as events that enable participants to learn by designing games and the literature presented points out to the relevance of narrowing down their scope by exploring how to use Game Jams to facilitate learning opportunities about specific topics or skills. To provide such learning opportunities for diverse audiences, the literature reviewed suggests exploring how to support participants who have limited skills in game development and to target communication strategies directly at females. This research argues that all-female Game Jams are not aligned with the ideas of democratisation and that going beyond gender to explore other forms of disparities in participants' profiles is needed. Therefore, this research explores the pertinence of facilitating learning opportunities on game development during Game Jams and to target communication strategies not only at women but at diverse audiences in order to address some issues related to inclusion and access in Game Jams.

Regarding the tools used, it was found that cards have a suitable format to support participants' contributions to group discussions during Game Jams. Adding to this, the presented literature suggested the relevance of using examples to make specialised knowl-

edge accessible to diverse audiences and questions to create engagement among groups. This section also illustrates that while using paper prototyping is presented as a relevant practice for game design, providing support seems needed to implement such a practice during Game Jams, especially with novice groups. The literature also points out that the choice of a game engine should be aligned with the participants' previous technical skills, which in the case of this research might involve participants who do not have any skills in game development. Lastly, the potential of using Game Jams for creating engagement in social issues was illustrated in this section, which highlighted the necessity to contribute toward a better understanding of how to frame Game Jams to facilitate such engagement.

2.2 Educational Game Design

Designing educational games relies on knowledge of educational approaches, game design, practices of educational game design and the topic of the game (de Freitas, 2006; Lameras et al., 2017; Westera et al., 2008). Hence, different approaches have been developed to support groups designing such games, which will be presented in this section. It first introduces educational game attributes and explores how they could be used to present game elements (see *Section 2.2.1*). Arguing that conceptual understanding about educational games is needed to design such games, conceptual models are then reviewed as an approach that relies on merging educational approaches with game design (*Section 2.2.2*). Following this, principles of learning in games are introduced, which present insights on how supportive information on educational game design could be facilitated during initiatives aimed at democratising educational game design (see *Section 2.2.3*). This section then explores processes, which provide insights on what and how activities could be sequenced to design educational games (see *Section 2.2.4*). Lastly, this section reviews how the literature could be used to support groups to define the objectives of educational games and to evaluate them (see *Section 2.2.5*).

2.2.1   Educational Game Attributes and Game Elements

The first approach introduced in this section is based on providing lists of educational game attributes, which are presented as generic attributes that could contribute to facilitating learning outcomes in games, examples of such game attributes include 'Interactions' (Wilson et al., 2009) or 'Feedback and Assessment' (Lameras et al., 2017). Educational game attributes are implemented using game elements, which are specific design features. Attributes and elements are used in most studies of educational game design, which each provide different levels of detail. *Table 2.1* and *Table 2.2* presented in the next two pages introduce the educational game attributes and game elements found in the literature. Examples of educational game attributes and game elements presented in these tables include 'Access to information' as an attribute with the following game elements: 'integration of voice', 'text', 'verbal communication', 'photographic content'. The provided game elements illustrate potential ideas on how to implement the educational game attribute presented. These tables present all the game attributes and elements that were found in the literature, which included reviewing more than 25 papers, and present practical information on features that could be included in a game to facilitate learning outcomes.

Table 2.1: *Educational game attributes and elements - Part I*

Educational game attribute	Game elements	References
Access to Information	• Integration of voices • Text • Verbal communication • Photographic content • Link to external web-page • Information about the game • Description of the game rules • Information on characters • Educational purpose • Educational content • Signs • Reminders • Indications •Hints	Schrier (2019); Beetham (2008); Gee (2005); Laurillard (2013); Prensky (2008)
Assessment and Feedback	• Scoring • Ranking • Tracking performance • Numerical score • Sensory stimuli (e.g. explosion as indication of result) • Gaining/losing lives • Progress bar • Dashboards • Virtual currencies • Progress tree • Rewards • Feedback as motivation and information on performance • Opportunity to learn from mistakes • Feedback given by finishing the game, characters or objects • Self-evaluation feedback • One way to finish the game • More than one way to finish the game • Incomplete or unresolved endings • Hints on available actions • Encouraging actions by a reward or penalty • Tutorials levels with no consequences • Repeat task or level when player loses • Re-entry level	Schrier (2019); Lameras et al. (2017); van Staalduinen (2011); Wilson et al. (2009); Carvalho (2017); Elverdam and Aarseth (2007); Kiili (2005); Michael and Chen (2005); Dempsey et al. (2002)
Customisable Game Features	• Customisable feedback • Customisable pace • Customisable solution parameters (access to hints, etc) • Multiple player options (e.g. collaborative or competitive) • Customisable level of pressure • Different types of rewards • Customisable appearances of character • Personalised character names • Time adjustment • Increase or reduce the number of hints • Tracking performance • Customisable playing styles e.g. achievers (winning points), socializers (social interactions), explorer (discovering areas) or fighters (competition) • Customisable learning styles e.g. visual learners (visualising information), auditory learners (hearing information), reading or writing learners (using text), kinesthetic learners (hands-on experiences)	Schrier (2019); Carvalho (2017); Flanagan (2009); Gee (2005); Lindley (2003)
Designers' Intentions	• Text or verbal recording on character design (cloths, gender, ect) • Text or verbal recording on game environment (research, historical background, etc) • Presentation of designers' values • Introduction of designers	Schrier (2019); van Staalduinen (2011); Flanagan (2009); Gee (2005); Lindley (2003)
Game Objectives and Rules	• Description of rules • Access to instructions • Game instruction • Questions and answers • System rules • Procedural Rules • Imported Rules • Descriptions of character's goals • Tutorials about character's goals • Pop-up information and reminders • Illustrations of the consequences of player's actions • Irreversible consequences • Replay opportunities • Cut scenes to recap and set goals	Lameras et al. (2017); Wilson et al. (2009); O'Connor and Menaker (2008); Blunt (2007); Amory (2007); Kiili (2005)
Gaming Atmosphere	• Fantasy adventure • Trusting environment • Realistic atmosphere • Everyday interactions • Authentic speech and dialogue • Letters from characters • Photos from the past	Schrier (2019); Wilson et al. (2009); Habgood et al. (2005); Owen (2004)
Gaming Environment	• Description of boundaries within the games • Definition of time • Definition of game scope • Theme of game • Genre of game • Different contexts in the game	Schrier (2019); van Staalduinen (2011); Wilson et al. (2009); Elverdam and Aarseth (2007)

Table 2.2: *Educational game attributes and elements - Part II*

Educational game attribute	Game elements	References
Goals	• Definition of gaming goals • Definition of educational goals • Short-term goals • Long-term goals • Missions within the game • Map of the game • Overview of strategy • Description of characters' duties • Illustration of progress in game • Illustration of character's progress • Descriptions of character's goals • Tutorials about character's goals • Pop-up information and reminders	Wilson et al. (2009); O'Connor and Menaker (2008); Carvalho (2017); Amory (2007); Kiili (2005); Gee (2005); Garris et al. (2002)
Interactions	• Dialogue between characters • Friendships between characters • Listening to other characters/objects • Non-verbal communication • Physical interaction between characters • Use of communicative symbol • Romantic interactions between characters • Dialogue between players • Listening/speaking to other players • Multiplayer features • Community building activities between players • Integration with social media platforms	Schrier (2019); van Staalduinen (2011); Carvalho (2017); Wilson et al. (2009); O'Connor and Menaker (2008); Amory (2007); Dempsey et al. (2002); Prensky (2008)
Learning Activities	• Reflective opportunities • Creative writing • Memorising activities • Labelling diagrams and concepts • Incomplete statement • Web-quest • Scientific experiments • Brainstorming activities • Open discussions • Guided discussions • Debates • Calculation • Question-asking activities • Citation reading • Creative expression • Deliberation • Persuasion/negotiation activities • Reading activities • Test skills in the game • Access to explanations and training • Mentoring by other characters	Schrier (2019); Lameras et al. (2017); Carvalho (2017); Beetham (2008); Laurillard (2013)
Players' Curiosity	• Unusual analogies • Unusual situations • Surprises • Mysterious scenes • Vivid visual • Vivid auditory • Mysterious characters • Unexpected skills or abilities of character • Counter-stereotype characters • Unpredictable character personalities • Character's secrets	van Staalduinen (2011); Wilson et al. (2009); Amory (2007); Garris et al. (2002)
Problem-Solving Activities	• Game levels • Tutorials • Increasing levels of difficulty • Use of acquired skills or knowledge • Structured problems • Overview of the problem • Problems provided by the player, other characters or game events • Multiple ways to solve a problem • Problems presented as conflicts • Decomposition of problems • Repeat challenges • Interviews with characters	Schrier (2019); van Staalduinen (2011); Carvalho (2017); Amory (2007); Dempsey et al. (2002); Prensky (2008)
Story and Narrative	• Story presented through character interactions • Story presented through environment exploration • Introduction of a protagonist • Introduction of the story • Story plot (e.g. conflict, implications and resolutions) • Perspective of storyteller • Skip scenes • Emotional stories • Dramatic scenes • Story premise • Atmospheric music • Sound effects • Characters' voices	Schrier (2019); Lameras et al. (2017); Wilson et al. (2009); O'Connor and Menaker (2008); Lindley (2003)

These lists are relevant from a practical perspective as they enable designers to explore various educational game attributes and elements that could be used to trigger learning in games. However, they do not address the designer's conceptual understanding of educational game design, which is covered by approaches that provide access to supporting information and that integrate educational approaches, namely conceptual models and principles of educational game design.

2.2.2 Conceptual Models

Conceptual models explore how to apply educational approaches to the design of educational games. Amory (2007) presented the 'Game Object Model II' which aims at introducing the connections between games and educational theories through the illustration of the interrelated components and dependencies of game elements. Arnab et al. (2015) presented a model to connect educational theories and game mechanics, which are described as the gaming activities, tools and goals of a game. Building on this study, Carvalho (2017) developed a conceptual model that represents how game elements could be associated with different educational outcomes. Finally, Lameras et al. (2017) created a taxonomy linking learning and game mechanics to guide university teachers to use educational games. These studies present a variety of educational theories and game elements enabling experienced groups to explore and reflect on potential combinations for their game. However, these models can pose risks, especially for groups with little or no expertise in educational game design. Firstly, they do not present how some educational approaches are better suited to certain educational topics and, secondly, they do not elaborate why certain combinations of educational approaches and game features could be more appropriate than others. In contexts where time is restricted, such as during Game Jams, accessing information that could be used to directly support design decisions that are related to the game being designed is considered preferable. These models do not provide this, instead they invite experienced designers to discuss what might be the most

suitable combinations of educational approaches and game elements for their games.

2.2.3   Principles of Learning in Games

Another approach found in the literature is to propose principles to design educational games, which present supportive information providing guidance on how to design educational games. Schrier (2017) proposed 10 design principle categories to create educational games specifically on the topic of morality. The proposed principles are composed of supportive information and game examples and are introduced as initial principles to consider to create educational games on the topic of morality. For example, the first principle presented is 'Support problem-solving activities' (Schrier, 2017, p.15) and its supporting information is based on illustrating that games on the topic of morality should provide experiences for players to solve problems and that game designers should explore if players could repeat scenes to define the extent to which they would experience the consequences of their actions. A limitation of these principles is that they do not provide information on why these principles could be used to trigger learning in games and about the topic of morality. This information is considered relevant in scenarios where novice groups are involved in designing educational games as it could be used as supportive information to inform their design decisions.

Gee (2005) proposes an approach based on principles that align educational approaches with game design. More specifically, the work of Gee presents 13 principles of learning in games that explain how and why gaming could be used for learning by building on the literature of gaming and educational theories. For example the first principle titled 'Co-design' is described as 'Good learning requires that learners feel like active agents (producers) not just passive recipients (consumers)' and provides supporting information on why this principle is suitable to trigger learning from both gaming and educational perspectives as well as presenting game examples (Gee, 2005, p.6). These principles are

considered suitable to be used to inform design decisions on educational games, which is relevant in the case of this research as participants might not have any knowledge of how to design educational games. However, indications on how to implement a principle into a game rely on introducing two to three game elements as examples, which can be considered insufficient for scenarios where these principles are used with novice groups. In addition, these principles are targeted at providing generic information on educational game design, which suggests that these principles have to be adapted for this research to democratise knowledge on the design of educational games specifically on social issues and to be used within the limited available time of Game Jams.

Gee's essay on the empirical relevance of Critical Pedagogy (Freire, 1970), which will be presented in *Section 2.4*, suggests a connection between Critical Pedagogy and these principles of learning in games (Gee, 2014). This suggests a relevance to use these principles to design educational games specifically on social issues and to use Critical Pedagogy as an educational approach to design educational games. Potential synergies between Gee's principles of learning in games and Critical Pedagogy to design educational games on social issues have also been explored in the works of Frasca (2001) and Torres (2015). Frasca (2001) used Critical Pedagogy to adapt the game 'The Sims' to stimulate players to think critically about social issues; while Torres (2015) created a game which considers inequalities by following the life of a young poor black woman in Colombia.

2.2.4 Educational Game Design Processes

The next approach introduced here goes beyond exploring what information could be provided to support groups designing educational games and presents processes of educational game design. Processes of educational game design present an order in which activities should be sequenced to design educational games. Processes found in the literature invite experienced groups in education, game design, the topic of the game and

game development to contribute to a given objective at a specific moment in the process. Marfisi-Schottman et al. (2010) introduces a seven-step model, which attributes specific tasks to each experienced group related to their expertise. The process starts with defining the educational topic and educational objective of the game before exploring the format of the game (e.g. puzzle or adventure game). It then turns to defining the storyline, characters and game environment, which is followed by the development and evaluation of the game.

Arguing that to design coherent games experienced groups should explore facets of educational game design that are not part of their expertise (e.g. the topic of the game for experienced groups in game design), Brian (2008) presents a process that supports them to work collectively. The iterative process starts by inviting designers to define an educational objective for their game by discussing its educational topic as well as potential educational approaches that could be implemented in their games. Designers are then guided to define a game idea that considers the game settings, characters and narrative in relation to the previously defined educational objective. The last stages are to develop and then evaluate the game.

These studies present important contributions to educational game design by illustrating the use of processes to order specific interventions coherently. However, they rely on the availability of these groups and on their specialised knowledge, which as seen in *Chapter 1* can represent a barrier to democratise educational game design.

2.2.5   Objectives of Educational Games

As seen in the previous section, designing educational games requires more than accessing information that could be used to facilitate learning outcomes. It also requires groups to be organised during processes of design. This section presents insights on the objectives of educational games and the next section focuses on the evaluation of such games, which

were both part of the previously presented processes.

More often than not, the objectives of educational games are presented primarily to facilitate learning and secondly to be fun. Drawing on other forms of media, such as films and fiction, that sometimes trigger learning without necessarily having a fun dimension, Marsh and Costello (2013) argue that it is needed to go beyond the notion of fun in educational games by exploring other feelings that could be facilitated. They introduce the term 'serious experience' to create learning opportunities through educational games that are "(1) uncomfortable, negative and/or unpleasant and/or (2) entertaining without being exclusively fun" (Marsh and Costello, 2013, p.4). Building on this, other authors have argued that educational games have two sorts of objectives, one related to their gaming dimension and the other related to their educational dimension (Nagalingam and Ibrahim, 2015). The gaming objective defines the extent to which the game is intended to be fun, entertaining, negative, unpleasant and/or to make players uncomfortable (Marsh and Costello, 2013). The educational objective invites designers to define what players are expected to learn through the game.

2.2.6 Evaluation of Educational Games

Regarding the evaluation of educational games, Mitgutsch and Alvarado (2012) presented the 'Serious Game Design Assessment' (SGDA) framework, which aims to support evaluating the conceptual design of educational games in relation to their defined objective. It invites designers to define the main components of educational games, namely their mechanics, framing, content/information, aesthetics/graphics and fiction/narrative before reflecting on the extent to which the design components are consistent with the objective of the game. This framework also invites designers to evaluate the components of the game from a holistic perspective, which provides an opportunity to reflect on the big picture of a game to explore its coherence to reach the game objective. This framework is facilitated

with a circle shaped template, called the SGDA template, where the five components and the objective of the game form a circle and designers are required to draw dashed or solid lines to illustrate how aligned each of the components are between them and toward the objective of the game. Arguing that an iterative approach is critical in educational game design, the SGDA framework was used during stages of prototype, development as well as evaluation (Geerts et al., 2019). Arguably, this framework is suitable toward contributing to a better understanding of how to evaluate educational games based on their intended objective. However, caution should be taken when defining the objective of an educational game. As presented in the previous section (see *Section 2.2.5*), the objectives of educational games need to be explored from both a gaming and an educational perspective, a specification that this framework does not include.

2.2.7   Summative Remarks

Approaches to providing support in designing educational games have taken two forms: resources and processes. Regarding the resources, lists of educational game attributes and game elements provide practical indications of features that could be implemented in educational games. These lists, however, provide limited information that could be used to support groups on their design decisions regarding what attributes and elements might be appropriate for their games. To provide such information, other approaches have been reviewed, namely conceptual models and principles. Concerning conceptual models, they aim to be as complete as possible to invite experienced groups to reflect on various combinations of educational approaches and game elements, which were reviewed as inappropriate to be used with novice groups and during Game Jams. Alternatively, the principles of learning in games introduced by Gee (2005) provide supporting information on gaming and educational approaches that is considered suitable to guide groups reflecting on the extent to which a given principle could be relevant for their games. The literature reviewed also suggests the relevance of aligning Gee's principles with Critical

Pedagogy to explore how to provide supporting information to design educational games specifically on social issues.

Moving on to processes, they were considered useful to facilitate a coherent order of interventions, given the multidisciplinarity of educational game design. During these processes, the literature suggests that the objectives of educational games should be defined considering both a gaming and an educational perspective. It also illustrates that game evaluations could be used to reflect iteratively on the coherence of the combined components of an educational game.

2.3 Participatory Educational Game Design

Participatory educational game design involves novice individuals, who are individuals who do not have any experience related to designing educational games, in processes of designing such games (Khaled and Vasalou, 2014). Studies that involved novice individuals in some activities related to the design of educational games will be introduced first (see *Section 2.3.1*). This section then introduces frameworks that involved novice groups throughout the entire processes of educational game design (see *Section 2.3.2*) before reviewing the literature on game engines (*Section 2.3.3*).

2.3.1 Partial Involvement of Novice Individuals

This section explores the involvement of novice individuals in some of the stages of educational game design. Danielsson and Wiberg (2006) presented a study where novice individuals were involved in the design of an educational game on gender issues. These individuals were introduced as representatives of potential game players and were requested to suggest changes or to approve specific design propositions created by experienced groups based on their preferences (e.g. graphics, characters, sound and audio). An

expert in gender studies was also invited to review how the topic of gender equality was presented in the game. This study illustrates that without exploring how to facilitate learning opportunities to novice groups, their contributions tend to be limited to their gaming preferences.

To increase the participation of novice groups in educational game design, studies have explored how to facilitate learning opportunities that could support their participation. This is illustrated in the study of Khaled and Vasalou (2014) who involved children in the development of an educational game on the topic of conflict resolution. Observing that a lack of knowledge on the educational topic was a significant barrier for inclusion, the authors proposed an approach based on facilitating a lecture aimed at presenting information on the educational topic first and then giving children precise design challenges. The evaluation of this study relied on presenting the children's contributions to the games designed. Similarly, the study of De Jans et al. (2017) presented a process where experienced and novice groups receive specific functions for the design of an educational game aimed at raising awareness of advertising literacy, which was also evaluated in terms of the games designed. Novice individuals were asked to participate in a workshop where first, the educational topic was introduced, second, their inputs on their favourite game features were captured (e.g. genre and music) and third, they had to create a game storyboard on the educational topic. They were involved again in the last stage of the process to test and give feedback on the then developed game. These two studies illustrate that the level of participation of novice individuals were defined by the learning opportunities that were offered to them. They also highlight that the focus of involving novice individuals is given to their contributions to educational games and not to the learning that they could acquire by being involved in processes of educational game design. This was also argued by Iacovides and Cox (2015) who, in response to this, proposed a framework to facilitate learning through designing educational games, from their conceptualisation to

their development. This study will be presented in the next section.

2.3.2 Complete Involvement of Novice Individuals

Arguing that greater attention should be given to how learning could be facilitated through participating in designing educational games, Iacovides et al. (2019) proposed a four months competition, inspired by the format of Game Jams, for engaging broad audiences in designing educational games aimed at raising awareness of issues related to health. This competition is open to groups of students from different disciplines with the specification that at least some participants with experiences in design and game development need to participate in each group. The competition starts with a kick-off day where mini-talks on health, a game design workshop that focuses on prototyping and playtesting, and a brainstorming session aimed at creating game ideas are facilitated. After this day, the participants can access an online platform to communicate with experts as well as to get additional information on game design and health. The groups then have four months to submit a game.

Regarding the results of this study, it was first illustrated that the 12 students who participated, allocated in four groups, did not use the platform to communicate with experts after the kick-off event. Concerning the resources provided on the website, the authors argue that they were used by the groups as some of these resources were identified in the games created. Individual evaluation forms were facilitated after the kick-off events which illustrated that the participants seemed to both have enjoyed the event and perceived learning about health and game design. The participants also reported recommendations targeted at facilitating shorter talks, longer collaborative workshops and more questions-and-answers sessions. Each group presented a game that was evaluated by a panel of judges who concluded that the four games produced were playable and had the potential to facilitate impactful educational outcomes. This study points out the potential

of using educational game design to enhance learning by affirming that the participants have learnt about health and game design throughout the competition, by attending the kick-off event, by experimenting how to design educational games on the topic of health in groups and by using the resources provided. However, indications on their learning are limited as they are based on the evaluation forms conducted after the kick-off event as well as on using participation and the games created to evidence learning on both health and game design.

This study lists as a future direction that additional research should explore the use of game engines to involve audiences that do not have knowledge of game development and not to rely on the technical skills of certain individuals, which was used to shape the Problem Statement of this thesis. Another insight extracted from this study is the relevance of facilitating stages at the beginning of the process of educational game design targeted at supporting learning about the educational topic and about game design. Overall, this study illustrates that more research needs to be conducted to capture indications on how to facilitate learning during initiatives aimed at involving broad and novice individuals into educational game design.

Falcão et al. (2018) presented a framework to enable novice individuals to acquire learning on the educational topics of mathematics and languages as well as skills related to game design. This framework consists of four stages, namely recruiting, training, development and testing, and intends to be applied during a period of 6 to 8 months. Participants are recruited based on a drawing and algorithm logic test that is first facilitated by the researchers. In the training stage, half of the participants receive resources and attend training to learn how to use a graphic editor while others learn how to use a game engine. After the training, groups are formed and they are requested to reflect on a game idea and develop a game in six months under the supervision of experts.

Moving on to the results extracted from applying this framework, in total 19 individuals participated in this study and were supported by 6 experts in the educational topics, game development and graphic design. The results were based on proposing four personas that were created from observing the participants to evaluate both the participants' learning and needs during each stage of the framework. This study reported that a challenge faced was related to the lack of support provided to help participants discuss and further understand the educational topic of the games. The authors also recommended exploring how to reduce hierarchical relations between experienced and novice groups to increase the autonomy and engagement of novice groups. This lack of autonomy and engagement was particularly noticed during the stage targeted at developing the games. It was presented as a factor that negatively impacted the participants' learning about game development as they were given instructions to develop their games without engaging in reflective discussions with the experts.

This study presents insights that can be used for this research. First, it illustrates the importance of providing support to create discussions and understandings on the educational topic of a game as part of the design process, which was also illustrated in the study of Iacovides et al. (2019) as well as in the processes presented in *Section 2.2.4*. Second, it evidences the risks of approaches that rely on the involvement of experts to develop games, which can limit the learning opportunities that are presented to novice groups. Third, it is argued that presenting a test to allocate participants to certain training opportunities goes against the ideas of democratisation as it makes certain learning opportunities exclusively available to groups who have preliminary knowledge on a given topic.

2.3.3   Game Engines

It is impossible to ignore that the democratisation of educational game design faces technological barriers. Over the years, the technological barriers of game design have been reducing due to the introduction of game engines, which are tools intending to simplify the development of games (Christopoulou and Xinogalos, 2017). Recent research shows that educational games are being developed using the same game engines that are used for game design (Pavkov et al., 2017).

Some engines require the use of programming languages and others do not. *Unity* is the most popular game engine and it requires the use of the C# programming language to give functions to game objects. Other engines such as *GameMaker* and *Construct* also require computer programming skills to be used effectively. People intending to use these engines to develop games need to have expertise with the programming languages of GML and Java. *Twine*, *GameSalad* and *Scratch* are game engines that do not require skills in programming languages. *Twine* is proposed to create interactive stories, *GameSalad* and *Scratch* enable the development of any kind of two-dimensional and single-player games.

Game engines have been described as suitable to both develop games and to support learning about computer programming languages and game development. This was observed in the research of Hernandez et al. (2010) who proposed a study that illustrates the relevance of using game engines to teach computer programming by presenting a case study using *GameMaker*. This study concluded that game engines, such as *GameMaker*, could be used to "introduce to freshmen the basic principles of programming logic and game development, without dealing with paradigms' idiosyncrasies or programming languages' details of syntax" (Hernandez et al., 2010, p.7). Regarding game engines that do not require skills in computer programming, the thesis of Stiklickas (2013) and research of Dekhane and Xu (2012) described the potential of *GameSalad* to facilitate learning in game development and computer programming concepts by illustrating that this engine

reflects the basic structures and logic of computer programming and game development, such as the use of variables, rules and loops. The research of Topalli and Cagiltay (2018) used *Scratch* in an introduction to programming course and reported satisfactory levels of learnings in both programming concepts and game development, which led them to recommend the use of this engine to teach such topics. The main limitation of these game engines (i.e. *GameSalad* and *Scratch*) is that they do not enable users to modify or access the lines of codes that are being created to develop their games. This could, arguably, enable individuals to reflect on the technicality of game development and support them in understanding the syntax of certain programming languages.

In a context where the democratisation of educational game design on social issues intends to be facilitated during Game Jams, the use of *GameMaker*, *Unity* or *Construct* is evaluated as not feasible due to time restrictions. Regarding engines that do not require computer programming, *Scratch* is targeted at young people aged 8 to 16, it is free of use, and its use is presented as an engine that facilitates learning in logical thinking and in understanding programming concepts. *GameSalad* is more advanced in terms of the programming concepts proposed and is widely used to trigger understanding about game development and programming concepts to adults. For instance, the programming concepts of inheritance and objects' attributes are not supported in *Scratch* but are in *GameSalad*. The *GameSalad* engine has a cost of 8 to 17 USD per month with a free trial of one month.

2.3.4   Summative Remarks

The literature reviewed indicates that to increase the participation of novice individuals in educational game design, learning opportunities need to be provided. Exploring how to facilitate such opportunities has been illustrated in studies intending to involve novice individuals in educational game design. These studies present insights that can be used to

develop a framework for the democratisation of educational games on social issues. They highlight the relevance of proposing stages dedicated to explore the main aspects of educational games design, including the educational topic, before starting to develop them. Issues related to creating disparities in participation and limiting learning opportunities to novice groups by presenting a framework that relies on experts to develop games were also presented. These issues were associated with experts in game development providing instructions to novice groups without inviting them to engage in reflective discussions. Lastly, regarding game engines, the presented literature illustrates their potential to enable participants to learn about game development and support their understanding of technical concepts.

2.4   Critical Pedagogy

Critical Pedagogy is presented as the application of Critical theory to education and is often attributed to the Brazilian educator and philosopher Paulo Freire who presented it in a book published in 1968 titled 'Pedagogy of the Oppressed' (Freire, 1970). Critical theory was first described by Max Horkheimer in 1937 as a theory targeted at criticising and changing society by reducing injustice and oppression through the development of self-reflective knowledge (Slattery, 1995). Paulo Freire applied this theory to education by proposing an educational approach to raise awareness of social issues to trigger engagement in tackling social inequalities. Critical Pedagogy is based on Freire's experiences in addressing poverty in rural Brazil and also presents applicable principles to democratise educational practices by creating agency and egalitarian participation. These principles are first presented (see *Section 2.4.1*). Following this, a process used to apply these principles in practice is presented and reviewed (see *Section 2.4.2*). Lastly, the application of Critical Pedagogy to tackle social issues and sexism is presented (see *Section 2.4.3*).

2.4.1 Principles

The first principle is to use everyday life experiences where social issues are faced or observed and use them as a starting point in educational interventions. These experiences are described as educational material that is used to trigger learners to develop broader knowledge and understanding about social issues. Using everyday experiences is described as an opportunity to contextualise learning and to enable learners to relate to educational topics, which in turn influences their participation in discussions (Darder, 2003).

Guidance on how to use these experiences leads to the second principle of Critical Pedagogy, which is to enable egalitarian participation in learning and teaching through the use of dialogue. This principle challenges hierarchical positions between students and teachers by identifying everyone involved in educational interventions as egalitarian learners who can both teach and learn with the use of dialogue (Giroux, 2018). This principle suggests framing dialogue toward facilitating questioning and reflection, which in turn creates engagement in discussions between learners (Freire, 1970). Portraying dialogue as such is also intended to enable learners to have agency over their educational pathways (Schugurensky, 2014).

Another principle of Critical Pedagogy is to ensure engagement with social issues and to portray learners as agents of change. Critical Pedagogy is presented as a "mode of intervention" (Darder, 2003, p.xii) where reflection needs to be directed toward enabling learners to perceive social issues as transformable and to develop ideas on solutions aimed at tackling them.

At the centre of Critical Pedagogy lies the idea of 'praxis', which expands on how to trigger learning and develop solutions to tackle social issues (Lankshear et al., 1993). It describes learning as a cyclic process of applying theory into practice and vice versa (Freire, 1970; Ledwith, 2015). Learning is created through performing actions in practice and by reflecting on these actions. These reflections are then used to inform subsequent

actions, leading this cycle to be repeated (Ledwith, 2015).

2.4.2   Process of Conscientisation

Critical Pedagogy also presents a process made up of a number of steps to apply the presented principles, which is known as 'the process of conscientisation' (Freire, 1970; Freire and Macedo, 2005). This process is described as: "learning to perceive social, political and economic conditions, and to take action against the oppressive elements of reality" (Freire, 1970, p.17).

The process starts with an 'Investigation' step where learners observe reality and start extracting experiences and keywords that illustrate some of the social issues they face or observe in their everyday lives. The 'Thematisation' step involves taking distance from these everyday life experiences by classifying them into themes and using creative processes, such as writing or drawing, to create representations of these experiences. In the 'Problematisation' step, all the material and discussions elaborated are used to trigger questions and conversations about social, economical and political aspects of the learners' lives that are affected by social issues. This step is also marked by understanding how these aspects could be transformed and position learners as catalysts of social change (Freire, 1970; Freire and Macedo, 2005). The last step is called 'Systematisation' and learners communicate their learning with the objectives of inspiring people in other realities and defining actions that could be taken to contribute toward tackling social issues (Tygel and Kirsch, 2016).

Daudelin (1996) presented a method to structure questions to cover the process of conscientisation, which was created with the intention to propose an easy-to-use method to apply this reflective process (Daudelin, 1996, p.39). The first stage is to direct questions toward identifying and presenting a social issue by elaborating 'what' questions (e.g. What is the issue represented?). Following this, the second stage is to generate

potential possibilities to explain the issue by facilitating 'why' questions (e.g. Why did it happen?). The penultimate stage is to formulate 'how' questions to frame a hypothesis to understand the issue (e.g. How could this issue contribute to inequalities?) and the last stage is represented by articulating actions with 'what' questions (e.g. What could be done about it?).

2.4.3   Social Issues and Sexism

Critical Pedagogy has been applied to tackle various social issues such as racism (Montgomery, 2013), islamophobia (Delaney, 2015), discrimination against the LBGTQ+ community (Lesbian, Gay, Bisexual, Transgender and Queer and others) (Watson and Miller, 2012) among others. The work of bell hooks, an American professor and activist, has been widely appreciated to illustrate how Critical Pedagogy could be used to tackle sexism (hooks, 2014).

A significant contribution of bell hooks to Critical Pedagogy was to accentuate the relevance of facilitating dialogue between diverse groups in order to trigger collaborative learning and contributions to tackle social issues (hooks, 2014, 2000). It is important to clarify that this idea was presented in 'The Pedagogy of the Oppressed' (Freire, 1970) although the practical implementations of Critical Pedagogy by Paulo Freire, exclusively with groups with similar socio-economic backgrounds, could lead to misinterpretations. With the social issue of sexism, bell hooks indicates that it is crucial to consider multiple points of view, ensuring that the experiences of people from various backgrounds are included, and to portray males as allies in tackling this social issue (hooks, 2014, 2000).

2.4.4   Summative Remarks

Critical Pedagogy presents principles aimed at democratising educational initiatives by creating agency, facilitating egalitarian participation and engagement with social issues.

It illustrates the use of experiences on social issues as educational material to enable egalitarian participation. It also portrays dialogue as a tool that is used to facilitate reflection, which in turn contributes to creating agency over discussions. Critical Pedagogy also highlights the importance of framing reflection toward creating engagement. This is presented as an activity that could facilitate the generation of ideas on solutions to tackle social issues that can, in turn, be used as additional material to be reflected upon, which is described by the praxis principle. The presented 'Process of conscientisation' and the method of Daudelin (1996) provides a structure on how to apply these principles in sequence. Lastly, this section illustrates that initiatives aimed at applying Critical Pedagogy to the social issue of sexism should consider the importance of discussing sexism with diverse groups and to explore social issues through diverse experiences.

2.5   Chapter Summary

This chapter reviewed the literature related to the democratisation of educational game design on social issues. This chapter started by reviewing the literature on Game Jams in *Section 2.1* looking at how Game Jams could be used to enable diverse and novice groups to learn about educational game design and social issues. It then presented summative remarks in *Section 2.1.6* that highlighted how, and why, Game Jams could be used to democratise educational game design on social issues. Then, a review of practices of educational game design was presented, with insights on how to democratise these practices in *Section 2.2*. Summative remarks illustrating how the literature reviewed could be used to democratise educational game design are presented in *Section 2.2.7*. Following this, *Section 2.3* discussed the literature on participatory approaches to educational game design and reviewed two frameworks that were used to enable diverse groups to design educational games. Summative remarks, presented in *Section 2.3.4*, stated the limitations of these framework as well as how they could be used to inform this research. Finally,

Critical Pedagogy was introduced in *Section 2.4* and its use and potential to democratise knowledge, facilitate agency and egalitarian participation, and create engagement with social issues were reviewed. This is followed by summative remarks in *Section 2.4.4* that discussed how Critical Pedagogy could be used to facilitate a framework to democratise educational games on social issues and to design educational games on such topics.

Chapter 3

Methodology

This chapter introduces the research paradigm and approach, and describes the three design studies conducted, justifying the methods chosen in each one. These studies were targeted at proposing interventions, activities and resources aimed at lowering the barriers to the democratisation of educational game design on social issues.

3.1 Paradigm

A paradigm presents the worldview that a researcher holds. The paradigm of this research is constructivist, described as "a viewpoint, reflected in research, that does not accept the socio-political status quo but seeks to challenge issues related to gender, for example, or to racism, power and all forms of oppression" (Burgess et al., 2006, p.55). Researchers working within a constructivist paradigm acknowledge their backgrounds and personal experiences and recognise that they influence their interpretations, typically involving individuals who contribute with diverse experiences, ideas and beliefs (Crotty, 1995). As a constructivist paradigm relies on various individuals' views on what is being researched, it is usually implemented following qualitative or mixed-method approaches to research (Creswell and Creswell, 2017).

3.2 Design-Based Research

This research adopted the Design-Based Research approach. First introduced by Brown (1992) and Collins (1992), Design-Based Research is presented as a methodology within educational research which is based on elaborating interventions aimed at solving issues related to learning and teaching. The objective of this approach was presented in The Design-Based Research Collective: "Design-based researchers' innovations embody specific theoretical claims about teaching and learning, and help us understand the relationships among educational theory, designed artefact and practice" (Collective, 2003, p.1). The use of Design-Based Research has been increasing in educational research, especially in contexts using computing and technological tools for education (Anderson and Shattuck, 2012; Zheng, 2015).

Wang and Hannafin (2005) proposed five characteristics to describe this approach. The first characteristic is introduced as a 'pragmatic research goal' and illustrates that Design-Based Research is based on exploring the synergies between theory and practice. The second one, named 'Grounded research methodology' contextualises the use of Design-Based Research in a real-world setting that involves complex social interactions. The next characteristic, 'Interactive, iterative, and flexible research process', expands on the creation processes of interventions, illustrating that interventions require revisions conducted during an iterative and flexible processes of creation. The fourth characteristic is presented as 'Integrative research methods' and connects the use of mixed or qualitative methods to Design-Based Research. Quantitative methods are typically applied to guide or complement qualitative findings by numerising, prioritising or classifying what demands interpretation or refinement (Holmes, 2013). Lastly, the 'Contextual research results' characteristic requires researchers to present their research processes, findings and reflections on the proposed interventions to enable other individuals to apply or adapt them coherently.

Two aspects of Design-Based Research that are often highlighted are its collaborative features and the application of iterative processes to propose interventions. More often than not, the collaborative features of Design-Based Research rely on the participation of various stakeholders, often introduced as co-researchers or co-designers, who actively contribute to the design of the proposed interventions (Holmes, 2013; Gravemeijer and Cobb, 2006; Kafai, 2005). The creation of interventions through iterative processes tends to be illustrated as a cyclical process aimed at the creation, evaluation, revision and validation of interventions. Plomp (2013) argued that this iterative process is based on the following three phases:

- 'Preliminary research phase' which consists of reviewing the literature or collecting inputs to inform and situate potential interventions;

- 'Prototyping phase' which is when interventions are proposed and evaluations are conducted to improve and refine them;

- 'Assessment phase' which is based on conducting evaluations to explore the extent to which the intended outcomes of the interventions are reached and to present recommendations for improvement (Plomp, 2013, p.15).

Inevitably, Design-Based Research also raises potential issues and criticisms. The first criticism relies on illustrating it as an emerging methodology that does not provide enough guidance and understanding of what methods and approaches should be used (Holmes, 2013; Hanghøj, 2011). This is aligned with recurrent observations that point at risks of Design-Based Research to generate a large amount of data of which only a small proportion is actually needed to explore a research question (Holmes, 2013; Dede, 2005).

The second criticism is connected to the timeframe of Design-Based Research, which describes this methodology as "long-term and intensive" (Herrington et al., 2007, p.1). The literature tends to warn PhD students about the timeframe needed to propose in-

terventions within a Design-Based Research methodology (McKenney and Reeves, 2018). However, an increasing body of literature has presented this methodology as suitable for PhD research and has extended its appropriate use for research that has to be conducted within a year period (Zheng, 2015; Herrington et al., 2007; Kennedy-Clark, 2013; Goff and Getenet, 2017). In educational game design, manifestations of PhD students successfully defending their thesis with this methodology has been increasing. For example, Hanghøj (2011) proposed a timeframe where a game was first designed, adapted and then redesigned in five consecutive sessions over the course of a year. Holmes (2013) also used Design-Based Research for his PhD and proposed a methodology based on shaping three cycles of studies to design an educational game in a one-year period.

3.3 Design-Based Research applied to this Research

The decision to adopt Design-Based Research is based on intentions to move beyond illustrating whether the proposed framework is effective or not. This research intends to present its iterative process of creation, findings on how it was used in practice and recommendations on how it could be improved.

To examine the literature gap and in accordance with the studies presented in *Section 2.4.3*, a case study on the social issue of everyday sexism was adopted, leading participants of the Game Jams to design educational games on everyday sexism. In addition, this research adopted a mixed-method approach using quantitative data to measure the perceived validity and overall impressions of the proposed interventions. Qualitative data is used to collect participants' suggestions and insights, to report on the use and suitability of the interventions as well as make recommendations to improve them.

The iterative process that led to the creation of the proposed framework was based on collecting information from both the literature during preliminary phases and from the

participating individuals. When individuals were included, one of the two approaches presented in the next two sections were used, namely Participatory Design or Informant Design.

3.3.1   Participatory Design

Participatory Design is a design approach where people intended to use a specific product are invited to participate in designing it (Schuler and Namioka, 1993). People involved in design, often called potential users, partners or co-designers, are given equal opportunities for participation throughout the design processes (Muller and Kuhn, 1993). Participatory Design intends to empower potential users to develop solutions that are aligned with their ideas, preferences and/or beliefs (Schuler and Namioka, 1993). More often than not, this approach is adopted by forming groups who participate in collaborative workshops aimed at capturing inputs by using, for instance, scenarios, paper prototypes, collages, mappings, mockups or discussing ideas directly (Kensing and Blomberg, 1998; Sanders et al., 2010). These inputs can be directly collected through the artefacts created or through the use of questionnaires, observation notes or interviews (Simonsen and Robertson, 2012).

3.3.2   Informant Design

Informant Design is an approach that involves individuals that have specific expertise, called informants, and invites them to inform decisions based on their expertise. This approach aims to maximise contributions from informants and access specialised inputs that are needed for a given project. Researchers adopting this approach start by defining the inputs that each informant is intended to provide and organising their contributions. To capture their inputs various methods are used, such as interviews, questionnaires, collaborative workshops and the creation of artefacts (Scaife et al., 1997).

3.4   Design Studies

Three consecutive studies are presented in this thesis following either Participatory Design or Informant Design. Participatory Design was used to capture diverse perspectives on a subject matter whereas Informant Design was applied to gather information based on specific expertise. Combining these two approaches enabled the creation of a framework that facilitates diverse inputs on everyday sexism and specialist information on educational game design.

The first two studies targeted the creation of cards as interventions to support design activities in a Game Jam. The first study, presented below in *Table 3.1*, aimed at creating cards on everyday sexism. The other proposed a set of cards aimed at democratising knowledge of educational game design. These cards were created during the second study and an overview of this study is provided in *Table 3.2*. The third study, introduced in *Table 3.3*, is based on proposing a framework to democratise educational game design on social issues applicable during Game Jams. Evaluating the framework involved groups of participants designing an educational game on everyday sexism during two Game Jams.

This research followed the ethical standards of the Open University. The research design for each study was approved by the university's Human Research Ethics Committee (HREC reference numbers: HREC/2018/2777/Myers, HREC/3168/Myers, HREC/2777/Myers, and HREC/3203/Myers).

1st study: Cards on everyday sexism					
	Timeline	**Aims**	**Methods**	**Participants**	**Approach**
Preliminary research phase	Feb to Mar-18	- To inform on the creation of a set of cards on everyday sexism	- Collaborative workshops - Artefacts creation (preliminary version of cards)	1st workshop: 23 people - (8 females and 15 males) 2nd workshop: 10 people - (4 males and 6 females)	Participatory Design
Prototyping phase	Apr-18	-To individually evaluate the clarity, understandability and reflective potential of the cards	- Online questionnaires with Likert scales and open-ended questions	58 people - (33 females and 25 males)	Participatory Design
Assessment phase	Jun-18	- To assess and validate the proposed set of cards collaboratively - To explore the potential of the cards to facilitate learning and support groups in creating stories and branching stories	-Collaborative workshops -Pre and Post-workshop questionnaires with Likert scales and open-ended questions -Artefacts creation (story and branching story)	47 people - (30 females and 17 males)	Participatory Design

Table 3.1: *Overview of 1st study: Cards on everyday sexism*

2nd study: Cards on educational game design					
	Timeline	**Aims**	**Methods**	**Participants**	**Approach**
Preliminary research phase **Prototyping phase**	Aug-18	- To create initial set of cards - To review, critique and improve initial version of cards	- Creation of initial design of cards - Modifications on cards	Researcher with two supervisors	Informant Design
Assessment phase	Dec to Feb - 19	-To assess and validate cards	Semi-structured Interviews	P. James Gee John Lockhart Jo Summers Tan Tran	Informant Design

Table 3.2: *Overview of 2nd study: Cards on educational game design*

Each of the Research Questions presented in this thesis is explored through three studies. The first study presents preliminary findings on the first Research Question (RQ1): 'What support do Game Jam participants need to engage with social issues?'. This Research Question is further explored during the third study where the proposed cards and activities were applied during two Game Jams.

3rd study: Framework					
	Timeline	**Aims**	**Methods**	**Participants**	**Approach**
Preliminary research phase **Prototyping phase**	Mar-19	- To create initial set of cards - To review, critique and improve the initial version of the framework	- Creation of initial design of framework - Modifications on framework	Researcher with two supervisors	Informant Design
Assessment phase	-1st Game Jam: Apr-19 -2nd Game Jam: May-19	- To assess, improve and validate the proposed framework	- Weekend-long Game Jams (x2) - Semi-structured interviews - Questionnaires with Likert scales and open-ended questions - Observation notes - Artefacts creation (story, branching story, prototype and game)	- 1st Game Jam: 8 people (3 females, 1 non-binary and 4 males) - 2nd Game Jam: 15 people (8 females and 6 males and 1 transman)	Participatory Design

Table 3.3: *Overview of 3rd study: Framework*

The second study is connected to the second Research Question (RQ2): 'What resources and processes can be used to democratise educational game design practices?'. This study is also connected to the third Research Question (RQ3): What support do participants need to acquire game development skills during Game Jams?, as the cards proposed include game elements that were implemented into a game using a game engine.

Similarly, these three Research Questions are explored during the last study. *Table 3.4* below illustrates the connections between the RQs and the studies.

	RQ1	RQ2	RQ3
Study 1	x		x
Study 2		x	x
Study 3	x	x	x

Table 3.4: *Research Questions explored through each of the studies conducted*

3.4.1 Everyday Sexism Cards

This study aimed at developing cards to create engagement with the topic of everyday sexism. The main idea behind this study was to involve broad audiences to capture a

diversity of perspectives on everyday sexism and present them on the cards. The creation process was based on iterations aimed at the creation, evaluation and validation of a set of cards, as illustrated in *Figure 3.1*.
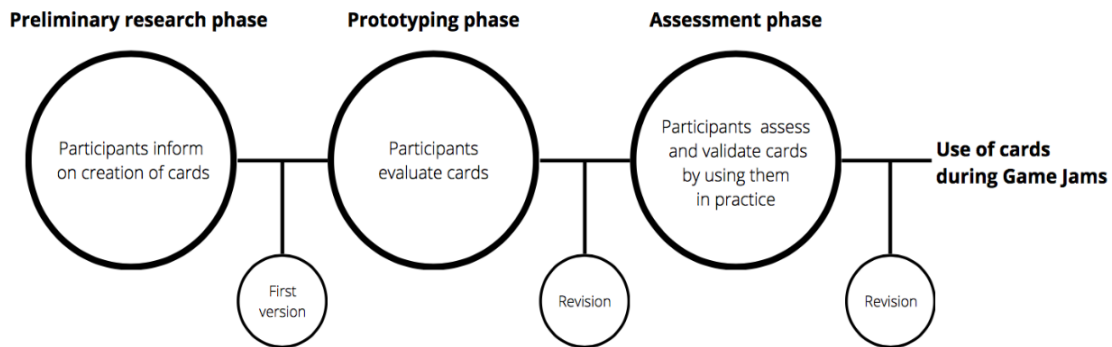
Figure 3.1: *Overview of study phases for 1st study on the everyday sexism cards*

The everyday sexism cards design started within the preliminary research phase with two collaborative workshops, which informed the creation of a set of cards through group discussions. Following this, in the prototyping phase, an online questionnaire, using Likert scales as well as open-ended questions, was used to gather feedback on the first version of each card. The assessment phase involved a collaborative workshop to enable broad audiences to use the proposed cards as part of a storyboarding activity, which intended to simulate how the cards were going to be used during the Game Jams. During this collaborative workshop, groups used the cards to create branching stories and feedback questionnaires, with Likert scales and open-ended questions, were completed individually at the beginning and end of the workshop.

3.4.1.1 Methods

In the preliminary research phase, collaborative workshops were facilitated to gather diverse perspectives on everyday sexism and to collect information that could directly be used to inform the design of the cards. The decision to facilitate workshops instead of interviews or focus groups was intended to give the groups agency over how the issue of

everyday sexism was discussed and illustrated. The collaborative workshops involved directing group activities toward discussing and providing information on each of the items that would appear on the cards, namely keywords, stories of lived experiences, illustrations and reflective questions. These activities were supported by templates that intended to be first filled collectively by groups before being presented by each group to the rest of the participants. Regarding the data analysis method, the data generated on the template and the transcription of the presentations was used to inform the first version of the cards. This use of data relied on an iterative process of categorisation that was based on data sorting and data reduction.

The prototyping phase was based on using online questionnaires, considered an appropriate method to collect individual impressions and feedback on each of the preliminary designed cards. It was decided that the names of respondents would not be asked to avoid receiving positive evaluations on the cards based on intentions to please the researcher. The downside of this is that the researcher could not contact the respondent in scenarios where clarifications on the given responses were needed. This online questionnaire invited participants to evaluate each card separately in order to gather data that could guide precise and situated improvements to the cards. Evaluating the perceived clarity, understandability and reflective potential of the cards individually was judged as suitable to collect inputs to make these cards as clear as possible to a large range of individuals, which is aligned with the intention to use these cards to achieve egalitarian participation. The data generated from this online questionnaire was used to inform the second version of the set of cards.

Likert scales were included to measure and compare overall impressions of the cards and each of their items to point out to what aspects of the cards needed to be improved. To do so, data frequency counts were calculated and interpreted by exploring similarities and differences in the participants' responses per question. Following this, open-ended

questions were incorporated to gather qualitative data on these impressions and to extract practical indications on how to improve each card. The data collected was organised and analysed using categories. Each card was reviewed separately by implementing the suggestions that were aligned with the objectives of the cards.

Regarding the last phase of the study, the assessment phase, a collaborative workshop, where the cards were used and then evaluated, was facilitated. The workshop invited participants to report on the cards and the proposed activities through individual questionnaires, which were completed at the beginning and at the end of the workshop. The choice of using individual questionnaires was considered appropriate as this phase of study intended to collect individual perspectives on the relevance of the proposed activities and cards. The data collected was used to inform the last version of the cards and the proposed activity to use such cards.

As in the previous phase, Likert scales were used to measure and compare overall impressions on the activities and of each card separately. Statistical analyses, including frequency counts and Chi-squared tests for independence, were used to explore differences related to the responses collected in the pre-workshop questions, namely the participants' perceived levels of understanding of everyday sexism and their interest in this topic. Following this, the artefact created, that took the form of branching stories on everyday sexism, were collected at the end of the workshop and reviewed to explore the suitability of the cards and activities to create material that could be used as a foundation to design educational games. To do so, a content analysis was performed on the artefacts created to explore if the artefacts were consistent with the information presented on the card used by each group. Lastly, open-ended questions were used to gather qualitative data to extract implementable ideas for improvements or areas of concern. This quantitative data was categorised and used to improve the set of cards and the proposed activities.

3.4.2 Educational Game Design Cards

The second design study led to the creation of a set of 13 cards on educational game design. The purpose of the cards is to support groups to explore, understand and implement practices of educational game design on social issues. The cards are intended to help people who might not be familiar with the literature on educational game design and Critical Pedagogy to understand and apply research-based concepts in the creation of games. The study was conducted using an Informant Design approach to create, critique and validate the cards on educational game design, as illustrated in *Figure 3.2*.
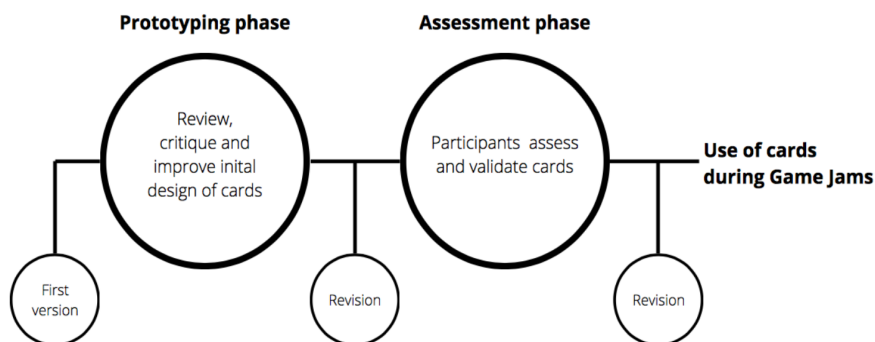
Figure 3.2: *Overview of study phases for 2nd study on the educational game design cards*

The first version of the cards put together Gee's principles of learning in games (Gee, 2005) and the literature of Critical Pedagogy (Freire, 1970). Following this, in the prototyping phase, three one-and-a-half-hour sessions were organised with the two supervisors of this doctoral project to collaboratively critic, review and improve each of the cards. The cards' validation, in the assessment phase, consisted of four semi-structured online interviews with individuals with expertise in educational game design, Critical Pedagogy game development, and Game Jams (respectively).

3.4.2.1   Methods

Concerning the prototyping phase of this study, reviewing, critiquing and improving the initial version of the cards collaboratively was considered appropriate to improve the clarity of the cards. Regarding the assessment phase, semi-structured interviews are presented as a suitable method to collect inputs from experts within an Informant Design approach (Scaife et al., 1997). In the context of this study, the areas of expertise needed to assess and validate the cards are considered niche and therefore informed the choice of participants. In addition, their geographical locations and limited time guided the choice of semi-structured online interviews.

Sending the cards and the questions in advance of each interview was considered necessary to enable the participants to prepare their responses. However, this method also presented a risk not to gather the needed data by deviating from the list of the questions preliminary proposed, especially in scenarios where the participants are asked to review 13 cards. To this end, the researcher was prepared to be flexible with the idea of asking the participants to send their feedback via email after the interview. The researcher was also prepared to be flexible to focus on specific cards that participants felt needed revisions. Lastly, the data collected from these interviews was used to directly modify the proposed set of cards based on the expert recommendations.

3.4.3   Framework for the Democratisation of Educational Game Design on Social Issues

The third study is a summative evaluation of the resources and framework developed through the two formative design studies. It aimed at proposing a framework for the democratisation of educational games on social issues applicable during Game Jams. The aim of this study was to create, review and validate the framework, as illustrated in *Figure 3.3*.

Prototyping phase

Review, critique and improve inital design of framework

First version

Revision

Assessment phase

Participants perform assessment and validaton of framework

Inputs for revision
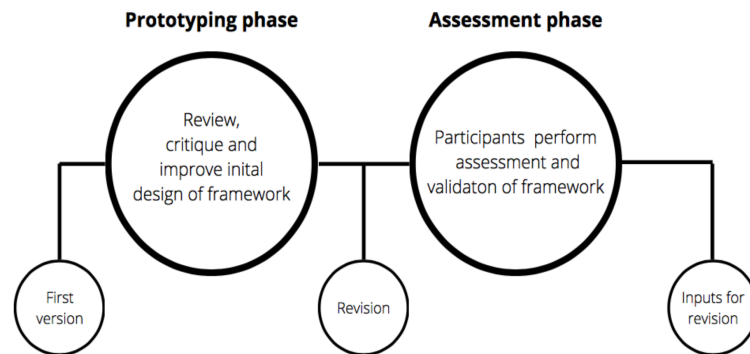
Figure 3.3: *Overview of study phases for 3rd study on the framework*

The initial version of the framework was created through a literature-based approach aimed at establishing the rationale for each stage of the framework. This initial version was reviewed through discussion with the two supervisors of this doctoral project in the prototyping phase. Following this, in the assessment phase, the framework was assessed during two weekend-long Game Jams where groups were invited to design educational games on everyday sexism. During these Game Jams data was collected through observation notes, group interviews, individual questionnaires and the artefacts created. These Game Jams were supported by the participation of three coaches who provided help in executing the activities and taking observation notes. These inputs for revision were then analysed and used to propose a revised version of the framework presented in *Chapter 6* (see *Section 6.5*).

3.4.3.1   Methods

Design-Based Research often involves several data collection methods to explore how data converges or could be used to complement results (McKenney and Reeves, 2018). In this study, questionnaires, group interviews, observation notes and the collection of created artefacts were facilitated to explore the Problem Statement of this thesis.

Individual perceptions and suggestions collected through questionnaires were considered suitable to evaluate the weaknesses and strengths of the framework. Similar to the pre-

vious studies, Likert scales and open-ended questions were used to point out aspects of the framework that needed to be reviewed while collecting suggestions for improvements. Quantitative data was also used to compare perceptions and to get an overall impression on specific aspects of the framework. Sections of the questionnaire were completed at specific times during the Game Jams to ensure that each questionnaire section was not excessively long, which could result in the participants not reading the questions carefully or not investing time in answering some of the questions (Herzog and Bachman, 1981). It was also considered relevant to ask specific questions close to the interventions to maximise the chances of collecting precise data. In addition, the use of snapshots to capture fluctuations on the participants' responses throughout the days was evaluated as appropriate to collect such data while not disturbing or overloading the participants with repetitive questions. A snapshot is described as the same question facilitated at various moments throughout an intervention and is presented in a visual representation taking the form of a graph.

Combining collective impressions with individual data was relevant to provide a more complete evaluation of the proposed framework. Conducting semi-structured interviews during the Game Jams was considered relevant to gather group impressions on the resources and activities facilitated. Semi-structured interviews also present flexibility to explore an aspect or area of concern that the research might not have anticipated or preliminary framed in one of the other methods of data collection (Barriball and While, 1994). On the other hand, interviews take time out of the available time that the participants have to design their games, can disturb participants and present risks in not asking the same questions to each group.

Observation notes were considered a suitable method to report information that participants would potentially not notice or could not report appropriately (e.g. when participants stopped using a card) as well as to collect data to illustrate potential distinctions

or similarities between the coaches' notes and the participants' perspectives. They also are relevant to reduce the length of questionnaires and interviews during the Game Jams. However, collecting observation notes also present potential issues related to making the participants feel observed or judged (Kawulich, 2005). With intentions to limit this, the observations were recorded by means of hand-written notes, which could be supplemented with additional notes made at the end or the next day of each of the Game Jams, and the coaches were required not to participate in discussions or interrupt groups.

The collection of the artefacts created was considered suitable to report on the evolution in the design of the games. It complements the data collected through the other methods introduced in this section by presenting inputs on what was created by the participants.

3.5 Chapter Summary

This chapter started by introducing the research paradigm of this PhD in *Section 3.1*, which followed a constructivist paradigm. It then introduced Design-Based Research as a methodology within educational research to elaborate interventions aimed at solving issues related to teaching and learning in *Section 3.2*. This was followed by *Section 3.3*, which described how Design-Based Research was applied to this research. The three design studies conducted were then introduced, and the methods chosen for each study were justified in sequence. Each of the study introduced were aimed at proposing interventions, activities and resources to lower the barriers to the democratisation of educational game design on social issues.

Chapter 4

Formative Design Studies

This chapter presents the execution of the studies introduced in the previous chapter which have led to the creation of three design interventions, namely cards on everyday sexism (see *Section 4.1*), cards on educational game design (see *Section 4.2*) and a framework for the democratisation of educational game design on social issues (see *Section 4.3*).

4.1   Everyday Sexism Cards

This section refers to the implementation of the studies on the everyday sexism cards. The purpose of the cards was to create engagement with the social issue of everyday sexism among groups and to support them to create branching stories on this topic. The outcomes of each phase, namely the preliminary research, prototyping and assessment, are used to directly inform the content of the cards. The iterative process of creating the cards is presented and an example of a card is used to illustrate this process. The last study introduced in this section presents and interprets the results proposed to validate the final version of the cards and an activity proposed to use them.

This process was applied to develop a set of 13 cards on seven categories of everyday sexism, as exemplified in *Figure 4.1*, showing the two sides of one of the cards on 'Gender

stereotypes'. The final set of cards are available online at the following URL:

https://figshare.com/s/e9c84fd34fcb1264388e
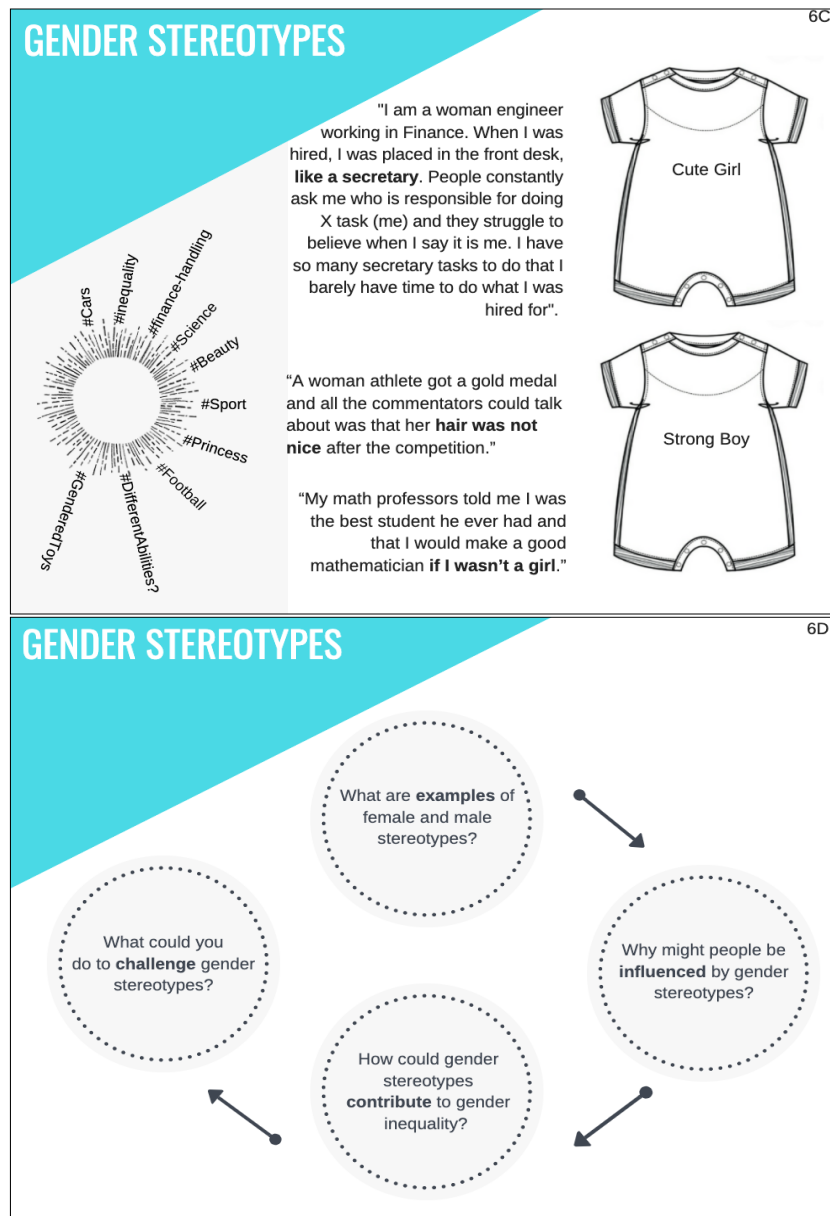
Figure 4.1: *Final version of an everyday sexism card on gender stereotypes*

4.1.1   Preliminary Research Phase

To propose the initial design of the cards two collaborative workshops were organised. The workshop participants were allocated randomly to groups of four or five people, each group was asked to address one of seven categories of everyday sexism: 'Benevolent Sexism', 'Sexist Language', 'Gender-based Harassment', 'Gender Stereotypes', 'Online Gender Discrimination', 'Feminism' and 'Downplaying Gender Discrimination'. Each workshop started with a 45 minute task where the groups were asked to choose stories on lived experiences, define keywords, create illustrations and reflective questions on a category of everyday sexism. After this task, each group had 10 minutes to provide feedback on the information generated by another group. The workshops were concluded with each group presenting their work to all the participants in five minutes.

Participants were first asked to read, individually, eight written lived experiences related to a category of everyday sexism and select the three most representative ones in groups. The lived experiences were extracted from a website called www.everydaysexism.com where people shared personal stories on this topic (Melville et al., 2019). Then, the groups were invited to propose reflective questions that would trigger reflection to people not necessarily knowledgeable of the topic.

The reporting of difficulties in creating such questions during the first workshop, led to the provision of an additional supporting structure for the second workshop (Myers et al., 2018). To better facilitate this, the second workshop used the guidance prompts by Daudelin (1996) that were introduced in *Section 2.4.2*. As a result, the participants were asked to create four questions with this additional supporting guidance. The first question was framed as a 'what question' that was targeted at identifying a problem related to everyday sexism (see *Figure 4.1* 'What are examples of female and male stereotypes?'); the second question was targeted at generating possibilities to explain the issue by facilitating a 'why' question (See *Figure 4.1* 'Why might people be influenced by gender stereotypes?');

the third question was presented as a 'how' question aimed at framing a hypothesis to understand the issue (see *Figure 4.1* 'How could gender stereotypes contribute to gender inequality?'); and the last question invited the participants to propose a 'what' question aimed at presenting actions to solve this issue (see *Figure 4.1* 'What could you do to challenge gender stereotypes?'). The groups were also asked to provide keywords and create illustrations that could trigger reflection on everyday sexism. The workshops were supported by a template in an A3 sheet aimed at guiding participants towards completing the tasks, and inviting them to add suggestions, the final version of this template is presented in *Appendix A* - *Figure A.1*.

Participants

The workshops were held at The Open University with a mixed group of university staff and research students with and without knowledge of the topic. To recruit participants, emails were sent via departmental, library and postgraduate student mailing lists. The recruitment invitation made clear the activity was seeking a group of participants with diverse backgrounds and occupations. When prospective participants responded to the invitation, they were sent a consent email informing them about the study, telling them that the data collected would be anonymised, and that they could withdraw at any time. Each participant could be involved in one of the two workshops.

Results

This preliminary study involved 23 participants in the first workshop and 10 participants in the second. The findings from these workshops were used to create the first version of the everyday sexism cards. The data from the two workshops (including the filled template, the feedback received and the transcription of the groups' presentation) informed the design of seven cards, one for each category of everyday sexism. The cards included a title, keywords, three lived experiences, an abstract image and four to eight reflective questions.

Regarding the illustrations, abstract images were added to the preliminary design of the cards due to six out of nine groups reporting that the illustrations created by the groups during the workshops were not clear or understandable. This is exemplified by a group who created an illustration on the use of the word 'just' to identify scenarios where people could be downplaying gender discrimination, which is shown in *Figure 4.2*. During the next task, that invited another group to provide feedback on this card, it was reported that a better illustration was necessary to understand issues related to downplaying gender discrimination. As a result of this, abstract illustrations were incorporated on the cards instead of using the illustrations created by the groups while the content generated on the illustration section was used to complement the keywords and the reflective questions.
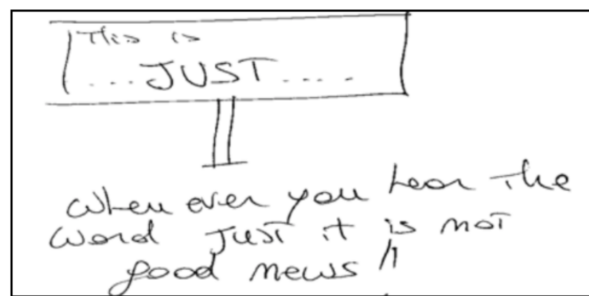
Figure 4.2: *Example of the results in the illustration section*

Following this, some of the stories of lived experiences chosen by the participants were edited to make them shorter and keywords were used with a hashtag to reinforce their symbolic meaning. An example of the first version of a card is presented in *Figure 4.3*.
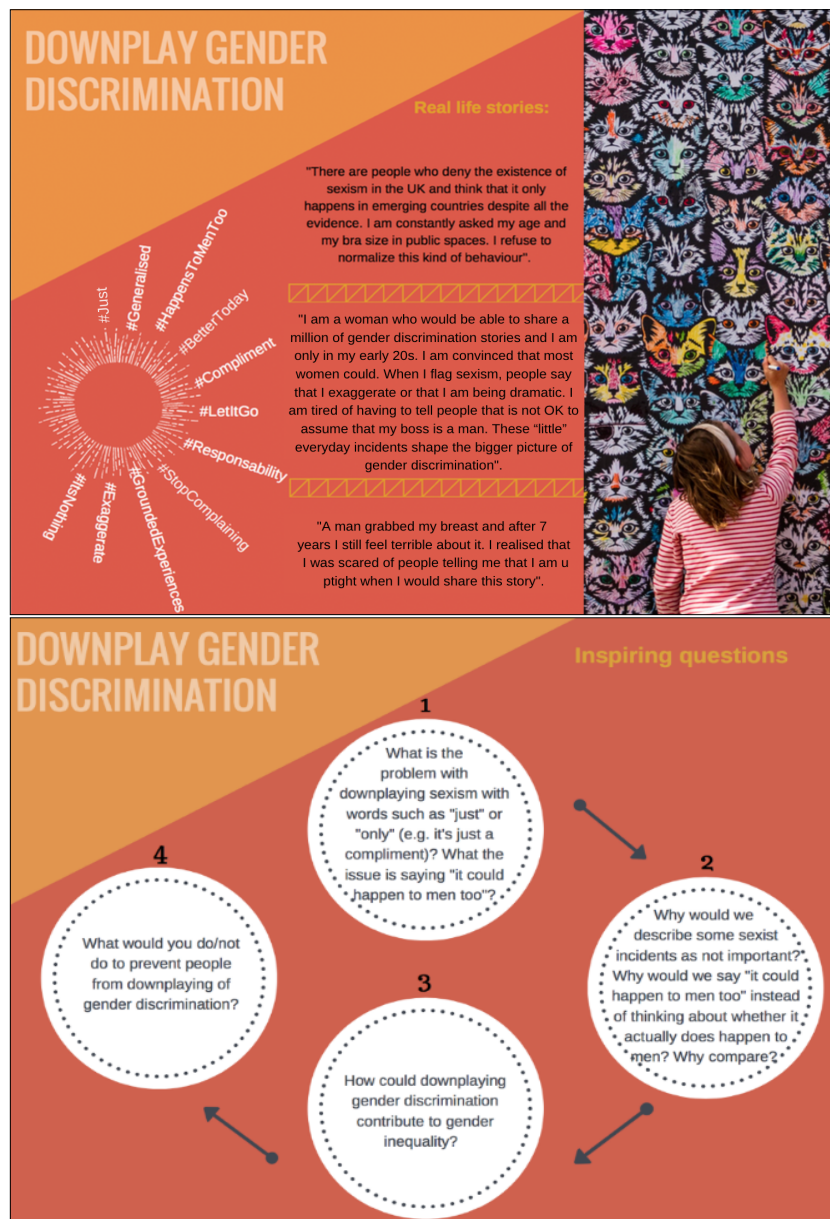
Figure 4.3: *First version of an everyday sexism card on downplaying gender discrimination*

4.1.2 Prototype Phase

The prototyping phase was conducted with an online questionnaire to review the first version of the cards and the responses collected were used to inform on the second version of the cards. The online questionnaire invited participants to review each card separately. Each participant was asked to review three or four cards per questionnaire. The first

question collected data on the respondent's understanding of everyday sexism, asking them if they considered themselves to be either an expert, aware, learner, unaware or indifferent to the topic of everyday sexism.

Following this, three questions, using Likert Scales, where the number 1 corresponded to 'Strongly disagree' and 6 to, 'Strongly agree', were asked:

- 'I find this card very clear and understandable';

- 'I find this card very inspiring and lead me to reflect on [category of everyday sexism]'

- 'I find [card item] very useful to trigger my reflection on [category of everyday sexism]' - where the potential card items were the [Keywords], [Lived experiences], [Illustration], [Reflective questions] and [All elements together].

The last item of the questionnaire was an open-ended question for general feedback and suggestions, targeted at improving each of the cards separately.

Participants

To recruit participants emails were sent via departmental, library and postgraduate student mailing lists as well as the personal network of the researcher. The online questionnaire included an introduction that explained that the responses will be treated as confidential, that the objective of the cards was to create engagement on everyday sexism and that they were going to be used by participants with different levels of understanding of this topic.

Results

A total of 58 people (33 females and 25 males) responded to the online questionnaire, which led to four cards being evaluated by 26 people and the remaining three cards by 32 people. In total, 5 people respondents considered themselves experts on the topic of everyday sexism, while 33 people reported being aware of this topic, 17 people reported

being learners, 2 people unaware and one person indifferent.

The responses to the first question, 'I find this card very clear and understandable', showed an average response per category of 4.9 out of 6, where the number 1 corresponded to 'Strongly disagree' and 6 to, 'Strongly agree'. The frequency distribution per category is presented in the *Table 4.1*. This table shows that the mode for each category of everyday sexism was found on participants responding 5 ('Agree') or 6 ('Strongly agree'), which suggests that the majority of the participants found the cards very clear and understandable.

Frequency of response per category	Benevolent Sexism	Online Gender Discrimination	Downplaying Gender Discrimination	Gender-based Harassment'	Feminism	Sexist Language	Gender Stereotypes
1 (Strongly disagree)	1	1	2	1	1	1	1
2 (Disagree)	1	0	1	0	2	0	1
3 (Slightly disagree)	1	4	5	3	0	1	1
4 (Slightly agree)	4	0	7	2	1	2	1
5 (Agree)	12	10	7	12	11	11	10
6 (Strongly agree)	13	11	10	8	17	11	12

Table 4.1: *Frequency distribution per everyday sexism category on clearness and under-standability of cards*

Moving on to the second question, the responses on the question 'I find this card very inspiring and lead me to reflect on [category of everyday sexism]' showed an average response weighted per category of 5.6 out of 6, on the same scale. The frequency distribution per category is presented in the following *Table 4.2*. This table shows that the mode for each category of everyday sexism was found on participants responding 6 ('Strongly agree'), with the exception of 'Online Gender Discrimination' where the reported highest frequency count was found on participants responding 5 ('Agree'). These results seem to suggest that the overall information presented was considered suitable to be used to inspire participants and lead them to reflect on everyday sexism.

Frequency of response per category	Benevolent Sexism	Online Gender Discrimination	Downplaying Gender Discrimination	Gender-based Harassment'	Feminism	Sexist Language	Gender Stereotypes
1 (Strongly disagree)	0	0	0	0	0	0	0
2 (Disagree)	0	0	0	0	2	0	0
3 (Slightly disagree)	2	1	1	0	0	0	0
4 (Slightly sagree)	3	2	0	5	3	9	0
5 (Agree)	6	12	8	10	8	7	11
6 (Strongly agree)	21	11	23	17	19	10	15

Table 4.2: *Frequency distribution per everyday sexism category on responses on the cards being inspiring and leading to reflection*

The results to the question 'I find [card item] very useful to trigger my reflection on [category of everyday sexism]' with the potential responses ranked from 'Strongly agree' to 'Strongly disagree' are illustrated in *Table 4.3* presented on the next page. This table shows that for each card the mode was found on participants 'Strongly agreeing' or 'Agreeing' on the card items 'Stories' and 'Questions' being very useful to trigger their reflection on a given category of everyday sexism. This suggests that these two card items seemed appropriate to trigger reflection on everyday sexism. Regarding the other items, namely 'Keywords' and 'Image', *Table 4.3* illustrates that for each card the mode was found on participants 'Strongly disagreeing' or 'Disagreeing' on these two card items being very useful to trigger their reflection on everyday sexism. For example on the card 'Benevolent Sexism', eight participants chose 'Strongly disagree' or 'Disagree' on the 'Keywords' and ten participants on the 'Image' being very useful to trigger reflection. This suggests that potential improvements on these cards should be particularly targeted at these two items.

The open question that requested feedback to improve each of the cards separately, resulted in 147 suggestions. This qualitative data was classified using the following themes 'Less abstract image', Shorten stories', 'Edit stories', 'Colors', 'Simplification of questions', 'Make keywords clearer', 'Simplification of cards', 'Additional information on category of everyday sexism' and 'Feedback on card design'. For example, under the theme 'Change image' one of the feedback gathered was "Don't understand the relevance of the picture. I would have used something more explicit like boys in blue with car toys and girls in pink

	Keywords	Stories	Image	Questions	All elements
Benevolent Sexism					
Strongly agree' or 'Agree'	11	30	12	26	25
Neither agree nor disagree'	13	2	10	4	5
Strongly disagree' or 'Disagree'	8	0	10	2	2
Online Gender Discrimination					
Strongly agree' or 'Agree'	7	24	11	25	21
Neither agree nor disagree'	8	2	10	1	5
Strongly disagree' or 'Disagree'	11	0	5	0	0
Downplaying Gender Discrimination					
Strongly agree' or 'Agree'	18	29	11	22	21
Neither agree nor disagree'	8	2	11	7	8
Strongly disagree' or 'Disagree'	6	1	10	3	3
Gender-based Harassment'					
Strongly agree' or 'Agree'	12	27	10	24	22
Neither agree nor disagree'	5	4	11	6	8
Strongly disagree' or 'Disagree'	15	1	11	2	2
Feminism					
Strongly agree' or 'Agree'	20	30	11	29	24
Neither agree nor disagree'	6	0	12	2	7
Strongly disagree' or 'Disagree'	6	2	9	1	1
Sexist Language					
Strongly agree' or 'Agree'	9	25	10	19	21
Neither agree nor disagree'	10	0	13	6	3
Strongly disagree' or 'Disagree'	7	1	3	1	2
Gender Stereotypes					
Strongly agree' or 'Agree'	7	22	12	23	23
Neither agree nor disagree'	11	3	10	2	1
Strongly disagree' or 'Disagree'	8	1	4	1	2

Table 4.3: *Responses on usefulness of everyday sexism cards to trigger reflection*

with barbies" and under the 'Make keywords clearer' category an example reported was "The keyword -bill-, Can you use something more explicit?". The frequency counts on these themes were found on making the images less abstract (21 entries in 'Less abstract image'), simplifying the questions (20 entries in 'Simplification of questions'), giving more context to the keywords (14 entries in 'Make keywords clearer), dividing or shortening the stories (11 entries in 'Simplification of questions') and limiting the number of questions to four per card (8 entries in 'Simplification of cards').

Based on these results and the information collected, the next iteration of the 13 cards was produced, which relied on considering and implementing the collected feedback on each card separately. This collected information was redistributed among two cards for each

category of everyday sexism with the exception of the card on online gender discrimination which, as suggested by the written feedback collected, was made more specific to the topic of online gender discrimination in gaming. The images were replaced by less abstract illustrations and the number of reflective questions were made more concise as well as limited to four per card. The lived experiences were re-phrased and divided to shorten them to a maximum of 50 words per story. Following this, the keywords were made more explicit, for instance #ItsJust was used instead of #Just. *Figure 4.4* presents an example on the second iteration of a card, which presents the front and back of the card.

DOWNPLAYING GENDER DISCRIMINATION 1C

"I studied in a class where females were a minority. During a practical experiment, the male professor asked me and another female student to be the 'glamorous assistants'. **Should I say 'Thank you'?"**

"A man grabbed my breast and after 7 years I still feel terrible about it. I realised that **I was scared of people telling me that I am uptight** when I would share this story".

"When I flag sexism, people say that I exaggerate or that I am being dramatic. I am tired of having to tell people that is not OK to assume that my boss is a man. These **"little" everyday incidents** shape the bigger picture of gender discrimination".

"It is just a compliment. Relax".

#FlagSexism #Insist #LetItGo #NoFuss #Responsability #Normalisation #Exaggerate #Diminishing

DOWNPLAYING GENDER DISCRIMINATION 1D

What are the potential consequences in using words such as 'just' (e.g it's just a compliment) when sexism is flagged?

Why would we describe some sexist incidents as not or less important?

How could downplaying gender discrimination **contribute** to gender inequality?

Under what circumstances should downplaying gender discrimination be prevented and how?

Figure 4.4: *Second version of an everyday sexism card on downplaying gender discrimination*

4.1.3 Assessment Phase

The assessment phase served to inform and validate the last version of the everyday sexism cards as well as their use. This phase comprised a 45 minute workshop with three group activities and two questionnaires, which were completed at the beginning and end of the workshop. Each group, randomly allocated, included three or four people that worked

with one card on a category of everyday sexism. They first filled in the first questionnaire (pre-workshop questionnaire) and then read the card and discussed the four questions presented on it. The second activity invited the participants to illustrate a sequential story on an issue presented on the card using post-it notes. The third activity asked the participants to think about a possible intervention to resolve the issue. To do so, the participants edited their story into a branching story using additional post-it notes to represent the intervention. They were also asked to describe what they expected people to learn from their story. The participants were then asked to fill in the second questionnaire and the artefacts created were also collected.

The questionnaires used Likert scales aimed at collecting the participant's perceptions of the relevance of each card, the activities to create engagement with everyday sexism and to create branching stories with an educational objective. The first part of the questionnaire gathered information at the beginning of the workshop on each participant's level of understanding and interest in everyday sexism (Questions 1 and 2). The second part of the questionnaire, completed at the end of the workshop, asked the participants to evaluate their perceived learning acquired during the workshop (Question 3), how useful the card was at triggering group discussion (Question 4), how useful the card was at stimulating reflection (Question 5), and how useful the card was at supporting participation in group discussion (Question 6). The questionnaire then explored how difficult it was to create a story based on the previous group conversations (Question 7) and how difficult it was to create a branching story with a learning outcome (Question 8). The questionnaire also included a an open-ended question for feedback and suggestions on the cards and/or activities. The responses were collected in a 5-point Likert scale (1 to 5). Questions 1, 2 and 3 used the scales: 'None, A little, Some, Quite a bit, A lot'. Questions 4, 5 and 6: 'Not at all useful, A little useful, Reasonably useful, Very useful, Extremely useful.' And questions 7 and 8: 'Very difficult, Difficult, OK, Easy, Very easy'.

Participants

The workshops were held at The Open University during a day-long event on gender equality organised by the STEM faculty (Science, Technology, Engineering and Mathematics) with students, researchers, PhD students and administration staff. The participants were recruited by the event organisers who aimed at forming a diverse range of backgrounds and occupations. A week before the event, the participants were sent information about the activity along with consent forms describing the aim of the workshop and reminding them that they could withdraw at any time.

Results

A total of 47 people (30 female and 17 male) participated in the workshop. To analyse the results, two categories were created based on the participants' self-assessment of their level of understanding and two others based on their level of interest, as reported in the pre-workshop questionnaire (Question 1 and 2). Low levels of understanding (LU) and interest (LI) are participants who responded 1, 2 or 3, and high level of understanding (HU) and interest (HI) and are participants who responded 4 or 5 to questions 1 and 2. The responses per participant are presented in *Table 4.4*, which illustrates the frequency data per question and per group (LI, LU, HU and HI).

Starting with the level of understanding (HU and LU), a Chi-squared test for independence was applied between LU (n=25) and HU (n=22) for each of these questions and the results are presented in *Table 4.5*.

As p>0.05 was found for all these questions, *Table 4.5* illustrates that at the 5% significance level the distributions between the two groups (i.e. LU and HU) for these questions are not independent, suggesting that the distribution of responses between the two groups are not significantly different for any of these questions. The calculation of the modes on these question illustrates that the modes and the lowest frequency counts were found

HU:

Response (scale)	1	2	3	4	5
3 -Learning	2	7	6	1	6
4 - Card group discussions	2	8	7	2	3
5 - Card stimulate reflection	1	4	10	3	4
6 - Card support participation	2	5	4	4	7
7 - Story	1	3	8	7	3
8 - Branching	1	1	5	10	5

HI:

Response (scale)	1	2	3	4	5
3 -Learning	0	5	12	1	8
4 - Card group discussions	1	7	6	8	4
5 - Card stimulate reflection	0	4	12	6	4
6 - Card support participation	1	5	7	8	5
7 - Story	1	3	10	9	3
8 - Branching	1	3	7	12	3

LU:

Response (scale)	1	2	3	4	5
3 - Learning	2	5	12	2	4
4 - Card group discussions	2	6	6	9	2
5 - Card stimulate reflection	1	4	11	5	4
6 - Card support participation	1	6	6	5	7
7 - Story	2	2	12	5	4
8 - Branching	2	3	8	9	3

LI:

Response (scale)	1	2	3	4	5
3 - Learning	4	7	6	2	2
4 - Card group discussions	3	7	7	3	1
5 - Card stimulate reflection	2	4	9	2	4
6 - Card support participation	2	7	3	2	7
7 - Story	2	2	10	3	4
8 - Branching	2	1	6	7	5

Table 4.4: *Frequency data on assessment phase of the everyday sexism cards per group (HU;LU; HI and LI)*

	df	N	X2	p-value
3 - Learning	4	47	2.9	0.5769
4 - Card group	4	47	4.8	0.3035
5 - Card stimulate	4	47	0.4	0.9858
6 - Card support participation	4	47	0.7	0.9454
7 - Story	4	47	1.6	0.8044
8 - Branching Learning	4	47	2.4	0.6633

Table 4.5: *Results on Chi-squared test for independence applied between LU and HU*

on the same responses for both groups in Questions 5, 6, 7 and 8 (e.g. in Question 8 the mode was found on 10 participants from the HU group responding 4 ('Easy') and 9 participants from the LU group also responding 4 ('Easy')). Regarding Question 3, and 4 the mode and distribution of responses pointed out divergences. For example in Question 3, the mode was found on seven participants from the HU group selectecting 2 ('A little') and 12 participants from LU reporting 3 ('Some') and, in Question 4 the mode was found on eight participants from HU reported 2 ('A little useful') and nine participants from LU reporting 4 ('Very useful').

Overall, these results imply that participants with high and low levels of understanding on everyday sexism had similar perceptions on their learning about the topic, the usefulness of the cards and the level of difficulties to create stories. However, the calculation of the

modes on Question 3 and Question 4 seem to suggest that participants with higher levels of understanding on everyday sexism reported perceiving less learning about everyday sexism and finding the cards less useful to trigger group conversations, than participants with low levels of understanding.

Regarding the other category, namely groups with low and high levels of interest in everyday sexism (HI and LI), a Chi-squared test for independence was applied between LI (n=21) and HI (n=26) for all these questions and the results are presented in *Table 4.6*.

	df	N	2	p-value
3 - Learning	4	47	9.8	0.0431
4 - Card group	4	47	4.7	0.3228
5 - Card stimulate	4	47	3.9	0.4140
6 - Card support participation	4	47	5.7	0.2200
7 - Story	4	47	3.2	0.5281
8 - Branching Learning	4	47	2.7	0.6049

Table 4.6: *Results on Chi-squared test for independence applied between LI and HI*

As p>0.05 was found for Questions 4 to Question 8, *Table 4.6* illustrates that at the 5% significance level the distributions between the two groups for these questions are not independent, suggesting that the distribution of responses between the two groups are not significantly different for any of these questions. Regarding Question 3 (e.g. perception of learning about everyday sexism), as a value of p <0.05 was found it is possible to indicate that at the 5% significance level the two distributions are independent, suggesting that the distribution of responses are different. The calculation of the mode on this question pointed out that eight participants from HI reported 5 ('A lot') while the mode for participants from LI was 2 ('A little') on this question. These results suggest that participants who reported having low levels of interest in everyday sexism felt they learnt less than the ones who reported higher levels of interest. This implies that facilitating an activity at the beginning of this workshop aimed at raising the level of interest about the social topic of certain participants could be used to affect the participants' perceived learning on everyday sexism.

Moving on to the qualitative results, the artefacts collected confirmed the suitability of the cards to enable the creation of branching stories. All the groups created a branching story on the category of everyday sexism of the card used per group, as exemplified in *Figure 4.5*. This group used a card on Gender Stereotypes (presented previously in *Figure 4.1*) and the story illustrates a girl who loves playing football and hears people saying that "Girls don't play", "Where's your doll" and "You suck". In the last part of the story, the girl looks sad and it says that she does not want to play. The intervention in the branching story shows the girl who says "How about you go in goal, I'll show you". At the end of the branching story, she scored and someone said "Turns out she is OK". The intended educational objective was described as "Raising awareness of the fact that discriminatory comments about women playing sports contribute to women not playing sports. People should understand that anyone can play any sport".
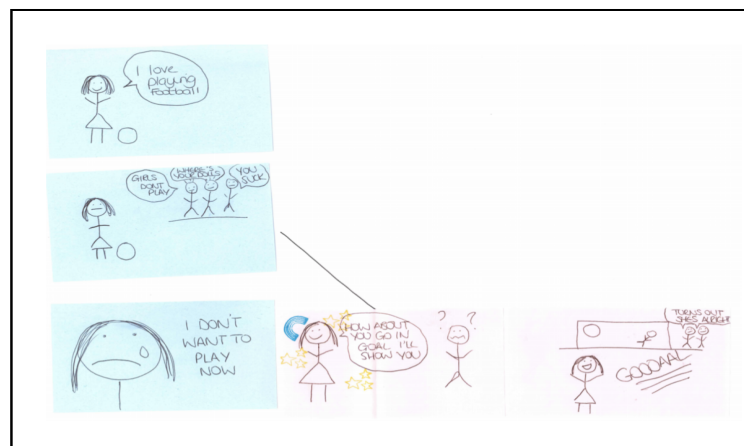
Figure 4.5: *Example of branching story created during assessment phase*

This section now explores the results collected on suggestions to improve the cards and their use. In total, 10 participants from eight different groups reported that they would have liked to have more time for the workshop, which suggests the relevance to extend the activities' allocated time. Based on this, it was decided that this workshop should allocate 30 minutes to answer the questions presented on the cards, 30 minutes to create the story

and 30 minutes to transform it into a branching story. In addition, seven participants from four different groups reported that the questions at the back of the cards were not clear or should be simplified. The questions at the back of the cards were then edited to make them shorter and simpler, as illustrated in *Figure 4.6*, which presents the final version of the everyday sexism card.
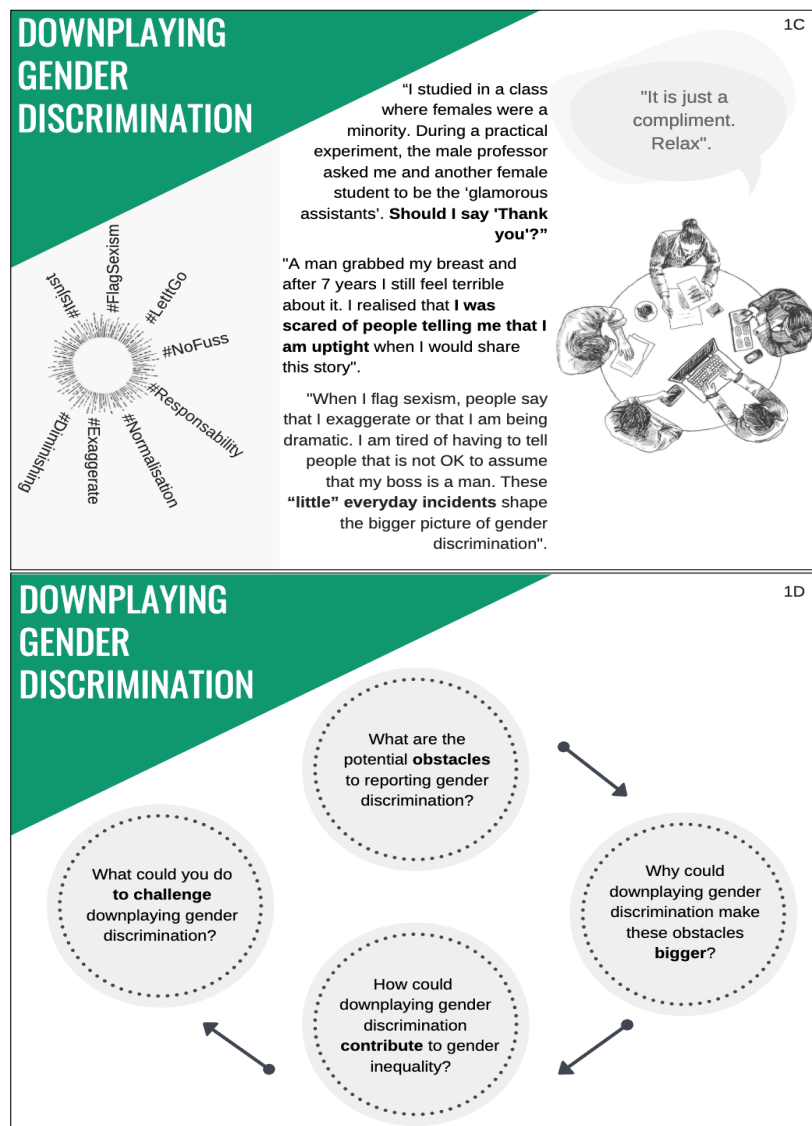
Figure 4.6: *Final version of an everyday sexism card on downplaying gender discrimination*

Overall, the results were considered satisfactory to validate the cards and the proposed activities. This study illustrated the relevance of having an activity to raise the level of interest in the social topic of certain participants at the beginning of the workshop, to make the activities longer and to simplify the questions presented on the cards.

4.2   Educational Game Design Cards

The studies presented in this section refer to the creation of the educational game design cards. The outcomes of each phase, namely the prototyping and assessment phases, are used to inform the development of the cards. This iterative process of creation is presented in this section and an example of a card is used to illustrate this process. These cards are targeted at helping groups who are not familiar with the academic literature on educational game design and Critical Pedagogy to understand as well as to apply research-informed concepts to the creation of games. *Figure 4.7* presents an example of the final version of a card, namely on the 'Skills as Strategy' principle, which present the front and the back of the card.

The final set of 13 cards and can be found online at the following URL:

https://figshare.com/articles/Educational_Game_Design_Cards/7466879

Figure 4.7: *Final version of an educational game design card 'Skills as Strategies'*

4.2.1 Prototyping Phase

This prototyping phase served to propose an initial version of the cards on educational game design. The process of creation relied on first merging the principles of learning in games developed by Gee (2005) with the literature of Critical Pedagogy (Freire, 1970) by identifying their similarities. Their similarities first became visible in the educational approaches they advocate, for instance Gee (2005) describes the agency that is given

to players to shape games based on their decisions and Freire (1970) illustrates how dialogue is used to enable learners to have agency over their educational pathways. More specifically, the process intended to build on these similarities to adapt and complement Gee's principles to present information to empower broad audiences to understand how to design educational games specifically on social issues. Each card presents a principle and is composed of a short description of the principle as well as insights on why it could be used to tackle social issues using Critical Pedagogy (presented under the heading 'Applied to Social Change' on the cards). Each card also presents insights on how it could be applied to games (presented under the heading 'Applied to games' on the cards). An example of the principle applied in practice and a game example using the principle are also illustrated on the cards for each principle.

The second step of this process was to use the recommendations of Gee (2005) on how to implement such principles into games using game elements and complement them with other game elements found in the literature (see *Table 2.1* and *Table 2.2* in *Chapter 2*). The game elements were presented with additional textual information that intended to make their connections with the presented principle clearer (e.g. the game element 'tutorials' was adapted to 'tutorials about character's goals'). The last step of this process was to simplify and strengthen the content presented on the cards as much as possible. In collaboration with the two supervisors of this thesis, each of the cards were critiqued and revised to make the information presented as concise and clear as possible. *Figure 4.8* presents an example of the first version of a card, namely on the 'Identity' principle.

Figure 4.8: *First version of an educational game design card on 'Identity' principle*

4.2.2 Assessment Phase

This phase validated the cards through four semi-structured online interviews with individuals who have specific knowledge on educational game design, Critical Pedagogy and game development, as well as an individual who has experience in organising Game Jams. This study followed an Informant Design approach where the cards were discussed with one of these individuals at a time. The focus given to each interview was determined by

the specific expertise of each interviewee, for example James Paul Gee, the author of the design principles (Gee, 2005), was asked to review the principles presented on the cards and their coherent alignment with the literature on Critical Pedagogy.

Each of the individuals interviewed in this phase were invited via email. The email stated that the interview would be recorded and last an hour and 30 minutes reviewing 13 cards. This email also included an overview of the PhD and a description of the intended objectives of the cards. When a positive answer was received, another email was sent with a consent form, the set of cards and a document explaining the questions and procedure of the interview, which was to assess and validate each card separately by responding to the preliminary defined questions for the interview. The questions for each individual interviewed are presented in *Table 4.7*. It was decided that the data collected during these interviews would be directly used to modify the text presented on the cards, as a result this data would not need to be thematically analysed and/or coded.

Individual interviewed	Occupation	Focus of interview	Questions asked
James Paul Gee	Professor and creator of the 13 principles of learning in games	- Principle of learning in games - Critical Pedagogy - Synergies between the principles of learning in games and Critical Pedagogy	- To what extent do you think this card describes accurately one of the principles of learning in games (including with the examples)? How do you think we could improve it? - To what extent do you think the synergies between the principle of learning in games and Critical Pedagogy presented on this card are coherent? How do you think we could improve it? - Anything you would recommend to improve this card?
John Lockhart	Director of the Paulo Freire Institute	- Critical Pedagogy - Synergies between the principles of learning in games and Critical Pedagogy	- To what extent do you think this card describes accurately an aspect of Critical Pedagogy (including with the examples)? How do you think we could improve it? - To what extent do you think the synergies between the principle of learning in games and Critical Pedagogy presented on this card are coherent? How do you think we could improve it? - Anything you would recommend to improve this card?
Jo Summers	Executive Producer of the Global Game Jam (GGJ)	Overview of cards	- To what extent do you think this card could be used during Game Jams to design educational games on social issues (including by non-experienced groups) ? How do you think we could improve it? - Anything you would recommend to improve this card?
Tan Tran	CEO of the game engine GameSalad	- Principle of learning in games - Game elements	- To what extent do you think this card is aligned with the features of *GameSalad*? How do you think we could improve it? - Which game elements presented are not implementable using GameSalad? - Anything you would recommend to improve this card?

Table 4.7: *Overview of semi-structured interviews during assessment phase*

Participants

The interviews were held using Skype or Facetime and the participants were contacted directly by the researcher. They were recruited because of their expertise and an effort was made to include individuals with expertise in educational game design, Critical Pedagogy, Game Jam and game development. *Table 4.7* presents the names, occupations, specific expertise of the individuals interviewed and the questions facilitated.

Results

In the first interview, James Paul Gee confirmed the influence of the work of Paulo Freire in the principles of learning in games that he proposed in 2005. Gee also confirmed the relevance to adapt and complement his principles using Critical Pedagogy to democratise knowledge of educational game design on social issues. In addition, he stated that the principles he proposed intend to be understandable by people with little or no experience designing educational games and that it was relevant to use them to democratise educational game design. He suggested a minor change on one card that was directly implemented, which led him to confirm the suitability of the set of cards to be used to democratise the design of educational games on social issues, for instance by saying "You did a phenomenal job, your cards show great content for the democratisation of video games for social change".

In the second interview, John Lockhart confirmed the theoretical synergies between each of the principles of learning in games (Gee, 2005) and Critical Pedagogy, for instance he said "I am not a gamer, however I can see the synergies of Critical Pedagogy with these game ideas, they describe similar concepts". This interview led to minor changes on the framing of one to three words in the section that refers to Critical Pedagogy ('Applied to social change') of six cards. Following the card example introduced, the word 'see' was replaced by 'perceive', as illustrated in *Figure 4.9*, to highlight Critical Pedagogy's contributions on the questioning of perceptions to tackle inequalities.

In the interview with Jo Summers, the potential of the cards to be used during Game Jams was confirmed and she highlighted the importance of illustrating game examples that could lead some participants to play games during the Game Jams. The interview led to minor modifications of three cards that were aimed at simplifying the description of the game examples provided.

Tan Tran confirmed the potential of *GameSalad* to be used during Game Jams and by participants who have any range of game development skills, including no skills at all. He confirmed the potential of *GameSalad* to enable participants to acquire technical skills by explaining that the engine was created with the objectives to facilitate understanding of computer programming concepts and to teach game development to diverse and novice audiences. He also recommended a specific tutorial that covers the main features of *GameSalad* in under two hours. The interview led to remove one game element (integration of videos) of one card which was not implementable using *GameSalad*.

Overall, the outcomes from the interviews were considered satisfactory to confirm the suitability of the cards. The interviews with James Paul Gee and John Lockhart also confirmed the synergies between Critical Pedagogy and the principles of learning in games (Gee, 2005) as well as the suitability of the content of the cards to be used to democratise the design of educational games on social issues. The modifications suggested by the participants were all implemented, which led to the final version of the educational game design cards, exemplified in *Figure 4.9*.

IDENTITY 1

Empowered learners

People's sense of identity changes as they learn

Example

Studying engineering helps people develop their identity as an engineer

Applied to social change

Learning about inequalities changes the way people perceive themselves and others

Applied to games

Players develop an identity through their characters experiences

Game example

'The Sims' is a simulation game that allows players to project their identity through their characters. It also invites players to explore different identities by playing multiple characters.

IDENTITY

Empowered learners

People's sense of identity changes as they learn

Cool things to try in your game

Customisation
Character's appearance and accessories
Character's personality
Character's abilities and skills
Game environment (e.g. location, music, background)

Clear character goals
Descriptions of character's goals
Tutorials about character's goals
Pop-up information and reminders

Intriguing characters
Unexpectted skills or abilities
Counterstereotype characters
Unpredictable character personalities
Character's secrets

Evolution of identity
Developments in character's identity
Developments in player's identity
Physical changes in characters and objects
Characters gaining titles and accessories

Figure 4.9: *Final version of an educational game design card on 'Identity' principle*

4.3 Framework for Democratising Educational Game Design

This section starts by presenting an overview of the initial version of the framework that was applied during the two Game Jams organised for this research. In this section, the rationales for each of the framework's stages are presented sequentially. The next

chapter, *Chapter 5*, presents the results from applying the framework during the Game Jams. Following this chapter, *Chapter 6*, presents a revised version of this framework, which considers the outcomes and participants' feedback that were collected through the Game Jams (see *Section 6.5*). The instructions provided for each stage will be briefly introduced in this section and further explained in *Section 6.5*, where the final version of the framework is presented.

The framework was developed for a two-day Game Jam with participants working in groups of 4 to 5 people. The groups are created taking into account diversity in age, sexual orientations, ethnicity and gender.

Based on Critical Pedagogy, the framework proposed aims at democratising educational game design on a social issue by supporting groups to design such games from a blank page to their development. This framework is based on the idea that to support individuals who might not have any of the knowledge needed to design educational games on social issues it is necessary to provide activities and resources that are first targeted at acquiring such knowledge collaboratively through agency and egalitarian participation. This was informed by the work of Iacovides and Cox (2015) and Falcão et al. (2018) (see *Section 2.3.2*), which presented insights on the facilitation of stages targeted at supporting learning. To this end, a framework constituted of a process where resources are sequentially facilitated has been developed.

As illustrated in *Figure 4.10*, the framework presents nine stages, represented as circles. It is first based on shaping group discussions toward **exploring** a social topic, getting familiar with the game engine development and educational game design practices. These group discussions are facilitated by providing specific resources and activities, and inviting groups to create artefacts. The next four stages intend to support groups in **conceptualising** their games by applying the knowledge acquired, using the resources available

and building on the artefacts created in the previous stages to create a game prototype. The penultimate stage invites groups to iteratively **develop** and review their games by transforming their prototype into a game using a game engine In the last stage each group is asked to **present** their games to the other participants of the Game Jam.
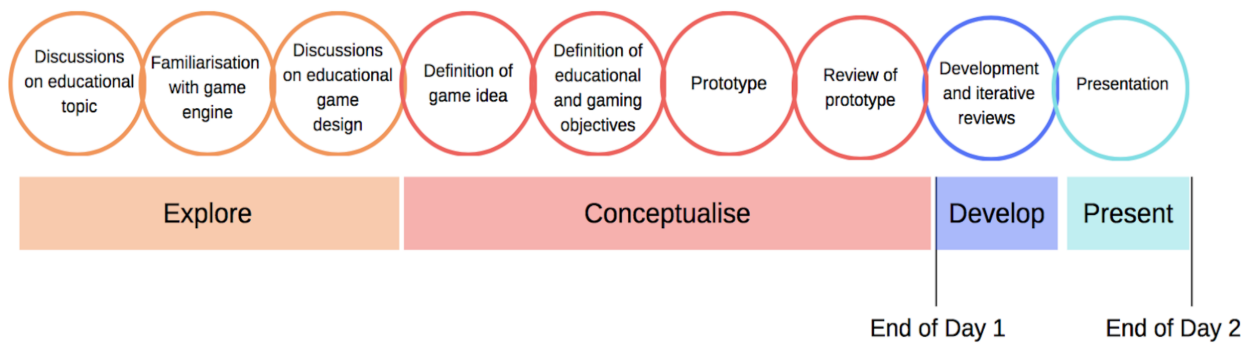
Figure 4.10: *Initial version of the framework*

The framework aims at democratising educational game design on a social issue to achieve the following three objectives: to create engagement with a social issue, to enable participants to acquire game development skills, and to support groups by making educational game design practices understandable and applicable. Each of the stages of the proposed framework is targeted at one or two of these three objectives, except for the 'Definition of game idea' and 'Presentation' stages, which intend to regroup and organise what was defined in the previous stages.

The framework reflects the process of conscientisation from Critical Pedagogy (see *Section 2.4.2*), which refers to the steps of Investigation, Thematisation, Problematisation and Systematisation. The process of conscientisation provides important insights on how to democratise educational game design on social issues by using experiences to create engagement in a social issue and by facilitating learning through dialogue, and the creation and transformation of ideas or artefacts. Each of the stages of this framework is informed by the literature from educational game design, participatory educational game

design and Game Jams to identify what activities and resources are needed. Merging such activities and resources with the process of consientisation presents insights on how they could be adapted and organised to democratise the design of educational games on social issues by endorsing agency and egalitarian participation among groups.

Figure 4.11 illustrates each stage with their respective objective and their alignment with one of the steps of the process of consientisation. Incorporating both elements in the framework explains how democratisation is implemented and what is the objective at each stage.
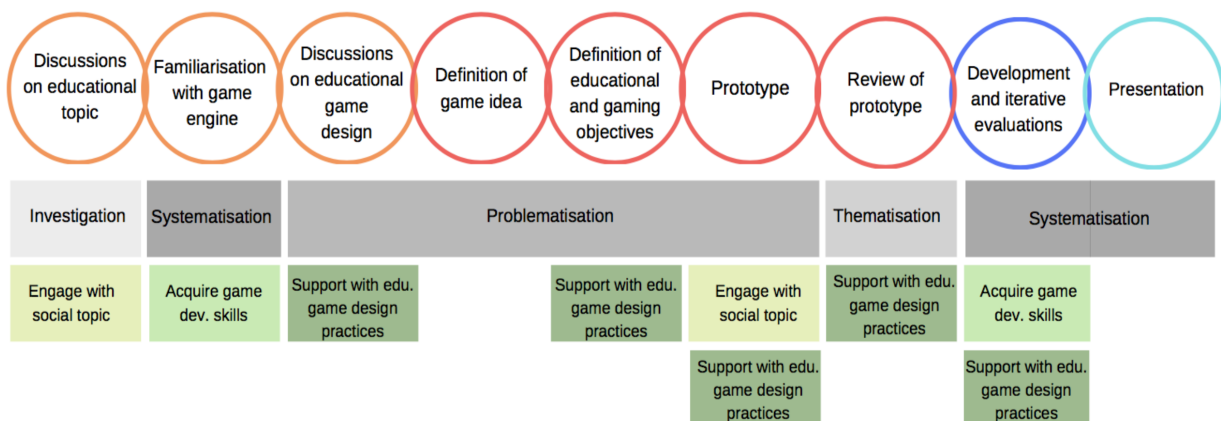
Figure 4.11: *Initial version of the framework with each objective represented with a shade of green*

4.3.1   Prototyping Phase

The initial version of the framework was applied during the two Game Jams with only one change between the first and second Game Jam. This difference was based on altering two stages of the framework, and will be further illustrated in *Section 5.7.1.1*. Here, the version with this alteration is presented.

4.3.1.1 Explore

The first three stages structure discussions toward **exploring** the social issue, game development and practices of educational game design. By the end of these three stages, each group should have created a branching story that aims to raise awareness of a social issue, developed a test game using a game engine and selected educational game design principles, from the provided cards, for their games. As already illustrated, in the case of this research, the social issue was everyday sexism and the game engine used was *GameSalad*. The activities for each stage and the resources facilitated are introduced in *Figure 4.12*.

Figure 4.12: *Activities and resources for stage 1 to 3 of the initial framework*

'Stage 1: Discussions on the educational topic' is based on discussing everyday sexism and has three activities. As illustrated in *Figure 4.12*, these activities are based on discussing the provided cards and storytelling. The storytelling activities replicate the activities presented and validated in *Section 4.1*, which are to create a story and transform it into a branching story that illustrates a solution to a social issue.

Regarding the rationale for this stage, the provided cards were intended to be used to facilitate learning about everyday sexism by creating engagement in discussing this topic among each group. The study of Deng et al. (2014) (see *Section 2.1.3*), illustrating the suitability of presenting examples to support the participation of individuals who have lit-

tle formal knowledge about the topic, informed the decision to present stories on everyday sexism on the cards. Furthermore, this research intended to avoid using definitions, which, as seen in the study of Flanagan (2009) in *Section 2.1.3*, risks overgeneralising complex social issues such as sexism. The proposed cards present keywords, stories, illustrations and reflective questions, to give overviews of the categories of everyday sexism, and to enable participants to have agency over what aspects of a category they decide to discuss. In addition, following a Participatory Design approach to develop these cards (see *Section 4.1*) and presenting various facets of a category of everyday sexism on each card was intended to provide various entry points for discussions and reflection. This was intended to accommodate the learning and participation of people who have diverse perspectives on this issue, different preferred learning styles and divergent levels of understanding on everyday sexism.

Chow et al. (2016) (see *Section 2.1.3*) report on a study where lived experiences and questions presented on cards were positively used to create engagement in group discussions. This is in line with the Investigation step of the process of conscientisation that argues that engagement with social issues is triggered by inviting learners to reflect on everyday experiences and by using questions to facilitate collaborative learning, dialogue and reflection. Building on this, the supporting structure proposed by Daudelin (1996) (see *Section 2.4.2*) was used to shape questions toward creating critical reflection about a social issue. Lastly, the storytelling activities proposed are intended to be aligned with both Critical Pedagogy, which relies on guiding learners to perceive social issues as transformable, and with game design, which (as illustrated in *Section 2.1.3*), presents branching stories as a practice to transition from stories to creating game prototypes.

'Stage 2: Familiarisation with game engine' is divided into three activities. The main activity is a tutorial that includes the development of a test game to equip participants with the needed foundations to start using the game engine. The other two activities

invite participants to reflect on the limitation and potential of the game engine. In this research, the participants are given a manual of *GameSalad* as well as a collection of art assets that they can use to develop their game (a screenshot of these documents are provided in *Appendix A* see *Figure A.2* and *Figure A.3*).

Moving on to the rationale, the tutorial on *GameSalad* followed the structure, content and test game example of an online tutorial recommended by Tan Tran when he was interviewed, which can be found at this URL: http://learn.gamesalad.com/course/the-absolute-beginners-guide-to-gamesalad/. Additionally, a pilot was organised with 26 people to ensure that the tutorial and the manual provided were suitable for participants who have different ranges of skills in game development. The outcomes of this pilot informed the duration of the tutorial and the decision to invite participants to help one another accomplish each of the tutorial steps.

This stage intends to empower participants with skills to communicate about a social issue through the design of a game, as suggested by the Systematisation step in the process of conscientisation. As presented in *Section 2.3.3*, the choice of using *GameSalad* was based on considering its suitability to facilitate learning about game development and to be used by participants who might not have technical knowledge of computer programming or game development. In addition, the choice was informed by the features of this game engine, arguing that using a game engine that enables the creation of very simple games, such as interactive stories, could restrict learning opportunities, especially about educational game design and game development. Indeed, this choice was also based on ensuring that the features of *GameSalad* would enable participants to learn about game development as well as learn about the principles presented on the educational game design cards. Some of these principles cannot be implemented using a game engine that only enables participants to create very simple games, implying that this would restrict the learning opportunities about these principles. Lastly, enabling groups to grasp the

limitations and potential of a game engine during this stage was perceived as a factor that could contribute toward avoiding the conceptualisation of games that cannot be implemented. The distribution of art assets was also done as early as possible in the framework to invite groups to use the images to start imagining their games.

'Stage 3: Discussion on educational game design' is targeted at using the educational game design cards (see *Section 4.2*) by inviting each group to discuss the cards collectively and choose the cards they want to use for their games. They are also asked to select some game elements, presented on the back of each card, to implement the principles on the cards they selected. A brief description of the cards is provided which states that each card intends to present a principle to facilitate learning in games and that the game elements serve to implement that principle in a game.

Concerning the rationale for this stage, as recommended by Ho (2017) (see *Section 2.1.3*), the resources on educational game design also took the form of cards. The studies presented in *Section 2.2.2* identified the need for conceptual models to design educational games, which are based on integrating educational approaches and gaming features. As seen in this section, such models are designed for experienced groups and invite them to explore and define how to create learning about a certain topic in a game. Merging the principles proposed by Gee (2005) and Critical Pedagogy Freire (1970) was proposed as a solution to provide such information to novice groups. Based on the problematisation step, it was also proposed to present insights on how social issues could be tackled to enable participants to further reflect on how to facilitate learning in games by discussing educational approaches. Lastly, the rationale for each of the card items was presented as part of the Prototyping phase to design these cards in *Section 4.2.1*.

4.3.1.2 Conceptualise

The next four stages shape discussions toward **conceptualising** a game, as illustrated in *Figure 4.13*. In these stages, groups apply the knowledge acquired, use the information provided and build on the artefacts created in the previous stages to create a game prototype. At the end of these stages, each group should have created and reviewed a game prototype, and have defined the gaming and educational objectives of their games.
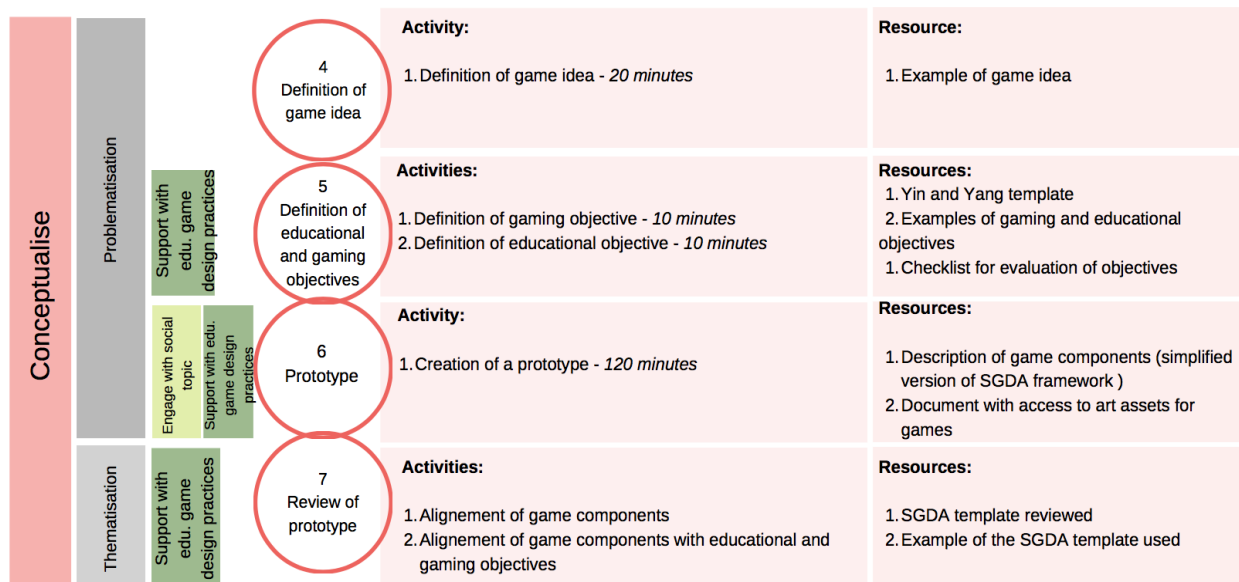
Figure 4.13: *Activities and resources for stages 4 to 7 of the initial framework*

'Stage 4: Definition of a game idea' asks groups to come up with a brief game idea. This stage was considered necessary for the next stages, which requires groups to define some of the aspects of their games in more details. Defining a consensual preliminary idea is perceived as necessary to enable the groups to be aligned with their overall idea when discussing next further decisions.

'Stage 5: Definition of educational and gaming objectives' invites groups to define the educational and gaming objectives for their game. Aligned with the study of Marsh and Costello (2013) (presented in *Section 2.2.5*), who argued that educational games need

to go beyond assuming that they needed to be fun, this stage invites groups to reflect on the various gaming objectives that their games could reach. The instructions for this stage illustrated that a gaming objective could create fun (i.e. in an amusing way) and/or trigger uncomfortable feelings (e.g. sadness, helplessness, etc.). Following this, to support these instructions game examples from the educational game design cards were presented (see *Section 6.5*). The instructions also provided information to support groups defining an educational objective, which stated that this objective defined what learning about everyday sexism was intended to be conveyed to the players of their games. To illustrate the interconnections between these objectives, groups are invited to fill a Yin and Yang template, presented in *Figure 4.14*.
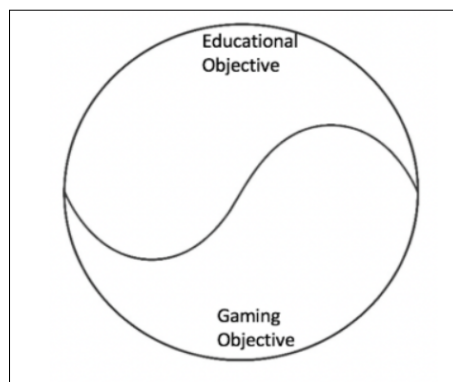
Figure 4.14: *Yin and Yang template with the educational and gaming objectives*

Regarding the rationale of this stage, the proposed activities are intended to support groups conceptualising their game informed by the objectives of their game. This stage also intends to enable groups to understand that they are conceiving a game that has an educational objective that is based on creating social change. This is aligned with the Problematisation step of the process of conscientisation that reports on the relevance to motivate and empower learners by enabling them to perceive themselves as catalysts of social change.

'Stage 6: Prototype' invites groups to create a paper prototype. The design of this stage is inspired by the SGDA framework proposed by Mitgutsch and Alvarado (2012) (see *Sec-*

tion 2.2.6), which requests groups to define the main components of an educational game (i.e. mechanics, framing, content/information, aesthetics/graphics and fiction/narrative) and provides a template that is based on facilitating a holistic view on an educational game prototype by presenting such components forming a circle. For this stage, the circle template was used and simplifications on the description of the components of the SGDA framework are proposed. Each one of the components is simplified by using less technical wording (presented in *Appendix A* - see *Table A.1*), for instance the 'Framing' component was reframed to 'Your players' and was described as 'This component aims at defining who your players will be and what characteristics they have'.

Regarding the rationale of this stage, it first relies on requiring groups to create a paper prototype, as recommended by the research of Zook and Riedl (2013) (see *Section 2.1.3*), who described creating paper prototyping during Game Jams as a beneficial practice for group collaboration and game design. In line with the Problematisation step, this stage triggers additional questions and conversations by defining how the game could facilitate learning about this topic. Aligned with the theoretical foundation of the SGDA framework (see *Section 2.2.6*), this framework was used with the intention to present supporting information about game components that, arguably, need to be discussed to create an educational game prototype and to invite groups to discuss their games by considering each of these components.

'Stage 7: Review of the prototype' is also based on using the SGDA template proposed by Mitgutsch and Alvarado (2012) (see *Section 2.2.6*). To review their prototypes, groups are asked to represent the connections between the components (defined in the previous stage) and toward the objectives of their games. This activity is facilitated by inviting groups to illustrate this by drawing lines between these components and toward the two objectives of their game, which can be either solid lines, referring to the components being aligned; or dashed lines, referring to the components being somewhat aligned. An

explanation on the activity is provided that states that exploring the alignment between the components and toward the objectives of a game contributes toward maintaining the coherence of a game as a whole and reduce the chances of sending mixed messages to the players. An example of a filled template provided to the participants is presented in *Figure 4.15*.
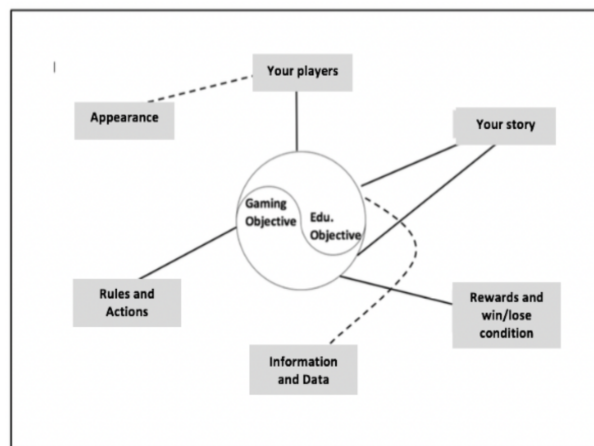
Figure 4.15: *SDGA template reviewed provided as example during Stage 7*

Aligned with the Thematisation step, this stage presents an opportunity for groups to review their prototypes by reflecting on the overall coherence. Reflecting on the coherence of a game by considering each of its components is perceived as important as it could increase the chances of a game reaching its intended objectives. Using the SGDA template (see *Section 2.2.6*) was considered suitable as this template was created to specifically provide support for reviewing and reflecting on the design of educational games in relation to their objective. This stage was also provided as an activity that could conclude the first day of the Game Jam by facilitating discussions on the overall conceptualisation of a game that could lead to refining or validating a prototype before moving on to the development.

4.3.1.3 Develop and Present

The next two stages aim at **developing** the games using a game engine and inviting each group to evaluate their games during two group interviews. The Game Jam is concluded by each group **presenting** their games to all the participants of the Game Jam.
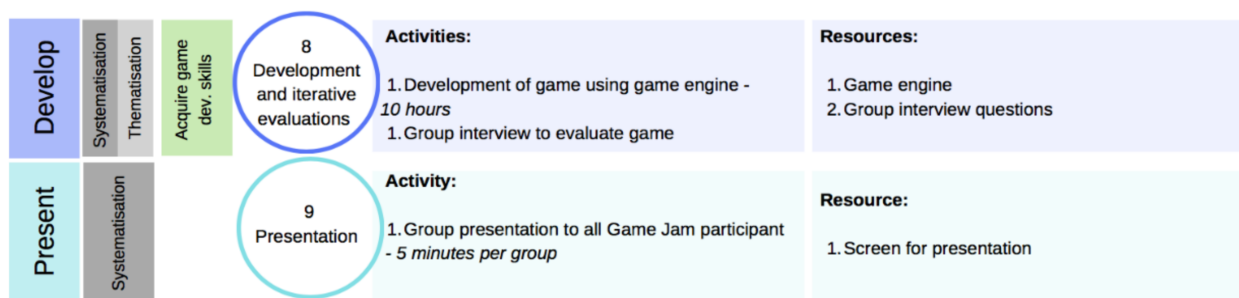
Figure 4.16: *Activities and resources facilitated for stage 8 to 9 of the initial framework*

In 'Stage 8: Development and iterative evaluation' groups are asked to develop and evaluate their games. To develop their games, participants are invited to translate their prototypes into games with the game engine used during the first day of the Game Jam. To evaluate their game, groups are asked to participate twice in group interviews for reflecting on the extent to which their games would reach their gaming and educational objectives. This is facilitated by asking them to rank how confident they feel toward their games achieving such objectives. In line with the Systematisation step, this stage invites groups to apply and communicate their prototype ideas by translating them into the actual development of games. Evaluating the games while developing them was perceived as relevant to support groups implementing modifications to their prototypes in line with the objectives of their games, as well as to enable them to experiment with iterative approaches to game development.

'Stage 9: Presentation' invites the groups to present their games to the other participants, concluding the framework. This stage is proposed to enable groups to present their games and discover the games created by other groups.

4.4   Chapter Summary

This chapter presented the results of the studies previously introduced, which led to the creation of three design interventions. These studies each followed the three research phases proposed by Design-Based Research (see *Section 3.2*), namely a preliminary research, prototype and assessment phase. Each study led to the creation of resources, which are cards on everyday sexism (see *Section 4.1*), cards on educational game design (see *Section 4.2*) and a framework for the democratisation of educational game design on social issues (see *Section 4.3*). The framework introduced aims at democratising educational game design on a social issue to achieve the following three objectives: to create engagement with a social issue, to enable participants to acquire game development skills, and to support groups by making educational game design practices understandable and applicable.

Chapter 5

Evaluation study

This chapter presents the results of the assessment phase of the proposed framework for democratising educational game design, which were drawn from two Game Jams where groups of participants designed educational games on everyday sexism using the framework. The chapter starts by presenting the study design (see *Section 5.1*). Then, the following section introduces the Game Jams' participants (*Section 5.2*) and provides an overview of the created games (*Section 5.3*). Then, the results are presented grouped by the objective of each of the framework stages, as illustrated in *Figure 4.11* in *Section 4.3*: Engage with social issue (*Section 5.4*); Support with educational game design practices (*Section 5.5*); and Acquire game development skills (*Section 5.6*). The last section presents the results on the general impressions on the framework (*Section 5.7*). For each of these objectives, the results are illustrated according to the methods used for data collection, namely questionnaires, group interviews and observation notes.

5.1 Study Design

To assess and validate the proposed framework, two Game Jams were organised applying the process and resources presented in *Section 4.3*. During these two-day events the

participants were required to both design an educational game on everyday sexism in groups and to assess the proposed framework.

A booklet of instructions and timings for all the activities, as well as a box with the supporting resources (e.g. the two sets of cards, paper, pens, etc.), were provided to the participants. The two Game Jams were structured identically except for swapping the order of two activities, as further described in *Section 5.7.1.1*.

Three coaches provided support to both Game Jams along the activities and by taking observation notes. Each coach had a group assigned and they were instructed in advance that they needed to make themselves available during the whole weekend and for both Game Jams to take observation notes without taking part in the group discussions. One of the coaches also facilitated a couple of group interviews during both Game Jams. Dividing the interviews between two people was considered necessary given the workload given to the researcher and the intention to run the interviews at similar times during the Game Jams. The role of the researcher was to lead the Game Jams by ensuring that each activity started on time, answering questions that could not be answered by the coaches in addition to taking observation notes, conducting group interviews and facilitating a tutorial on *GameSalad*.

Figure 5.1 presented below illustrates the distribution of the data collection activities across the two days of the Game Jam. The questions and material used to collect data is presented in *Appendix B*. The coaches were asked to capture observation notes with a template document that provided guidance on what data needed to be reported, presented in *Section B.1*. In the afternoon of the first and second day, semi-structured group interviews were used to evaluate the proposed activities and resources, the questions used during these interviews are included in *Section B.2*. During the second day, group interviews were used to evaluate the game created, the questions facilitated can be found in

Section B.3. At the beginning and at the end of both days, the participants were asked to fill individual questionnaires that comprised open-ended questions and Likert scales, these are presented in *Section B.4.* All the artefacts created during both days were collected, namely the stories, branching stories, prototypes and games. Lastly, the participants were asked to complete two snapshot graphs in the questionnaire over both days to report fluctuations on their levels of motivation and confidence for designing educational games, a template of these graphs and the instructions facilitated are presented in *Section B.5.* The graphs were part of an open-ended questionnaire to receive suggestions and explanations on their fluctuation graphs.
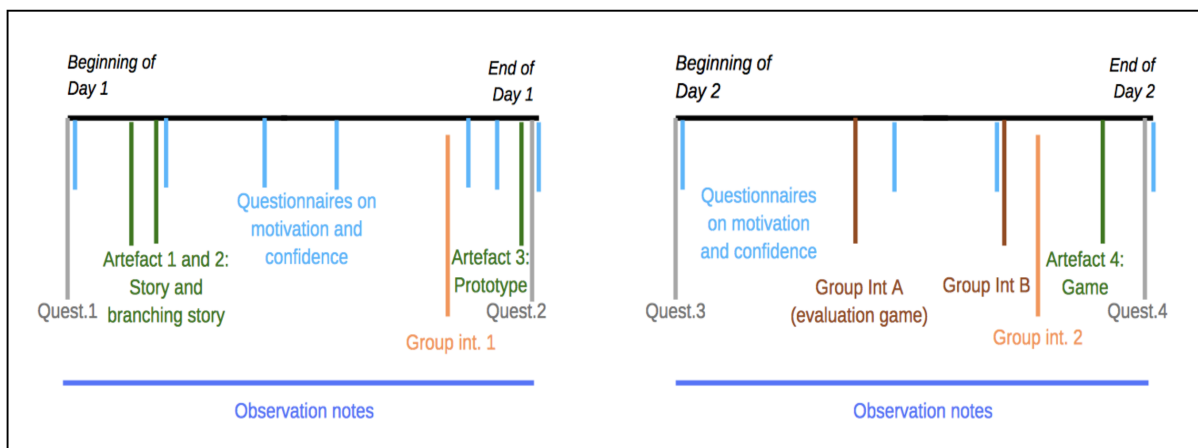
Figure 5.1: *Overview of data collected during Game Jams*

Both Game Jams started at 8am on Saturday and Sunday and finished at 8pm on both days, and took place at a gaming venue in central London called 'Platform'. Lunches were provided for the participants and they received a certificate of participation at the end of the event. Both Game Jams were advertised on a range of online platforms, such as Eventbrite, the London Games Festival, Platform and *GameSalad* social media as well as on the United Nations website. The communication material, presented in *Appendix B* (see *Figure B.3*), stated that no previous skills or knowledge was needed to participate and that participants were going to be designing an educational game on the topic of

gender inequality in groups. It also stated that support and guidance was going to be provided to guide participants to design such games in groups. The description of the event also clearly stated that the Game Jams were part of a doctoral research and that data was going to be collected for research throughout the event.

Potential participants first visited the Eventbrite page registering their names and email addresses. After this, they were asked to confirm their participation by completing an online form that collected additional details, such as their age category, gender, experience designing games, etc. (which are presented in *Section B.6*). Then, they received a confirmation email with information about the event, a link to a tutorial on *GameSalad* and its users' manual and a consent form. They were told that they could get familiar with *GameSalad* if they wanted to, but a tutorial would be offered during the Game Jam. The participants were also told that they could withdraw at any time during the weekend.

5.2   Participants

In total, 23 people participated in the Game Jams, working in two groups of four in the first Game Jam and three groups of five in the second one. No participant dropped out at any point in either event. To refer to a specific group or participant, the following mnemonic will be used: A or B corresponds to the Game Jam, G1 to G5 for the Group number, and P1 to P23 for the Participant number (e.g. A-G1-P1 refers to participant 1, in group 1, in the first Game Jam). The following table shows the distribution of participants in each group.

			Age	Gender	Ethnicity	Sexual orientation	Designed game before	Designed educational game before	Participated to Game Jam before	Experience with computer programming
Game Jam A	G1	P1	34 to 39	Non-binary	White – British	Pansexual	*Yes*	*No*	*Yes*	*Yes*
	G1	P2	22 to 27	Male	Black or Black British	Heterosexual	*No*	*No*	*No*	*No*
	G1	P3	22 to 27	Female	Other ethnic group	Lesbian	*Yes*	*No*	*Yes*	*No*
	G1	P4	28 to 33	Male	White - Other	Heterosexual	*Yes*	*No*	*Yes*	*No*
	G2	P5	28 to 33	Female	White – British	Heterosexual	*Yes*	*Yes*	*No*	*No*
	G2	P6	22 to 27	Male	Black or Black British	Heterosexual	*No*	*No*	*No*	*No*
	G2	P7	22 to 27	Female	Mixed - Other	Heterosexual	*No*	*No*	*No*	*No*
	G2	P8	22 to 27	Male	Chinese -	Heterosexual	*No*	*No*	*No*	*No*
Game Jam B	G3	P9	22 to 27	Female	Mixed - White Asian	Lesbian	*No*	*No*	*No*	*No*
	G3	P10	28 to 33	Male	White -	Heterosexual	*Yes*	*No*	*No*	*No*
	G3	P11	22 to 27	Male	Black or Black British	Heterosexual	*Yes*	*No*	*No*	*Yes*
	G3	P12	28 to 33	Transman	White – British	Gay	*No*	*No*	*No*	*No*
	G3	P13	22 to 27	Female	Other ethnic group	Heterosexual	*No*	*No*	*No*	*No*
	G4	P14	22 to 27	Female	White -	Bisexual	*No*	*No*	*No*	*No*
	G4	P15	28 to 33	Male	White -	Heterosexual	*No*	*No*	*No*	*No*
	G4	P16	40 to 45	Male	White – British	Heterosexual	*No*	*No*	*No*	*No*
	G4	P17	16 to 21	Female	Black or Black British	Heteroflexible	*Yes*	*Yes*	*Yes*	*Yes*
	G4	P18	28 to 33	Male	White -	Heterosexual	*Yes*	*No*	*Yes*	*Yes*
	G5	P19	28 to 33	Female	Chinese -	Heterosexual	*No*	*No*	*No*	*No*
	G5	P20	Older than 52	Female	Black British – Caribbean	Heterosexual	*No*	*No*	*No*	*No*
	G5	P21	34 to 39	Female	White -	Heterosexual	*Yes*	*Yes*	*No*	*No*
	G5	P22	16 to 21	Male	White – British	Bisexual	*Yes*	*No*	*No*	*No*
	G5	P23	28 to 33	Female	Chinese -	Heterosexual	*No*	*No*	*No*	*No*

Table 5.1: *Overview of Game Jams' participants*

Out of the 23 participants, 10 participants had previous experience in game design and only three participants had some previous experience in educational game design. In total, five participants had participated in a Game Jam previously and four participants had experience with computer programming. Both Game Jams and each group had diversity in gender, ethnicity, sexual orientation and age, for instance 11 participants were from other ethnic backgrounds than white and six participants identified with another sexual orientation than heterosexual.

5.3   Games Created

The first group in the first Game Jam, A-G1, created a game aimed at raising awareness of gender-based toys, illustrated in *Figure 5.2*. In the game, two twin characters, one boy and one girl, receive a gender-stereotyped present for their birthday and have to go to a toystore to change them. To reach the store they have to go through a platform game where stereotyped statements have to be avoided. Self-esteem points are lost every time the characters touch a stereotyped statement. The number of self-esteem points the characters have at the end of the game defines the array of presents they can choose from at the toy store. The appearance of the twins is allocated randomly at the beginning of the game and the player can switch to play the boy or girl character by clicking on the character icon at the top of the screen at any point. The toy store scene and the function to allocate the character randomly were not finished by the end of the Game Jam and the scenes were not merged together by the end of the Game Jam due to a limitation of the *GameSalad* engine.
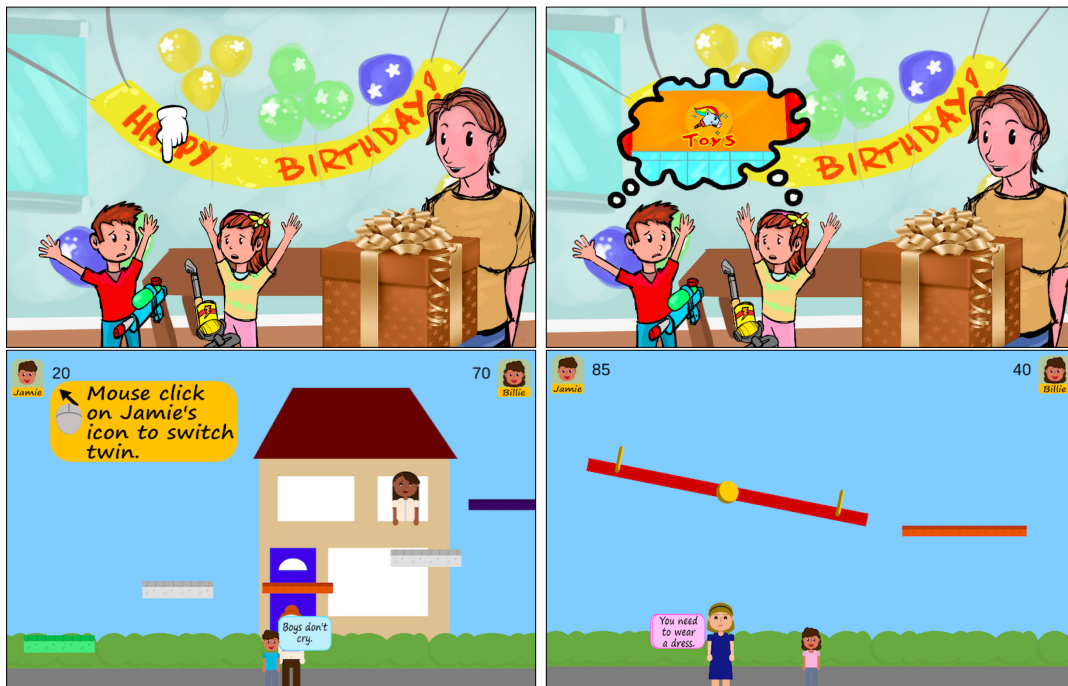
Figure 5.2: *Screenshots on game designed by A-G1*

The second group, A-G2, created a game divided into three scenes where the player controls a genderless character. The game aims at raising awareness of the impact of gender stereotypes by exploring scenarios that illustrate issues related to the gender pay gap and patronising discourse. The first game scene requires the player to save a city from fire but where the character loses its powers without being given any reason, which was intended to represent unequal societal power structures. The second scene illustrates six characters whose job is to shoot enemies. This scene includes a clock that represents how long the characters are working for, which first illustrates "time: 8:00 hours" and then increases as the game goes on. When the clock shows 15:00, a textual prompt, illustrated in *Figure 5.3*, is shown which states that some characters can leave work while the played character has to work longer hours to earn the same salary. The last scenario is a maze where after a few minutes the player loses control over the direction of the character. This represented the frustration the participants feel when faced with patronising discourse. The game ends with a sentence asking 'WHY DO ALL OF THIS HAPPEN?' and the players have to write 'BECAUSE I AM A WOMAN' to win and finish the game. The scenes were completed during the Game Jam, but the scenes could not be merged into one game due to a limitation of the *GameSalad* engine, as each of the participants were working on a different computer.
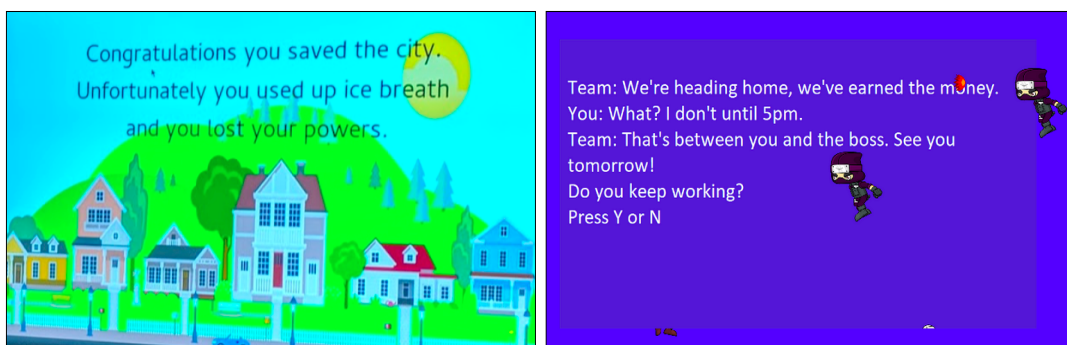
Figure 5.3: *Screenshots on game designed by A-G2*

In the second Game Jam, group B-G3, created a game on the use of sexist language that was intended to provide insights on how to have constructive and informed dialogue when sexist language is encountered. The game is based on living 24 hours as a male character and illustrates three scenarios where sexist language is used, at home, at work and on the street. In the home scene, the character is placed in his room and when he moves toward some of the objects a narrative-based dialogue scene appears. For instance, when touching the breakfast table the character is asked if he wants to eat 'Bacon and Eggs' or 'Granola'. The player is then presented with the character's roommate's answers and is given the choice to engage or move on, as illustrated in *Figure 5.4*. Players score points based on when and how they engage with these scenarios. The game also illustrates energy and risk points, which shows how engaging in conversations about sexism can be more energy consuming or risky in certain scenarios, for instance engaging with a stranger in the street is represented as being riskier than engaging with a roommate. The script was written for each of the three scenes while two scenes out of three, the home and work scenes, could be developed with *GameSalad* during the Game Jam due to time limitations.
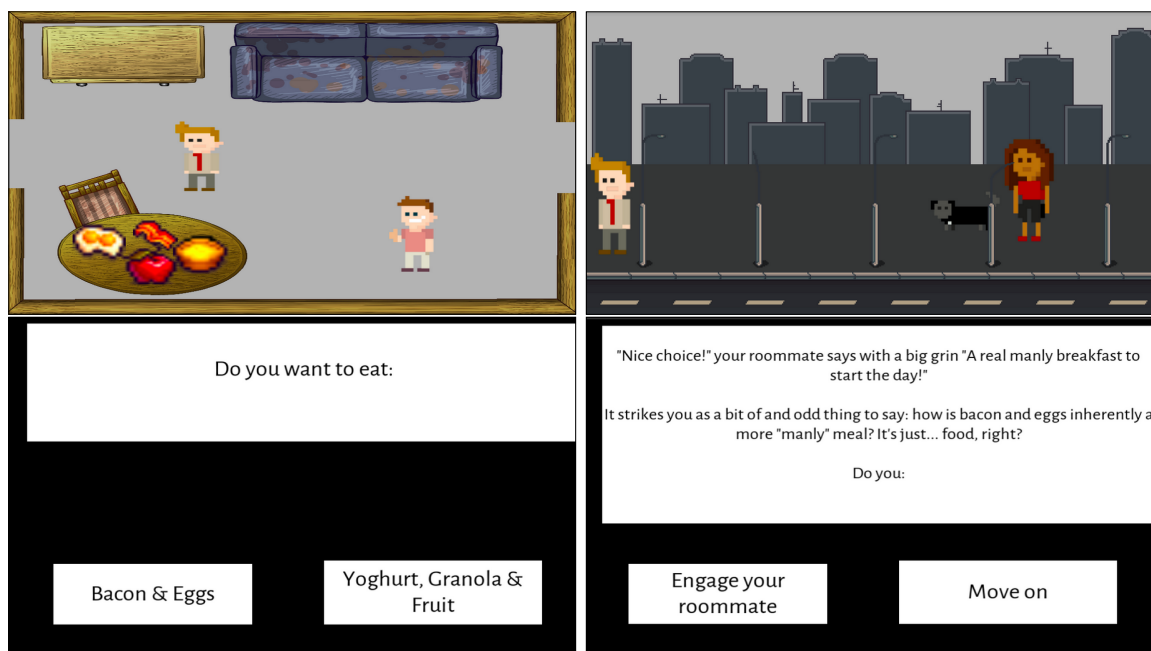
Figure 5.4: *Screenshots on game designed by B-G3*

The fourth group, B-G4, created a game, illustrated in *Figure 5.5* about the impact of discriminatory comments and prejudice based on gender stereotypes. The game sheds lights on how certain individuals treat people differently according to their gender and raises awareness of how discriminatory comments can affect performance. The first part is about a female character who wants to become a chef and the career is affected by gender discriminatory comments and prejudice, which was an experience of a participant in this group (B-G2-P17). The second part of the game represents an online shooting game where information about the player's gender cannot be communicated to fictional players. This part presents two scenes that both have to be played to finish the game. In the first scene, the player is assumed to be a male by the other fictional players and is sent positive and encouraging comments as the game goes on. In the other scene, fictional players assume that the player is a female and receive stereotyped and discriminatory comments, which in turn affect the number of points the player receives in the game. The game finishes by reflective sentences such as 'Why do people treat women and men differently?'. The elements of the game were completed by the group during the Game Jam but the scenes could not be merged into one game due to *GameSalad* limitations as participants worked on different computers.

Figure 5.5: *Screenshots on game designed by B-G4*

The last group, B-G5, created a game illustrated in *Figure 5.6* on gender discrimination in the workforce aimed at helping players recognise their own biases. The player is asked to answer four scenarios that present different facets of sexism. The player is given some background information on the scenario before being asked to respond to it. The scenarios are about opening doors for females, afterwork activities, the gender pay gap, and offensive comments about physical appearances. The character's gender is altered throughout the game. The player scores points based on the responses given and there are four possible end scenes depending on the player's score. The ending scenes present some of the research behind each of the topics presented. This game was fully developed and functioning by the end of the Game Jam.
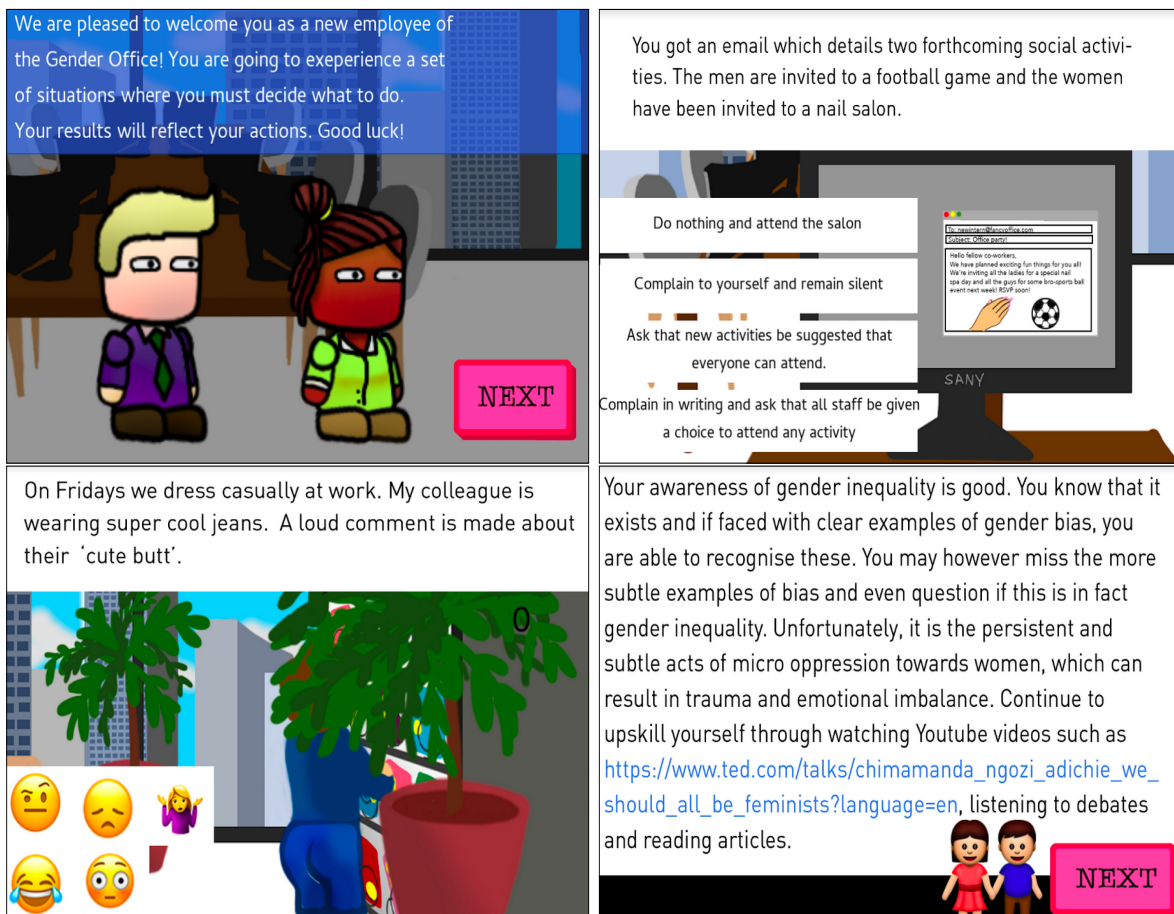
Figure 5.6: *Screenshots on game designed by B-G5*

5.3.1 Objectives

The games created were based on the educational and gaming objectives presented in *Table 5.2*. These objectives were defined during 'Stage 5: Definition of educational and gaming objectives' and used continuously throughout the Game Jams, as further explained in *Section 5.5.3*.

	Educational objective	Gaming objective
G1	Understand that we are defined by gender from a very young age. Toys are gender-specific.	The playability is fun. The game itself is frustrating. If they win they get a liberating (happy, positive) feeling.
G2	Impact of gender stereotypes on the individual and society. Why is this happening to me? Why do I have to do this?	Frustrating, confusing, different
G3	How to have a constructive dialogue with others when encountering sexist language.	Fun (setpoints, keep energy), frustrating (sometimes interacting gives negative points)
G4	Recognise prejudice and act on it, identify stereotypes, learn / rethink stereotypes, self-awareness, be aware of your actions.	Uncomfortable, challenged, rethink, thoughtful, amusing
G5	Recognise their own bias, reveal different manifestations of daily sexism, provide solutions.	Positive, fun and also frustrating

Table 5.2: *Educational and gaming objectives of the games created*

5.4 Engage with Social Issue

The level of engagement with the social topic of everyday sexism is explored through the data collected using questionnaires, group interviews and observation notes. The observation notes presented in this section refer to the data collected during stages aimed at creating engagement with everyday sexism, as referred in *Figure 4.11* (see *Section 4.3*), 'Stage 1: Discussions on educational topic' and 'Stage 6: Prototype'. For each data collection method, a summary of the results is introduced first, followed by the data evidencing them. Lastly, implications for the framework derived from these results are presented.

5.4.1   Questionnaires

This section first explores the extent to which participants felt they learnt about everyday sexism throughout the Game Jams. Following this, results on how much the cards contributed toward creating engagement with everyday sexism are presented before moving to exploring general impressions on the cards.

5.4.1.1   Perceived learning

Summary

- Participants with lower prior levels of understanding on everyday sexism perceived learning more about this topic than participants with high levels of understanding on the first day. Nevertheless, participants with prior high level of understanding on everyday sexism also reported satisfactory levels of learning about everyday sexism;

- Overall perceptions on learning about everyday sexism was balanced among participants with high and low prior levels of understanding on this topic by the end of the Game Jams;

- Both collaborative and individual learning about everyday sexism could be accommodated using the cards provided, with the majority of participants reporting mostly learning from collaborative activities.

The results presented here were found by using the responses to the questionnaires aimed at exploring if the participants' prior (i.e. pre-Game Jam) level of understanding of everyday sexism influenced their perception of learning. Two categories of participants were used, low levels of understanding (LU) are participants who responded 1 (None), 2 (A little) or 3 (Some), and high level of understanding (HU) are participants who responded 4 (Quite a bit) or 5 (A lot) to the question on the participants' perceived

level of understanding on everyday sexism in 'Questionnaire 1'. The following *Table 5.7*
presents the participant's responses to their perceived learning on everyday sexism per
category (LU and HU) during Day 1, which was captured with 'Questionnaire 2', and
during the Game Jam, collected through 'Questionnaire 4'. Both questions used the same
Likert Scale, ranking from 1 (None) to 5 (A lot).
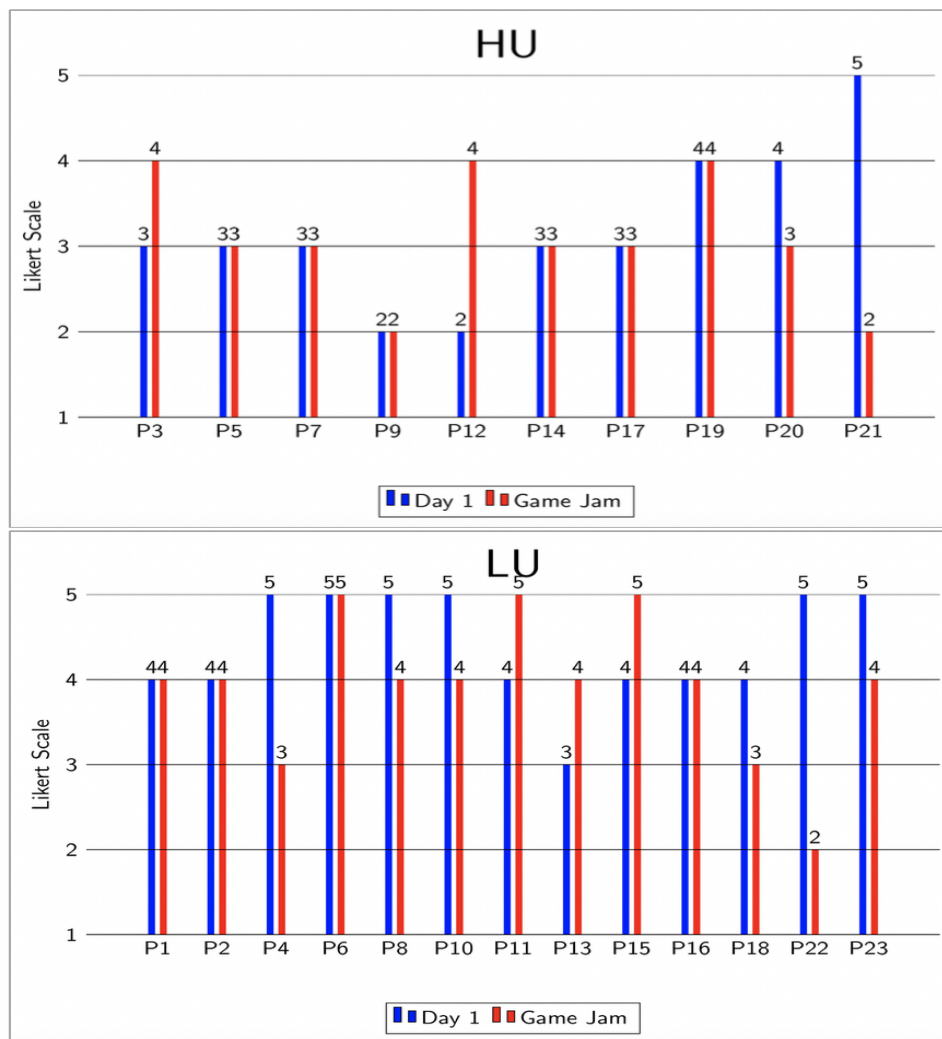
Figure 5.7: *The level of perceived learning about everyday sexism acquired during Day 1
and across the Game Jams grouped in HU and LU*

Figure 5.7 first illustrates that for both questions all participants answered 2 (A little) or
higher, suggesting that all participants felt learning a little or more about everyday sexism

during the Game Jams. Following this, a Chi-squared test for independence was applied between LU (n=13) and HU (n=10) categories. The results on this test applied between LU and HU for both questions (perceived learning during Day 1 and during Game Jam) and the results are presented in *Table 5.3*. A significance level of 0.05 was selected to evidence potential differences in the frequency' distributions of these two groups.

	df	N	2	p-value
Day 1	3	23	10	0.018
Game Jam	3	23	5.9	0.115

Table 5.3: *Results on the chi-squared test for independence applied on perceived learning about everyday sexism*

As $p < 0.05$ in the first question on the perceived learning acquired in Day 1, this indicates that at the 5% significance level the two distributions are independent, suggesting that the low understanding and high understanding responses are different. The LU category is bimodal with mode values of 4 (Quite a bit) and 5 (A lot), and the mode for the HU category is 3 (Some). These results suggest that participants from the LU category felt they had learnt more during Day 1 than what participants from the HU category. Regarding the participants from the HU category, the results point out that two of them reported learning 2 (A little) while five participants reported learning 3 (Some), two participants 4 (Quite a bit) and one participant 5 (A lot) about everyday sexism during Day 1. This suggests that while participants with high prior levels of understanding (HU) rated their level of learning as less than participants with lower levels of understanding (LU) during Day 1, perceived learning for this category were still found (i.e. 2 (A little) and above).

For the second question on the perceived learning acquired during the Game Jams, a p-value of 0.115 (>0.05) was found. This illustrates that at the 5% significance level the two distributions are not independent, suggesting that the distribution of responses between the two categories are not different for the second question (i.e. perceived learning about

everyday sexism during the Game Jams). Calculating the modes reveals a value of 4 (A lot) for the LU category and 3 (Some) for the HU category, which suggests that the difference in the perceived learning between these two groups during the Game Jams was higher for participants with lower prior levels of understanding on everyday sexism. This suggests that the overall perceptions on the participants' acquired learning about everyday sexism became more balanced among these two groups by the end of the Game Jam. This could be explained by the fact that 6 participants from the LU category (n=13) reported lower levels of learning during the Game Jam than during Day 1, which indicates that the perceptions of their learning about everyday sexism decreased by the end of the Game Jam. These results are aligned with the design intentions of the framework, which aimed at providing most of the learning opportunities about everyday sexism during the first day of the Game Jam.

Following this, 'Questionnaire 2' included a question on the three activities that most contributed to the participants' learning about everyday sexism. This question presented a list of potential options, that also included an 'other' option to enter additional textual information, and the participants were asked to select three options. The responses presented in the following table are ordered by frequency.

Activity	Number of responses
People from your group sharing their knowledge	17
Group discussions on everyday sexism	14
Discussing the game throughout the day	11
Using the everyday sexism cards with your group	10
Answering the questions on the everyday sexism cards	4
Reflecting on the everyday sexism cards individually	4
Accessing the stories illustrated on the everyday sexism cards on your own	4
Reading the everyday sexism cards individually	3
Accessing the illustrations on the cards individually	2
Total of responses	69

Table 5.4: *Responses on the three activities that most contributed to learning on everyday sexism*

In total, 17 participants chose the option 'People from your group sharing their knowledge'.

The six participants who did not select this option presented a level of understanding on everyday sexism that is scattered, varying from 2 (A little) to 5 (A lot). Out of these six participants, two of them selected the option 'Reading the everyday sexism cards individually', three of them 'Reflecting on the everyday card individually' and two of them 'Answering the questions on the everyday sexism cards'. The selection of these options by these six participants is important to be noticed due to the low number of total responses to these three options, for example 'Reading the everyday sexism cards individually' was selected by only three participants. This suggests that the participants who did not perceive that most of their learning about everyday sexism came from the participants of their group sharing their knowledge assimilated accessing the information presented on the cards as an activity that contributed to their learning about everyday sexism.

Table 5.4 also illustrates that the four most reported activities were collaborative while the activities with the lowest frequency counts were individual activities. This implies that most participants perceived learning about everyday sexism from collaborating with other participants but that the rest of the participants were able to learn from individual activities. It is important to note that the individual activities were based on using the cards individually, and mostly the stories and questions, which implies that these participants felt they learnt from accessing this information presented on the cards.

5.4.1.2 Cards

Summary

- The majority of the participants would highly recommend the everyday sexism cards to design educational games on everyday sexism;
- The recommendations to improve the cards are: to create more cards, to reduce the amount of text on them to make the cards more differentiable and to present less common stories about everyday sexism.

'Questionnaire 2' included a question asking participants how much they would recommend the everyday sexism cards and storytelling activities to people who intend to design educational games on everyday sexism. The responses per participant are presented in *Table 5.5*.

Recommendation of cards and storytelling activity	Frequency	Participant
1 (Not at all)	0	
2 (Slightly)	1	P10
3 (Moderately)	3	P2-P4-P22
4 (Very much)	10	P5-P6-P8-P11-P13-P14-P15-P17-P18-P19
5 (Strongly)	9	P1-P3-P7-P9-P12-P16-P20-P21-P23

Table 5.5: *Responses on recommendation to use everyday sexism cards and activities*

This table illustrates that 19 participants reported recommending 4 (Very much) or 5 (Strongly) the everyday sexism cards and storytelling activities to people who intend to design educational games on everyday sexism. The participant who reported recommending 2 (Slightly) the cards in this question, B-G3-P10, expressed in the group interviews that the cards presented too much textual information and that the cards were not differentiable due to their design (which will be presented in greater detail in *Section 5.4.2*).

Six participants added comments about the cards on the feedback questionnaire. Regarding feedback targeted at improving the use of the cards, A-G1-P3 suggested creating more

cards and A-G2-P8 suggested providing less common stories on everyday sexism to be able to learn from the stories. Other participants expressed positive impressions toward the cards; A-G2-P6 said that the cards were useful to give a focus and start discussions on everyday sexism, A-G2-P7 mentioned that the cards were helpful to create discussions and learn from other participants and, lastly, B-G3-P12 mentioned that the stories were helpful to both raise awareness of gender issues and to get a deeper understanding of gender issues. These responses highlight that the cards were perceived as suitable to trigger discussions and learning on everyday sexism, which is in accordance with the results presented in the previous section.

5.4.2 Group Interviews

Summary

- All groups explicitly mentioned that the cards were suitable to start group discussions and to learn about everyday sexism;

- The two participants who mentioned learning mostly from individual activities in *Section 5.4.1.1* reported that the questions and stories presented on the cards were suitable to learn about everyday sexism;

- Three groups expressed that using the cards helped them to create their story;

- Two groups reported difficulties in choosing a topic for their story due to the quantity of cards they preliminary selected;

- Two groups mentioned that some stories on the cards presented an unknown aspect of everyday sexism and that this contributed to their learning;

- A divergent comment from the overall positive impressions on the cards was that they presented too much textual information and that they were not differentiable;

- All groups reported associating their learning to participants sharing different perspectives on everyday sexism;

- Four groups mentioned that their learning on everyday sexism took place mostly during Day 1.

The transcription of the interviews were coded into three themes: Use of cards, Feedback on the cards and Perceived learning on everyday sexism.

Use of the cards: all groups reported that the cards were used to start group discussions, which is exemplified by A-G2-P7 who said "They were good and I could relate to many of the stories so it was a good starting point for discussions." and B-G4-P14 who expressed that "They were good to jump-start conversations". Three groups, A-G1, A-G2 and B-

G5, added on this mentioning that relating to the stories enabled them to participate in such discussions. Two other comments were found on the use of the cards were A-G1-P1 who mentioned that the cards and the questions were useful to cause personal reflection on everyday sexism and B-G5-P19 who expressed that the examples were useful to raise awareness on everyday sexism. It is important to note at this point that these two participants reported mostly learning from individual activities in *Section 5.4.1.1*. Another aspect of the use of the cards that was expressed was on the extent to which they offered support to create a story on everyday sexism. Two groups, A-G2 and B-G4, reported that it was difficult to create a story on everyday sexism due to the number of cards previously selected and the amount of information that the cards presented, which is illustrated by B-G4-P14 who said "There are so many cards and sides of gender inequality and there are so many examples of gender inequalities on the cards we chose. Narrowing it down to do something manageable to do was hard." In total three groups chose three cards and two groups chose two cards to create their stories (see *Annex B* in *Table B.1*. The two groups who reported these difficulties selected three cards during the first activity, implying that groups who selected two cards did not face difficulties with this task. Lastly, the other three groups mentioned that the cards helped them to create their games, which is exemplified by B-G3-P12 who said "I think the cards were good and it is a good place to have them. For us, we decided to focus on everyday sexism language with the cards and, without these cards, I don't think we would have been able to go with that."

Feedback on the cards: all groups described the cards as "good" to learn about everyday sexism. Other comments found on the cards were the group A-G1 who mentioned that the cards gave a good overview of everyday sexism and A-G2 who expressed that seeing the topic of gender inequality in everyday sexism was interesting. One diverging comment from these positive impressions was found which was B-G3-P10 who said that the cards

presented too much text and that they were not differentiable.

Perceived learning on everyday sexism: all groups mentioned that different perspectives on everyday sexism shared during group conversations contributed to their learning, for instance, B-G3-P13 said "We all had very different points of views (on everyday sexism), so that was interesting and I learnt from that" and B-G4-P14 mentioned "I think the important part is that we learnt about different people's perspectives on the subject from discussions, I learnt from [B-G4-P17's name] and how she has dealt with some aspects of sexism and how others have dealt with such aspects of everyday sexism". Additionally, two groups, A-G2 and B-G4, mentioned that some of the stories presented an unknown aspect of everyday sexism to them and that this directly impacted their learning on this topic. Lastly, four groups, A-G1, A-G2, B-G3 and B-G4, reported that their learning on everyday sexism took place mostly during Day 1, for instance, A-G1-P1 said "I don't think I have learnt more than what I learnt yesterday on everyday sexism. Today it was more about the implementation." The reminding group did not provide such information and only mentioned having learnt about everyday sexism during the Game Jam.

5.4.3   Observation Notes

Summary

- While the stories triggered participants to share personal experiences with everyday sexism, the questions led participants to discuss sexism in a less personal way;
- The questions at the back of the cards effectively contributed toward creating discussions on everyday sexism;
- The keywords and illustrations presented on the cards were only read when the groups were requested to create a story on everyday sexism, which illustrates that the keywords and illustrations were ignored for the first activity and used as an inspiration to create stories;
- Four groups conducted additional research on the Internet to find statistics on everyday sexism while creating their prototypes.

In the observation notes collected about 'Stage 1: 'Discussions on educational topic' the coaches reported not having to intervene during this stage as none of the group asked questions or expressed issues on either the instructions, cards or activities proposed. It was also reported that all groups started this activity by reading and discussing the stories presented on the cards, which led participants to share personal experiences with everyday sexism. Once the groups selected their cards for their stories, which are presented in *Table B.1*, the observation notes pointed out that all groups read the questions at the back of the selected cards out loud and answered them collaboratively, which led to additional discussions on everyday sexism. It was reported that the discussions using the questions enabled groups to shift from discussing personal experiences to having conversations about issues related to sexism and what solutions could be provided to tackle them. After this, the storytelling activity was launched and it was reported that only at this point the

groups started reading and discussing the keywords and illustrations presented on the cards.

For 'Stage 6: Prototype' it was reported that all groups but A-G1 conducted additional research on everyday sexism on the internet, as illustrated in *Figure 5.8*. These four groups looked for statistics on the aspects of everyday sexism that they wanted to illustrate in their games. It was also reported that no additional research on the internet on everyday sexism was conducted by any group after this stage.
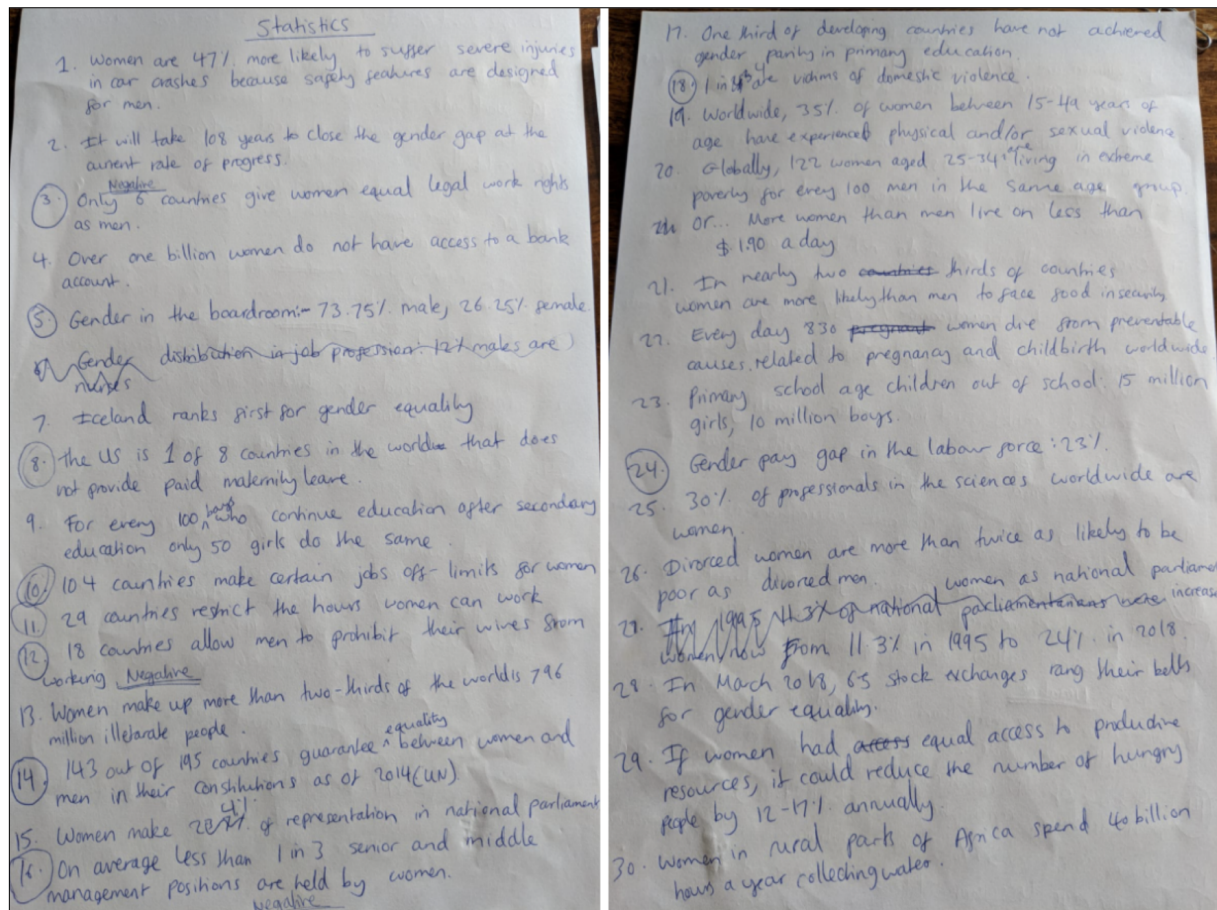
Figure 5.8: *Additional research conducted by G5 on everyday sexism during 'Stage 6: Prototype'*

5.4.4   Implications

The results presented here suggest that the proposed activities and resources are suitable to democratise learning by creating engagement on everyday sexism to participants who have various levels of understanding on this topic. It was evidenced that the use of the cards, group discussions and the creation of artefacts, both the stories and prototypes, were key factors to trigger this engagement.

Regarding the use of the cards, the stories were indeed used to start group discussions by triggering participants to share personal experiences with everyday sexism. Following this, the questions at the back of the cards contributed to shifting these conversations to discussing sexism in a more generalised and less personal way. The results indicated that this process of reflection, facilitated as a collective activity, was perceived by most of the participants as relevant to trigger learning about everyday sexism. The results also indicated that individual learning, facilitated by accessing the information presented on the cards, and especially the stories and questions, could also be accommodated with the proposed cards. This implies that the information presented on the cards, and especially the stories and questions on everyday sexism, can be described as suitable to trigger both collective and individual learning about everyday sexism.

Concerning the group discussions, most of the participants perceived learning about everyday sexism by sharing their knowledge with each other and having participants sharing different perspectives was a key factor that contributed to this learning. This implies that shaping resources and activities with the objective to create group discussions based on sharing different perspectives can facilitate learning about everyday sexism.

Regarding the creation of the stories, both resources and activities were suitable to enable groups to create stories and branching stories on everyday sexism. The results first illustrated that the keywords and illustrations presented on the cards were used in the

transition from discussing the questions to the storytelling activity, and not during the preliminary group discussions, suggesting that additional information on the topic of everyday sexism is needed to support groups starting the storytelling activity, with keywords and illustrations suitable to achieve this. The results also evidenced difficulties in choosing a topic for the stories, which was related to the number of cards that groups had selected to create their stories. Arguably, the number of cards selected to create the stories also influenced the fact that groups could discuss some interconnections between categories of everyday sexism and that the games created relied on illustrating various facets of everyday sexism (e.g. B-G5 created a story and a game on Benevolent Sexism and Gender Stereotypes, as illustrated in *Section 5.3* and further illustrated in *Section 5.7.4.1*). As these difficulties were collected from groups who selected three cards and that no difficulties were reported from groups who selected two cards, a potential solution could be to provide the facilitator and/or coaches with a strategy based on inviting groups to prioritise two cards for the creation of their stories in scenarios where groups cannot create their stories.

Concerning the creation of the prototypes, the results illustrated that online research to find statistics on everyday sexism took place during this stage. Conducting online research was not requested during this activity, which implies that this type of engagement was triggered autonomously by the groups. This evidences that activities based on creating game prototypes can be used to create engagement with everyday sexism, which is triggered by groups reflecting on the information they want to present in their games.

5.5   Support with Educational Game Design Practices

The extent to which the provided resources and activities supported groups with educational game design practices is explored through the data collected using questionnaires, group interviews and observation notes. The observation notes presented in this section refer to the data collected during stages aimed supporting groups with educational game design practices, as referred in *Figure 4.11* in *Section 4.3*, namely 'Stage 3: Discussions on educational game design', 'Stage 5: Definition of educational and gaming objectives', 'Stage 6: Prototype' and 'Stage 7: Review of prototype'. The evaluation of the games designed during 'Stage 8: Development and iterative evaluations' will also be presented in this section.

5.5.1   Questionnaires

This section first presents results on the participants' perceptions on learning about educational game design. Then, it turns to present general impressions on the use of the proposed cards to design educational games on social issues.

5.5.1.1   Perceived Learning

Summary

- All participants, including the ones with previous experience designing educational games, reported satisfactory levels of perceived learning about educational game design using the cards;
- All participants felt learning about educational game design during the Game Jams.

Facilitated at the end of the first day, 'Questionnaire 2', included a question aimed at capturing perceptions on learning about educational game design using the cards. This question used a Likert scale ranked from 1 (None) to 5 (A lot) and the responses are presented in *Table 5.6* below. Three participants, A-G2-P5, B-G4-P17 and B-G5-P21, reported having some previous experience in the design of educational games. Their responses are marked with an asterisk in the following table.

Perceived learning using cards	Frequency	Participant
1 (None)	0	
2 (A little)	0	
3 (Some)	5	P4 - P5* - P16 - P19 - P20
4 (Very much)	7	P3 - P8 - P9 - P11 - P14 - P18 - P22
5 (A lot)	11	P1 - P2 - P6 - P7 - P10 - P12 - P13 - P15 - P17* - P19 - P21*

Table 5.6: *Perceived learning about educational game design by discussing the cards*

As *Table 5.6* illustrates, all participants reported learning 3 (Some), 4 (Very much) or 5 (A lot) and the mode was found on 11 participants responding 5 (A lot), revealing satisfactory levels of learning about educational game design using the cards. The responses by the three participants who had previous experience with educational game design were similar to the rest of the participants as two of them reported learning 5 (A lot) and one of them 3 (Some), suggesting that these participants could also learn about educational game design by accessing the cards.

At the end of the first day of the Game Jams the participants were asked about their perception of learning about educational game design during the first day of the Game Jams. Following this, at the end of the Game Jams, the participants were asked about their perception of learning about educational game design during the Game Jam. These questions used the same Likert scale, ranked from 1 (None) to 5 (A lot). Figure 2 below compares the responses referring to Day 1 only with the whole Game Jam.
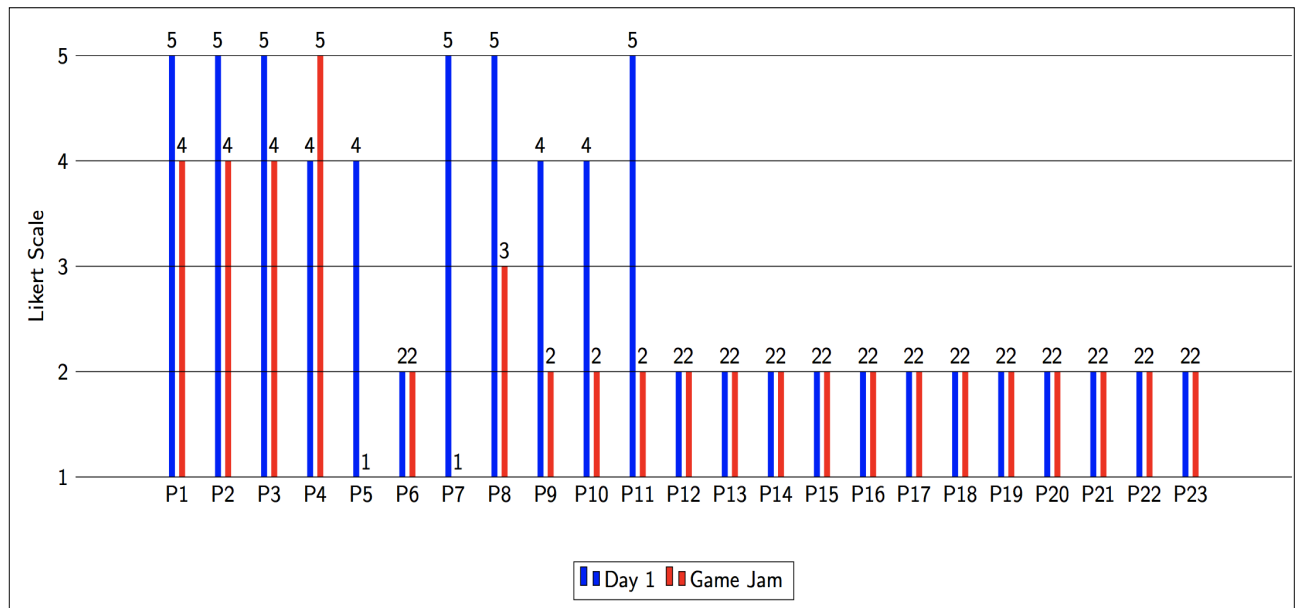
Figure 5.9: *Perceived learning on educational game design during Day 1 and during Game Jam*

Figue 5.9 illustrates that for both questions all participants answered 3 (Some) or higher, suggesting that all participants felt learning some or more about educational game design during the Game Jams. The modes for these two questions were found on 5 (A lot) selected by 12 participants for both questions, which points out to satisfactory perceived levels of learning about educational game design throughout the Game Jam. Lastly, the responses of the three participants who had experience with educational games, which are not lower than 3 (Some), also suggest that they felt learning about educational game design by participating in this Game Jam.

5.5.1.2 Cards

Summary

- The cards were perceived as useful to support groups with ideas to design educational games by most participants;
- The majority of participants would recommend the cards to people who intend to design educational games on social issues;
- Recommendations to improve the use of the cards included consolidating the game elements in one list, reducing the amount of textual information on each card and facilitating a presentation on how to use them.

In 'Questionnaire 2', participants were asked about the usefulness of the cards to support them with ideas to design educational games. The responses per participant are presented in *Table 5.7*.

Reported usefulness of cards to provide support	Frequency	Participant
1 (Not at all)	0	
2 (A little)	0	
3 (Reasonably)	2	P19 - P22
4 (Very)	11	P1- P2-P3-P4-P5*-P6-P8-P9-P14-P17*-P18
5 (Extremely)	10	P7-P10-P11-P12-P13-P15-P16-P20-P21*-P23

Table 5.7: *Usefulness of the cards reported per participant to provide support with ideas to design educational games*

This table shows that 21 participants reported that the cards were either 4 (Very) or 5 (Extremely) useful to support them with ideas to design educational games, suggesting that the cards were appreciated by the majority of the participants as a supporting resource to design educational games. An open-ended question gave the opportunity to participants to comment or make suggestions about the cards and activity. In total, 5 participants provided feedback. Two participants, A-G1-P1 and B-G3-P12, expressed that accessing the cards collaboratively was a valuable activity to design their games, A-G2-P7

said that using the cards was helpful to create their games, A-G1-P3 said that the design of the cards could be made more digestible, and B-G3-P14 revealed that it was difficult to understand how to use the cards when the group first received them.

The participants were also asked to report on how much they would recommend these cards to people who intend to design educational games in 'Questionnaire 2'. The responses per participant are presented in following *Table 5.8*.

Recommendation of cards to design educational games	Frequency	Participant
1 (Not at all)	0	
2 (A little)	1	P16
3 (Reasonably)	1	P8
4 (Very)	9	P1-P4-P5*-P6-P9-P11-P13-P14-P19
5 (Extremely)	12	P2-P3-P7-P10-P12-P15-P17*-P18-P20-P21*-P22-P23

Table 5.8: *Responses per participants on how much they would recommend the educational game design cards*

This table shows that in total 21 participants would recommend the cards either 4 (Very much) or 5 (Strongly), which suggests that the cards were appreciated by the majority as resources to design educational games.

An open-ended question then asked the participants to justify the response was answered by 16 participants. Out of 16, 10 of them described the information presented on the card as valuable, which is exemplified by A-G2-P7 who expressed "Lots of great information communicated in a very understandable way." and B-G4-P14 who said "They are great to get information and think critically about how to encompass the social issue within an educational game structure". B-G4-P16 suggested that the back of the cards should be consolidated into one list to make the cards look nicer, and B-G5-P19 and B-G5-P20 said that the amount of information presented on each card felt it was too much information when first received. Participant B-G3-P10 said that they were eye-opening on how complex educational game design is, B-G4-P16 said that they present patterns to follow to design educational games and B-G4-P18 expressed that the game elements at

the back of the cards were inspiring.

5.5.2 Group Interviews

Summary

- All groups mentioned that the information presented on the cards was valuable to design their games;
- A suggestion to improve the card-based activity was to illustrate with examples how the cards should be used;
- Recommendations to improve the cards were targeted at reducing the amount of text on the cards;
- The interviews to evaluate the games were perceived as an interruption, they did not trigger discussions within groups, neither led to modifications or improvements in the games.

The transcripts of the interviews on educational game design were categorised into the use of the cards and feedback on the cards design. On Day 2, another set of group interviews was conducted to evaluate the games being developed.

Use of the cards: all groups mentioned that the information presented on the cards was either 'useful' or 'helpful' to design their educational games. This is exemplified by A-G2-P7 who said "I think that they are really really useful resources. Without them I wouldn't know how to do it, how to design a game that creates learning" and B-G3-P9 who said "To define the interactional model of the games these (educational game design cards) are very useful, they help us define a structure to define how to reach the learning outcome of our game." Complementary, Group G5 mentioned that it was difficult to use them at first and suggested that a presentation illustrating how to use them with examples would improve their understanding.

Feedback on cards: two groups, G1 and G3, suggested reducing the amount of text on the cards to improve their design. Another group, G4, advocated that the game elements at the back of each card should be consolidated into one list that could be used for all the cards.

Evaluation of the games: in the interviews during Day 2, referred to as Interview A and B in *Figure 5.1*, each group was invited to iteratively evaluate the games that they were developing. The groups were asked how confident they felt toward their game achieving their educational and gaming objectives and had to provide responses from 'Not confident at all' (1) to 'Extremely confident' (5). The responses per group are provided in *Figure 5.10*, the first one presents the responses of the first interview and the second one of the second interview.
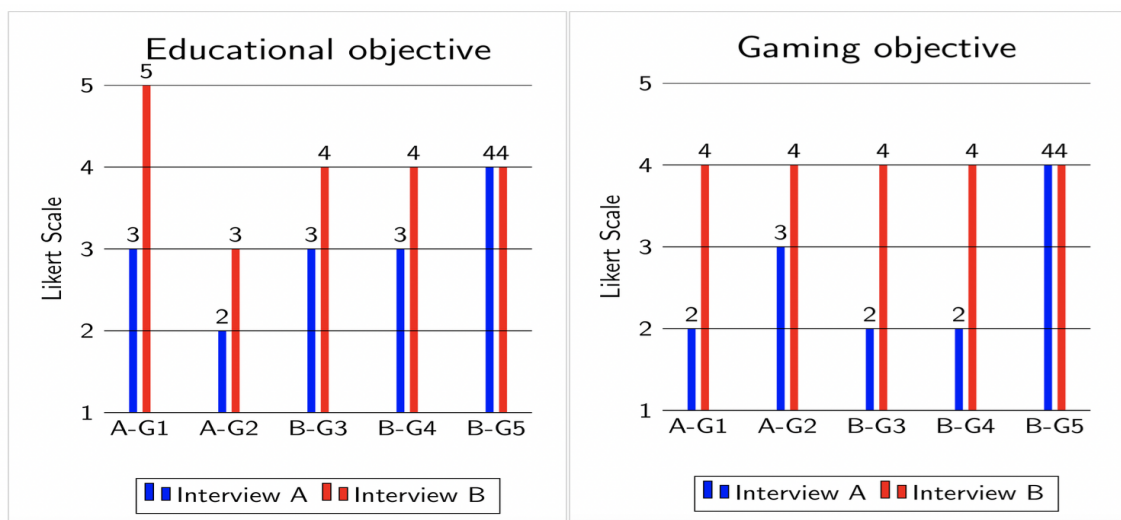
Figure 5.10: *Group evaluations of games during Day 2*

In the first interview, all groups mentioned that reflecting on their level of confidence toward the gaming and educational objectives in their games was not helpful at this point because they were still defining how to develop their games using *GameSalad* and that they would prefer discussing that later in the process. They were also asked if they considered modifying their original game ideas to be able to develop their scene using *GameSalad*.

All groups replied that they were sticking with their prototype ideas and that they were trying to develop the scenes they conceptualised the day before. In the second interview, the confidence of the groups toward the games achieving their objectives increased for all groups but for B-G5 and was justified by advancements in the development of their games. Again, all groups confirmed that the scenes they were developing were still based on their game ideas presented in their prototypes. It was also reported by the coaches that the groups did not engage in discussions, they felt the interview was an interruption and wanted to go back to the development of their games.

5.5.3 Observation Notes

Summary

- All groups needed clarifications on how to use the cards when they received them;
- In 'Stage 6: Prototype', the provided supporting material on educational game components was used to guide discussions on the creation of the prototypes and three groups used the art assets provided (images that they could integrate in their games) to create their prototype;
- In 'Stage 6: Prototype', all groups accessed and used the everyday sexism stories, the selected cards on educational game design and the defined objectives for their games;
- During 'Stage 7: Review of Prototype' all groups requested clarifications to be able to carry the proposed activity and did not engage in reviewing their prototype during this activity.

The observation notes of the stage 'Stage 3: Discussions on educational game design' reported that all groups asked questions on the use of the educational game design cards. All groups reported not understanding the instructions for this stage on how to use the

cards. In response to this, the coaches and the researcher instructed the participants to explain the objectives of the cards and used an example of a card to support their instructions. This led groups to discuss each of the cards and select the one to be used on their games, the selected cards per group are presented in *Appendix B* in *Table B.9*. Once the groups selected their cards, they all read and wrote directly on the cards to define the game elements they selected for their games.

In 'Stage 5: Definition of gaming and educational objectives' all groups managed to come up with coherent gaming and educational objectives, as illustrated in *Section 5.3.1* that presents the objectives defined by the groups. It was also found that for each group, the educational and gaming objectives defined were used as supporting information in all the following stages of the Game Jam (Stage 6 to 9) and illustrated in the games created. None of the groups asked questions to the coaches and no issues were reported during this activity.

On 'Stage 6: Prototype', all the groups created prototypes that illustrated educational games on everyday sexism and used them to develop their games on the second day of the Game Jam. It was also found that each group started this activity by creating their prototype in different ways. While A-G1 and B-G3 initiated by reading and discussing the provided supporting information about educational game components, A-G2 and B-G4 discussed their game idea before reading this information, and B-G5 did some research on everyday sexism online as a first step to create their prototype. It was reported that all groups ended up reading the supporting information on the educational game components at some point during this stage, which led them to have additional conversations on each of the presented game components for their prototypes. The observation notes also reported that when discussing the component on the the appearances of their games, A-G2, B-G3 and B-G4 used the document with the art asset provided while in A-G1 and B-G5 one participant in each group, namely A-G1-P4 and B-G5-P22, mentioned wanting to create

the art resources for their games. These two participants ended up creating art resources for their game during the second day of the Game Jam. Lastly, it was reported that during this stage all groups accessed and used the same resources previously facilitated throughout the day, namely the created everyday sexism stories, the selected educational game design cards and the objectives of their games.

In 'Stage 7: Review of the prototype', all groups requested clarifications on this activity by mentioning that they could not understand what they were supposed to do. For both Game Jams and each group, the researcher read the instructions out loud and presented the example provided with more details, which led both groups to fill the template provided in less than 5 minutes (20 minutes were allocated to this activity) and without having additional discussions about the coherence of their prototypes. No changes in the game prototype were implemented for any of the groups during this stage. This was not expected as it was anticipated that reviewing their prototypes would have led groups to refine some aspects of their prototypes.

5.5.4 Implications

The results illustrated here present insights on activities and resources to democratise practices of educational game design. Perceptions on the use of the cards evidenced the relevance of providing information on educational game design both to facilitate learning in groups and to support them designing educational games. Following this, responses and impressions on the proposed activities to defining games' objectives, prototyping, reviewing of prototypes and evaluating the games present insights to democratise educational game design practices. In accordance with the framework, participants mostly perceived learning about educational game design throughout the first day of the Game Jam, as the second day is indeed dedicated to the development of games.

The design and content of the cards were suitable to both support learning about ed-

ucational games and to design them. The recommendation to consolidate all the game elements into one list would result in even more textual information (groups only access the game elements of the cards that they previously select). Therefore, it is argued that the cards should not be modified. The results showed that to improve the proposed framework the cards should be distributed together with a short presentation, supported by using one of the cards as an example, illustrating how to use them to design their educational games.

The information generated during 'Stage 5: Definition of educational and gaming objectives' was persistently used during the Game Jam and consistent with the instructions, as all groups proposed an educational objective based on raising awareness on everyday sexism and a gaming objective intending to make players uncomfortable and/or create fun. This suggests that this activity was suitable to enable groups to define the objectives of their games and to support them in the creation of their games.

Concerning 'Stage 6: Prototype', the results suggested that each group managed to create a prototype that illustrated an educational game on everyday sexism. The results suggest that information on the educational game components, presented as supporting information to trigger and guide discussions on the various components that encompass an educational game, is relevant to support groups creating prototypes. Following this, it was found that during this activity groups discussed and chose the art assets that they wanted to use for their games, which implies that the selection of art assets should indeed be distributed during this stage. Lastly, the results also illustrated that all groups accessed the same resources previously used during this day, namely the everyday sexism stories, the selected cards on educational game design and the defined objectives for their games, suggesting that this information could also be used to support groups creating prototypes.

The activity and resources proposed for 'Stage 7: Review of prototype' were not understood and not used as anticipated, suggesting this stage needs to be re-framed and made simpler, especially as the last activity of the first day, when participants might feel tired. One proposition to improve this activity could be to ask groups to review their prototype by reflecting on the coherence between the game components they defined and modify them if they think they could be better aligned with each other.

Regarding 'Stage 8: Development and iterative evaluations', it was first found that facilitating evaluations through group interviews when the group were developing their games using GameSalad was perceived as fruitless to improve the games and to create engagement in group discussions. The results also illustrated that even when evaluative interviews were facilitated later in the Game Jams, the groups tended not to engage in discussions to evaluate their games, describing these interviews as interruptions. This activity was facilitated because it was anticipated that some groups would have to modify their prototype ideas to what they were able to develop using *GameSalad*. It was then argued that these modifications would have to be shaped considering the educational and gaming objectives of the games. In the Game Jams organised, it was found that no group had to modify their prototype ideas to be able to implement them using *GameSalad*. Building on this, it might be relevant to invite groups to take part in evaluative activities when they implement modifications to their games' prototypes to develop their games. This activity could be based on facilitating a reflective question that could be used to evaluate and refine the proposed modifications considering the educational and gaming objectives of the games.

5.6 Acquire Game Development Skills

The acquisition of game development skills are evaluated through the data collected using questionnaires, group interviews and the observation notes collected during stages aimed

at supporting participants acquiring such skills, namely 'Stage 2: Familiarisation with game engine' and 'Stage 8: Development and iterative evaluations'.

5.6.1   Questionnaires

The acquisition of game development skills is explored by presenting results on the perceived learning of the participants on game development using *GameSalad* followed by insights about the needed features of an engine to design educational games by participants who might not have any experience in game development.

5.6.1.1   Perceived Learning

Summary

- All participants who used *GameSalad* during Day 2 reported satisfactory levels of learning on game development, including the ones with previous experience with computer programming, game design and/or *GameSalad*.

'Questionnaire 0' included questions asking participants if they had designed games and if they had experience using computer programming. Following this, 'Questionnaire 1' invited them to report on their levels of experience using *GameSalad* using a Likert Scale ranking from 1 (None) to 5 (A lot). At the end of the Game Jams, participants were then asked in 'Questionnaire 4' to report on their perceptions on their acquired learning about developing games using *GameSalad*. This question also used a Likert Scale where 1 referred to None and 5 to A lot.

In total, three participants, A-G1-P1, B-G3-P11 and B-G4-P17, reported having experience designing games and with computer programming. The three of them mentioned having experience with C++ and C# and A-G1-P1 also mentioned having experience with Java. Regarding the other participants, 7 of them reported having experience with

game design but not with computer programming while the rest of the participants reported having no experience with either. The responses on the participants' levels of experience with *GameSalad* and their perceived learning developing games with *Game-Salad* acquired during the Game Jam are presented in the following figure. In this figure, a participant's reference followed by an asterisk symbol refers to participants who had previous experience with game design and with computer programming. Two asterisks are used to refer to participants who had previous experience with game design and not with computer programming.
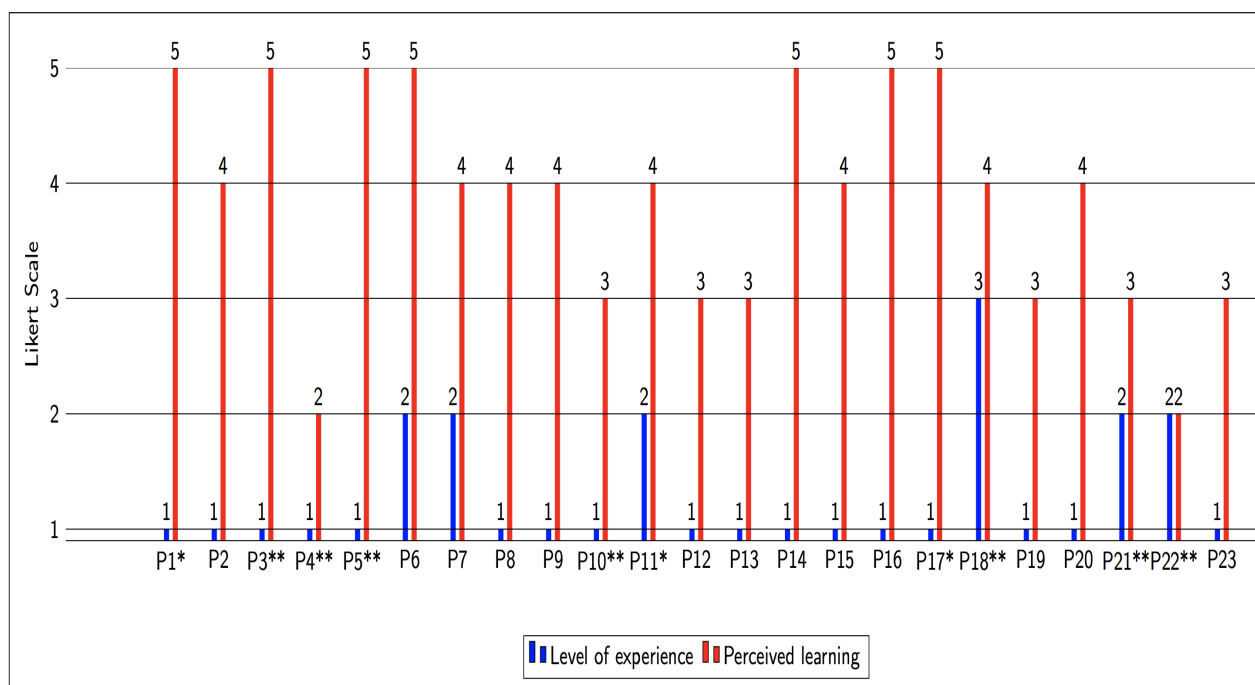
Figure 5.11: *Level of experience with GameSalad and perceived learning developing games with GameSalad during Game Jams*

This figure shows that two participants associated their perceived learning to 'A little' (2), six of them perceived learning 'Some' (3), eight of them 'Quite a bit' (4) and seven participants 'A lot' (5) about developing games using *GameSalad* during the Game Jam. The data collected through the observation notes, that will be presented in *Section 5.6.3*, showed that A-G1-P4 and B-G5-P22 are the only two participants who did not use *Game-Salad* during the second day of the Game Jam and who instead worked on creating art

assets for the games. These participants are the only two participants who associated their perceived learning to 'A little' (2).

This figure also illustrates that the three participants who had experience with computer programming and game design perceived learning either 'Quite a bit' (4) or 'A lot' (5) about developing games using *GameSalad*. Regarding the participants who had experience with game design and excluding the two participants who did not use *GameSalad* during Day 2 (i.e P4 and P22), it was found that they reported learning 'Some' (3), 'Quite a bit' (4) or 'A lot' (5). Lastly, about the participants who reported having 'A little'(2) or 'Some' (3) experience using *GameSalad* and who used *GameSalad* during Day 2 (i.e. P6, P7, P11, P18 and P21), one of them perceived learning 'Some' (3), three of them 'Quite a bit' (4) and the last one 'A lot'. This suggests that all participants who used *GameSalad* during Day 2 reported satisfactory levels of learning, including the ones with previous experience with computer programming, game design and/or *GameSalad*.

Game Engine

Summary

- In total 13 participants would recommend *GameSalad* 'Very much' or 'Strongly' and 10 'Moderately', 'Slightly' or 'Not at all';
- Participants who would 'Slightly' or 'Not at all' recommend *GameSalad* have reported on issues related to software bugs, lack of collaborative features and/or not being user-friendly on PC;
- Easy of use and good online tutorials were the main aspects mentioned by the participants who would 'Strongly' recommend *GameSalad*.

The participants were asked in 'Questionnaire 4' how much they would recommend using *GameSalad* to design educational games to people who do not have experience designing games. The number of responses per category are shown in *Table 5.9*.

Recommendation of using GameSalad to design educational games	Frequency	Participant
1 (Not at all)	1	P9
2 (Slightly)	2	P7-P8
3 (Moderately)	7	P2 - P4** - P10** - P13 - P20 - P21** - P23
4 (Very much)	10	P5** - P6 - P11* - P12 - P14 - P15 - P16- P17* - P18**- P22**
5 (Strongly)	3	P1* - P3** - P19

Table 5.9: *Frequency of responses per category on recommendations toward GameSalad*

This table illustrates that 13 participants would recommend *GameSalad* either 'Very much (4)' or 'Strongly (5)' and that the remaining 10 participants would recommend *GameSalad* either 'Moderately (3)', 'Slightly (2)' or 'Not at all' (1). The mode on this question was found on 10 participants reporting that they would recommend *GameSalad* 'Very much (4)'. Following this, an open-ended question asking them 'why?' was provided. The responses classified into categories and per participants are presented in *Table 5.10*. In the following two tables * refers to participants with game design and with computer programming experience and ** refers to participants with game design experience

Response	Frequency	Participants
Easy to use	13	P1*-P2-P3**-P5**-P6-P7-P11*-P12-P13-P18**-P19-P21**-P23
Good to learn about game development	4	P4**-P11-P13-P14
Has bugs	3	P7-P8-P21**
Lack of collaborative features	3	P9-P13-P21**
Good online tutorials	2	P1-P19
Create a sense of accomplishment	2	P6-P14
Not user-friendly on PC	2	P7-P8
Other: "Easy to download assets to design game"	1	P13
Other: "Simplified Unity"	1	P17*
Other: "Frustrating"	1	P9

Table 5.10: *Responses on why participants would (not) recommend GameSalad*

This table illustrates that 18 participants answered to this question and that the three participants who would recommend *GameSalad* either 'Slightly (2)' or 'Not at all' (1), namely A-G2-P7, A-G2-P8 and A-G2-P9, have reported on issues related to *GameSalad*

presenting bugs, lack of collaborative features and/or not being user-friendly on PC. Participant A-G2-P7 also mentioned that *GameSalad* was easy to use and A-G2-P9 that it was frustrating. The three participants who would recommend *GameSalad* 'Strongly (5)' reported that it was easy to use and had good online tutorials. Regarding other positive features of *GameSalad*, 13 participants mentioned that it was easy to use. Lastly, four participants, of which two had experience with game development and two had not, reported that *GameSalad* was good to learn about game development.

5.6.2   Group Interviews

Summary

- Recommendations to improve the use of *GameSalad* included inviting experts, making the online tutorial on *GameSalad* in advance mandatory for participation and to ensure that each group have at least one individual with technical skills;

- Negative comments about *GameSalad* included its worse performance on PCs than MAC, lack of features for collaboration and zooming;

- Positive comments about *GameSalad* included availability of good online tutorials and the way it replicates structures of game development and computer programming;

- Participants experienced in game design found *GameSalad* suitable to learn about game development.

Two main themes were identified in the transcripts of the interviews on game development, which are the use of *GameSalad* and its features.

Use of GameSalad: four groups proposed suggestions to improve the use of *GameSalad* during Game Jams. Group G1 suggested inviting an expert on *GameSalad* during Day 2

to answer participants' questions while G2 and G3 suggested making the online tutorial on *GameSalad* mandatory for participation to avoid that participants spend time looking for information on how to use the engine during Day 2. Lastly, G4 recommended ensuring that each group has someone with technical skills to deal with questions regarding the development during Day 2.

Features of GameSalad: G2 mentioned that *GameSalad* was better on MAC than PC and that *GameSalad* had glitches, G3 expressed that *GameSalad* was not collaborative enough and that it did not allow to zoom on the scenes and G4 also mentioned that *GameSalad* does not allow people to work collaboratively on the same scene. In addition, the five groups mentioned that it was easy to find online tutorials that helped them using *GameSalad* during Day 2. Additionally, three participants, A-G1-P1, A-G2-P11, B-G4-P18, who had experience in game development mentioned that *GameSalad* was suitable to learn game development as the features of *GameSalad* are similar to the *Unity* engine and programming languages used for game development. This was also mentioned by a participant, B-G3-P12, who did not have experience developing games, who said "It was interesting to see the technical logic of games and see how this is how this happens. Programming is not something that is interesting to me but understanding how games are created is relevant for me and I think for this *GameSalad* was useful for that."

5.6.3   Observation Notes

Summary

- During 'Stage 2: Familiarisation with game engine', all participants finished a test game;

- The majority of participants each developed a game scene using *GameSalad* during Day 2 while the others developed art assets;

- All participants who used *GameSalad* accessed online tutorials and the manual provided during Day 2;

- Three groups reported difficulties merging their individually created scenes into a game.

Regarding 'Stage 2: Familiarisation with game engine', it was reported that in both Game Jams all participants completed a test game by the end of the tutorial, also, that the participants who completed a tutorial's task tended to help those who had issues. Regarding limitations and potential of *GameSalad*, during Game Jam A, participant A-G1-P3, asked two questions on how to access help on *GameSalad*, which led the researcher to re-introduce the manual and to point at forums on the *GameSalad* website where participants could find information and ask questions. Participant A-G1-P1 expressed that one of the limitations was that *GameSalad* does not permit the creation of a 3D game. During Game Jam B, two participants, B-G3-P11 and B-G4-P15, asked if it was possible to create a multiplayer game, which the researcher answered saying that it was not possible. Another participant, B-G4-P17, talked about the potential of *GameSalad* mentioning that the rules and variables seemed to provide many possibilities for developing games. Lastly, one participant, B-G3-P12, highlighted that the text features of *GameSalad* enabled the integration of textual information in games. The participants of Game Jam B collaboratively read the provided examples of games developed with *GameSalad* and again the document with the art assets provided at the end of this stage before going to

lunch.

In 'Stage 8: Development and iterative evaluation' the coaches reported that all participants but A-G1-P4 and B-G5-P22 individually developed a scene in *GameSalad*. These two participants worked on art assets while the other groups used some of the art resources provided. Only one question was asked to the coach assigned to B-G3, who recommended using the manual, online tutorials or the *GameSalad* forums to find the solution. Instead, questions were asked to other participants, searching online and/or using the manual provided. All participants who used *GameSalad* during this day accessed the manual provided as well as online tutorials. The groups A-G2, B-G3 and B-G4 reported issues related to merging their scenes at the end of the day and A-G2-P6 reported issues on *GameSalad* expressing that the version on MAC was better than the PC version. Lastly, it was also reported that none of the cards was accessed during Day 2 and that all groups requested their paper prototype and the Yin and Yang template at the beginning of Day 2, which led four groups, A-G1, B-G3, B-G4 and B-G5, to stick them to the wall.

5.6.4 Implications

This section presented results on the support provided to participants in acquiring game development skills during the Game Jams. The participants' perceptions of learning about game development using *GameSalad* suggested that this engine was suitable to be used with participants who have different levels of experience with computer programming, game design and/or *GameSalad*. Recommendations and impressions about *GameSalad* were captured to present insights on game engine features and activities that could be relevant to democratise game development during Game Jams.

The results evidenced that all the participants who used *GameSalad* during the Game Jams reported satisfactory (i.e 'Some' or above) levels of learning about game development with *GameSalad*. All participants managed to develop a test game during the tutorial and

developed one game scene with *GameSalad*. They also managed to solve their questions using the material provided or other participants, except for the two participants who decided to create art assets instead of using this engine. These results suggest that the tutorial and the use of *GameSalad* are suitable to democratise game development during Game Jams. These results also indicated that supporting participants to develop game scenes individually enabled them to acquire game development skills during the second day of the Game Jams.

Despite a few drawbacks, *GameSalad* was considered easy to use, compatible with computer programming structures and the logic of computer programming and game development. These aspects could guide choices on game engines suitable to democratise game development during Game Jams.

Lastly, concerning recommendations to improve the use of *GameSalad* during Game Jams, the first two recommendations are based on inviting and relying on people with specific expertise, which was presented as a barrier to the democratisation of educational games (see *Section 1*). Regarding requiring participants to learn how to use *GameSalad* before attending the Game Jams, this research acknowledges the benefit of saving time during the Game Jam, but that also creates a barrier to participation and, assuming that not all participants would learn how to use *GameSalad* to the same extent, could also create disparities in participation.

5.7   Democratising Educational Game Design on Social Issues

This section presents the results related to the framework based on the data collected using questionnaires, group interviews, observation notes and the artefacts created during the Game Jams. Additionally, to explore the process of creation of artefacts throughout

the Game Jams, two examples that present the created stories, branching stories and prototypes are provided.

5.7.1   Questionnaires

The proposed framework is first evaluated through the data gathered from questionnaires about the logistics, support provided to the participants, their expectation, satisfaction, capacity toward designing educational games as well as their levels of motivation and confidence throughout the Game Jams.

5.7.1.1   Logistics

Summary

- The majority of the participants of Game Jam A suggested swapping two stages of the framework, placing 'Discussions on educational game design' before 'Defining a game idea';
- This change was implemented for Game Jam B and the order of the stages was validated;
- The timing of the activities was considered adequate;
- Providing verbal instructions for the time allocated at the beginning of each activity was recommended to improve timing.

This section presents the alteration on the framework proposed for Game Jam B, which is the only modification that was implemented between Game Jam A and Game Jam B. In Game Jam A, five participants (all the participants from A-G2 and A-G1-P3) mentioned in 'Questionnaire 2' that the order of the stages should be changed, placing the stage 'Discussion on educational game design' before the stage 'Definition of a game idea'.

This was taken into account for Game Jam B and the change was implemented, as illus-

trated in *Figure 5.12*). Following this, 14 participants out of 15 who participated in Game Jam B, expressed that the order of the activities should not be changed in 'Questionnaire 2'. These results imply that participants considered it relevant to explore the educational topic, game development and educational game design before starting to feel that they were conceptualising their games. The participant who mentioned that the order should be changed, B-G1-P12, suggested having the 'Familiarisation with game engine' stage before the 'Discussion on educational topic'.
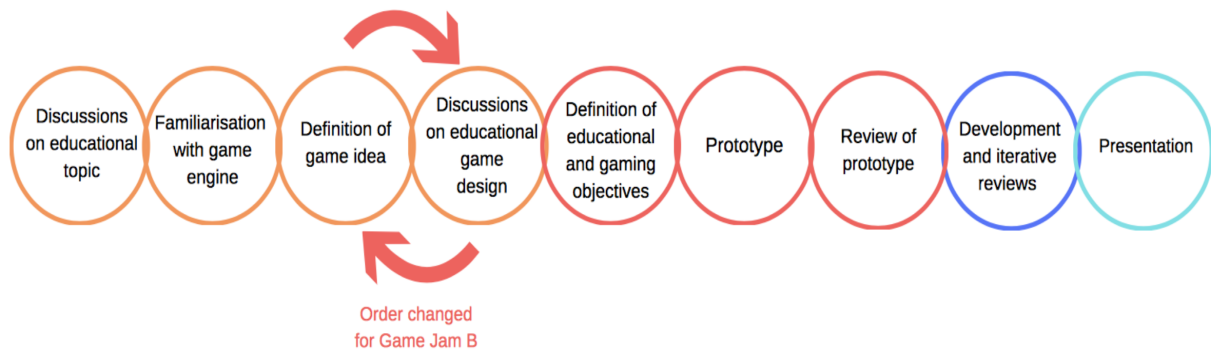
Figure 5.12: *Alteration on the order of two stages of the framework for Game Jam B*

Moving on to the timing of the activities, in 'Questionnaire 2', the participants were asked about the adequacy of the timing of the stages conducted during Day 1. The responses per participant are shown in *Table 5.11*.

Adequacy of timing	Frequency	Participant
1 (Not at all)	0	
2 (A little)	0	
3 (Reasonably)	7	P5 - P8 - P9 - P12 - P13 - P15 - P19
4 (Very)	5	P10 - P14 - P17 - P20 - P23
5 (Extremely)	11	P1 - P2 - P3 - P4 - P6 - P7 - P11 - P16 - P18 - P21 - P22

Table 5.11: *Responses per participant on the adequacy of the timing of the stages*

A following open-ended question aimed at collecting additional insights was responded by 13 participants. To illustrate this, one response per group on the timing of the stages are presented next:

– A-G1-P1: "It was well structured and had plenty of time to do all of the exercises. In fact, as we finished early in one of them."

– A-G2-P8: "Mostly, we did have somewhat sufficient time for most activities"

– B-G3-P14: "The timing was pretty good with the occasional step overs, which are unavoidable since you have to let finish talking but in general good timing management."

– B-G4-P17: "They allowed enough time to complete what was needed but were short enough to keep people focused."

– B-G5-P19: "Enough to plan a game."

Other comments in the questionnaire included A-G1-P3 and A-G1-P2 saying that their group finished earlier and A-G2-P5 expressing needing verbal indications on the time allowed for each stage at the beginning of each activity. In addition, one participant, B-G3-P13, said that it was hard to stay focused for long periods of time and B-G3-P12 said that switching from one activity to another felt sometimes overloading. Lastly, participants A-G1-P4, A-G2-P6 and B-G4-P16 described the timing of the activities as appropriate. These results suggest that the timing of the activities of Day 1 was considered appropriate by most of the participants.

5.7.1.2   Support

Summary

- The demand for guidance and support to design educational games on social issue was evidenced;

- A small proportion of participants reported the need for additional support on *GameSalad*;

- Only one participant disagreed that all the activities and resources provided were necessary to help groups design educational games on everyday sexism;

- The relevance of including stages targeted at learning on everyday sexism and educational game design to democratise educational game design on social issues was validated;

- The majority of the participants felt that they contributed to group discussions in balanced ways.

The participants were asked in 'Questionnaire 1' how much guidance and support they thought they would need to design an educational game on everyday sexism. *Table 5.12* presents the results to this question per participant.

Needed guidance and support	Frequency	Participant
1 (None)	1	P21
2 (A little)	1	P4
3 (Some)	11	P1 - P3 - P11 - P12 - P13 - P16 - P17 - P19 - P20 - P22 - P23
4 (Quite a bit)	6	P5 - P6 - P10 - P14 - P15 - P18
5 (A lot)	4	P2- P7 - P8 - P9

Table 5.12: *Level of guidance and support participants would need to design an educational game on everyday sexism per participant*

The participants who reported needing 1 (None) and 2 (A little) support are participants who also reported previous experience with game design. The other 21 participants reported needing 3 (Some), 4 (Quite a bit) or 5 (A lot) support to design educational games

on everyday sexism. All together, these responses highlight the demand to provide support during Game Jams that intend to democratise educational game design on a social issue, especially to participants who do not have prior experience designing games.

At the end of Day 2, participants were asked in 'Questionnaire 4' if they would have needed additional support during the Game Jam. The responses showed that 4 participants, A-G1-P2, A-G1-P3, A-G2-P7 and B-G2-P18, answered Yes and pointed to support to *GameSalad* as justifications. The participants were also asked in 'Questionnaire 4' if all the activities and resources used were necessary to help them design an educational game on everyday sexism. Only one participant, B-G4-P16 answered No to this question with the following justification "I thought the educational game design cards added some value but were not necessary". Two other comments by A-G1-P3 who wrote "This is a very different form of Game Jam. I enjoyed the guides and the general support" and A-G1-P4 saying that "The structure of the Game Jam was great and our game is really cool".

The participants were then asked how important it was to learn about everyday sexism and educational game design to create their prototype in 'Questionnaire 2'. The responses per participant are presented in following *Table 5.13*.

	Frequency of responses on the importance to learn about everyday sexism to create their prototype	Frequency of responses on the importance to learn about educational game design to create prototype
1 (Not at all)	0	0
2 (A little)	0	2
3 (Reasonably)	5	5
4 (Very)	8	11
5 (Extremely)	10	5

Table 5.13: *Reported importance to learn about everyday sexism and educational game design*

Learning about everyday sexism was considered from 3 (Reasonably) to 5 (Extremely) important to create prototypes. Regarding educational game design, two participants expressed that it was 2 (A little) important to learn about educational game design to create

their prototype while the other participants gave responses ranking from 3 (Reasonably) to 5 (Extremely) important. The mode for each question was found on participants reporting that it was 5 (Extremely) important to learn about everyday sexism to create a prototype and on participants saying that it was 4 (Very) important to learn about educational game design to create a prototype. These results suggest that participants found important to learn about these topics as part of a framework to create their prototypes.

Lastly, the participants were asked in 'Questionnaire 3' how balanced were the contributions to discussions within their groups during Day 1. The results in *Table 5.14* illustrate that two participants from two groups expressed that the contributions were moderately balanced while the other 21 participants either reported that the contributions of the participants in their group were either 4 (Very balanced) or 5 (Strongly balanced). This table shows that the contributions of the participants were in majority perceived as being balanced within their groups.

Perceptions on balanced contributions	Frequency	Participant
1 (Not at all balanced)	0	
2 (Slightly balanced)	0	
3 (Moderately balanced)	2	P8 - P22
4 (Very balanced)	12	P5 - P6 - P9 - P10- P12 - P14 - P15 - P16 - P17 - P18 - P20 - P23
5 (Strongly balanced)	9	P1 - P2 - P3 - P4- P7- P11 - P13 - P19 - P21

Table 5.14: *Perceptions on balanced contributions per groups during Day 1*

5.7.1.3 Expectations

Summary

- The main expectation reported to take part in this Game Jam was to learn how to design educational games;
- The most frequent motivations to participate in the Game Jam were, in order, to learn about educational game design, to have fun and to design an effective educational game;
- Unexpectedly, only a small proportion of the participants referred to learning about everyday sexism as a motivation to participate in the Game Jam.

Regarding expectations, the participants were asked in 'Questionnaire 1' on their main expectations for the Game Jam and a list with potential responses was provided, which also included an 'other' option to enter additional text. The responses to this question are presented in *Table 5.15*.

Main expectation	Frequency	Participant
To learn how to design an educational game	15	P1-P2-P3-P5-P7-P8-P9-P10-P14-P18-P19-P20-P21-P22-P23
To experiment how to design an educational game	4	P11-P12-P15-P17
To have a game prototype by the end of the Game Jam	3	P4-P6-P13
To have fun	1	P16

Table 5.15: *Main expectations for Game Jam per participant*

In this question, none of the participants chose neither of the following two options: 'To have a polished game by the end of the Game Jam', 'To have an effective educational game by the end of the Game Jam'. In total, 15 participants referred to learning how to design an educational game as the main expectation for participating in the Game Jam.

Also in 'Questionnaire 1', participants were asked what were their motivations to participate in the Game Jam. They could choose as many options from a list as they wanted

and also had an 'Other' option where they could enter text. *Table 5.16*, introduced below, presents their responses.

Response	Frequency
Learn about educational game design	22
To have fun	17
To create an effective educational game	16
To create social change	15
You were curious	13
To contribute to scientific research	11
Learn how to use GameSalad	8
To get free food	7
Learn about everyday sexism	6
To meet people	6
To receive a certificate	6
For the networking opportunities	5
For your CV	4
Other	Game writing experience
Other	To meet and talk to other like-minded people
Total of responses	**139**

Table 5.16: *Motivations to participate in Game Jam*

In total 22 of the 23 participants selected the option 'Learn about educational game design' as one of the motivations to participate in the Game Jam, which is aligned with their expectations to participate. The results on the motivations to participate also present additional data on the role of fun in Game Jams, which was selected by 17 of the participants. In addition, creating an effective educational game was a motivation to participate selected by 16 participants, but not selected as an expectation of the Game Jam by any of the participants. This suggests that these participants were motivated by the idea of creating an effective educational game but were not necessarily expecting to have one created by the end of the Game Jam. Lastly, learning about everyday sexism was selected by six participants only, which can be considered low given that the Game Jams were framed around engagement with this topic.

5.7.1.4 Challenges

Summary

- The development of the game was the main expected challenge;

- Using *GameSalad* and time management were the actual challenges faced during the Game Jam;

- The participants who reported that time management was a challenge also reported that the timing of Day 1 was adequate, suggesting that time management became a concern during the second day of the Game Jam.

The participants were asked in 'Questionnaire 1' to select three expected challenges to designing educational games on everyday sexism during the Game Jam. *Table 5.17* illustrates the responses to this question.

Response	Frequency
Developing a game with *GameSalad*	16
Finishing the Game Jam with a game	14
Learning about educational game design because you don't know much about it	9
Understanding more about how to design effective educational games	8
Learning about everyday sexism because you don't know much about it	5
Staying the whole weekend because you get tired regularly	5
Learning about everyday sexism because you don't have much interest in this topic	3
Feeling comfortable working with people you don't know	2
Staying the whole weekend because you might get bored	2
Other: - None - Working in groups - Staying the whole weekend because I do not have much time for myself during the week	3
Total of responses	**67**

Table 5.17: *Responses on expected challenges during Game Jam*

Developing a game using *GameSalad* was a challenge expected by 16 participants. Following this, 14 participants selected finishing the Game Jam with a game as a challenge. All the participants who selected this option also selected 'Developing a game with *GameSalad*', which suggests that the development of the game using *GameSalad* was perceived as one of the main challenges to finish the Game Jam with a game.

To explore the challenges actually faced, at the end of the Game Jam, in 'Questionnaire 4', the participants were asked in an open-ended question, what was the main challenge they faced during the Game Jam. Their answers were classified and are presented in following *Table 5.18*.

Challenge	Frequency	Participant
Using GameSalad	9	P2-P3-P6-P8-P9-P12-P13-P17-P18
Time Management	5	P1-P7-P10-P16-P21
Define the main game concept	2	P4-P19
Work in groups	2	P15-P22
Other: - Being over-ambitious and not simplifying things - Nothing - No challenge faced! -As a perfectionist, it is always difficult for me to be happy with anything I do so accepting that we crea something that is not bad is still a little difficult to acc -The complexity of sexism.	5	P5 - P11 - P20 - P14 - P23

Table 5.18: *Responses on the main challenge during Game Jam per participant*

In total nine participants reported that using *GameSalad* was the main challenge faced during the Game Jam and five participants referred to managing time as a challenge. As previously introduced in *Section 5.7.1.1*, these five participants (i.e. P1-P7-P10-P16-P21) reported that the timing of the activities of Day 1 were 5 (Extremely) adequate, with the exception of P10 who mentioned that the timing was 4 (Very) adequate. This suggests that time management was perceived as a challenge during Day 2.

5.7.1.5 Satisfaction

Summary

- The majority of the participants felt satisfied with the prototypes and games they created;

- Divergent perceptions on the most fruitful activity of the Game Jam were found, with the most reported response being to learn how to develop a game with *GameSalad*;

- The majority of participants would highly recommend participating in the Game Jam;

- Participants would most recommend to participate to the Game Jam to learn about educational game design, to learn about sexism and to take part of a fun or enjoyable experience;

- Pieces of advice that participants would give to future participants included getting familiar with *GameSalad* before the Game Jam, starting with simple ideas and being conscious of time.

This section starts by exploring the participants' satisfaction toward the prototype and games that they created during the Game Jams. The participants were asked in 'Questionnaire 3' how satisfied they felt with their prototype and in 'Questionnaire 4' with their games. The Likert scale ranged from 1 (Not at all) to 5 (Extremely) and the responses are illustrated in *Figure 5.13*.

This figure shows that 11 participants reported the same level of satisfaction with their prototypes than with their games. Regarding the other participants, six of them reported lower levels of satisfaction with their prototypes than with their games and this was the opposite for the remaining six participants. Lastly, the lowest level of satisfaction reported was 3 (Moderately), which suggests that none of the participants felt 1 (Not
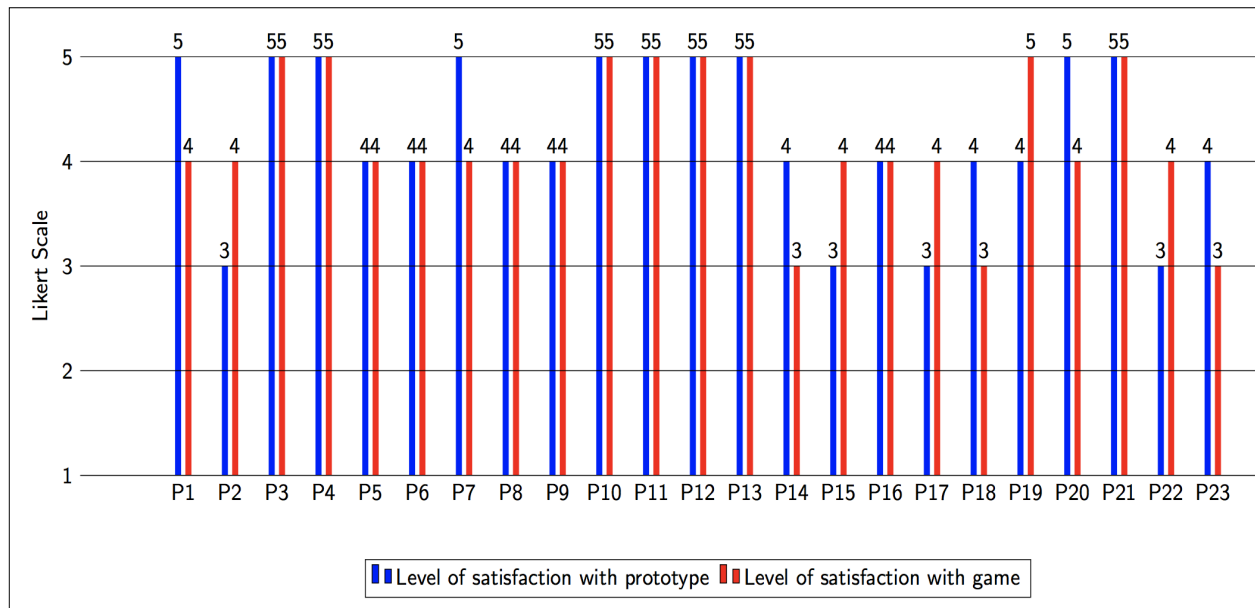
Figure 5.13: *Level of satisfaction with prototype and game per participant*

satisfied at all) or 2 (Slightly satisfied) with either their prototype or game. These results illustrate that participants felt, at minimum 3 (Moderately) satisfied with their prototype and games.

Both questions were followed by an open-ended question asking them why, which was answered by eight participants on their reported level of satisfaction with their prototype. Three participants, P3, P14, P16, wrote positive impressions on their prototype, which is exemplified by P3 who wrote: "The concept and idea is great, simple and effective". Two of them, P9 and P11 mentioned that their games had potential for social change or raise awareness about gender issues, for instance, P9 said: "It has everything to raise awareness about gender issues". Concerning other participants P8 wrote "Not enough details" and P15 "Never want to be satisfied, there's always room for improvement". Lastly, P18 wrote "Great research behind it and short stories".

Moving on to the satisfaction of the participants, they were first asked in 'Questionnaire 4' in an open-ended question what was the most fruitful activity of the Game Jam. In total 19 participants answered this question and their responses are presented in following

Table 5.19.

Most fruitful activity of Game Jam	Frequency	Participant
Learning about game development with *GameSalad*	5	P2 -P3 - P5 - P8 - P14
Meeting people	3	P4 - P10 - P17
Interacting with their group	3	P12 - P17 - P18
Learning to design an educational game	2	P6 - P14
Other: - Everything - Creating the story of the game - The educational game design cards - Writing about sexism - Creating animations - Discussions with everyday sexism cards	6	P1 - P7 - P9 - P21 - P22 - P23

Table 5.19: *Most fruitful activity reported per participant*

The most reported activity was to learn about game development using *GameSalad*, which was expressed by five participants. The participants were also asked in 'Questionnaire 4' how much they would recommend participating in the Game Jam to other people. The responses per participant are presented in *Table 5.20.* .

Recommendation on participating in Game Jam	Frequency	Participant
1 (Not at all)	0	
2 (A little)	0	
3 (Reasonably)	2	P13 - P22
4 (Very)	7	P5 - P7 - P14 - P17 - P18 - P19 - P23
5 (Extremely)	14	P1 - P2 - P3 - P4 - P6 - P8 - P9 - P10 - P11 - P12 - P15 - P16 - P20 - P21

Table 5.20: *Responses per participant on how much they would recommend other people to participate in Game Jam*

As described, 21 participants would either recommend participating in the Game Jam 4 (Very much) or 5 (Strongly). Overall, this implies that the participants perceived the Game Jam as an experience that they would tend to recommend to other people. This question was followed by an open-ended question asking them why, which was answered by 17 participants, as presented in the following table.

Justifications on level of which participants would recommend Game Jam	Frequency	Participant
General positive comments such as "worth it", "amazing" or "great experience"	5	P2 -P3 - P5 - P8 - P14
Recommend to learn about educational game design	3	P4 - P10 - P17
Recommend to learn about sexism	3	P12 - P17 - P18
Game Jam described as fun or enjoyable experience	2	P6 - P14
Game Jam described as positive experience to learn (without additional specifications)	6	P1 - P7 - P9 - P21 - P22 - P23
Other: - "Because even if you are not used to it, you can achieve great things." - "It is a great experience and a safe space to learn something complicated." - "Some aspects are more suited to people who have photoshop skills or prior gaming knowledge." - It's a new experience that brings no harm, only new ideas and ways to express them." - "I think this Game Jam sums up the topic of sexism really neatly and nicely. Anybody would feel part of a supportive and empowering experience; especially for people who are not involved in the feminist community. It's a great event to bring people together and gain knowledge."	5	P2 - P3 - P13 - P17 - P23

Table 5.21: *Justifications on level of which a participant would recommend Game Jam*

This table illustrates that the participants who would recommend this Game Jam 3 (Moderately) reported that some of the aspects of the Game Jam were more suited for people who had photoshop skills or prior gaming knowledge (P13) and that the Game Jam was fun (P22). This table also shows that in total nine participants described the Game Jam as a valuable experience to learn, either about educational game design (three participants), about sexism (three participants) or without giving additional specifications on what people could learn during the Game Jam (three participants).

Following this, 'Questionnaire 4' included an open-ended question on what piece of advice participants would give to people who would attend the same Game Jam in the future. In total 17 participants answered this question and seven of them mentioned that future participants should either read the manuals on *GameSalad*, follow the suggested tutorial in advance to the Game Jam or get more familiar with *GameSalad* before attending the

Game Jam. Another three comments recommended to start with simple ideas and two comments were targeted at being conscious of time during Day 2. The other responses were general comments about the Game Jam such as 'Creating your own game is an opportunity for you to have a voice in telling a story that you want to tell." (A-G2-P4) and "Just give it a try. Don't give up because something doesn't work straight away" (B-G4-P14).

5.7.1.6 Capacity

Summary

- The majority of the participants reported high levels of capacity toward designing other educational games on social issues by the end of the Game Jams;
- Only one participant responded that she was not feeling capable of designing another educational game on a social issue with the knowledge acquired during the Game Jam and justified her response by reporting that she did not feel she has the adequate skills on *GameSalad*;
- The majority of the participants reported that it was likely for them to design another educational game on a social issue in the future.

The participants were asked in 'Questionnaire 4' how capable they felt toward designing another educational game on social issues. The responses per participant are presented in the table below.

This table shows that the participants' responses ranged from feeling 3 (Reasonably capable) to 5 (Extremely capable) toward designing another educational game on social issues. This question was followed by asking the participants in 'Questionnaire 4', if with the knowledge they acquired during the Game Jam they felt they could design another educational game on social issues in the future. The only participant who responded No to the last question is B-G3-P13 and gave the following justification "As someone with

Capacity toward designing another educational game on social issues	Frequency	Participant
1 (Not capable at all)	0	
2 (A little capable)	0	
3 (Reasonably capable)	7	P4-P8-P13-P14-P18-P21-P22
4 (Very capable)	9	P3-P6-P9-P10-P15-P16-P17-P19-P23
5 (Extremely capable)	7	P1-P2-P5-P7-P11-P12-P20

Table 5.22: *Response per participant on how capable they felt to design another educational game on social issues*

no prior gaming experience I don't feel I have the adequate skills to design a game on *GameSalad"*. These results suggest that the majority of the participants felt capable of designing other educational games on social issues in the future by the end of the Game Jam.

Following this, the participants were asked how likely it is that they will design another educational game in the future. The responses to both questions are presented in the following tables.

Likelihood to design another educational game on a social issue	Frequency	Participant
1 (Extremely unlikely)	0	
2 (very unlikely)	0	
3 (Uncertain)	2	P4 - P16
4 (Very likely)	5	P8 - P9 - P18 - P19 - P22
5 (Extremely likely)	16	P1 - P2 - P3 - P5 - P6 - P7 - P10 - P11 - P12 - P13 - P14 - P15 - P17 - P20 - P21 - P23

Table 5.23: *Response per participant on how capable they felt to design another educational game on social issues*

These results illustrate that 21 participants reported that it was either 4 (Very likely) or 5 (Extremely likely) for them to design another educational game on a social issue, suggesting that the majority of the participants left the Game Jam with intentions to design other educational games on social issues.

5.7.1.7 Motivation

Summary

- The majority of the participants finished Day 1 with higher or equal levels of motivation than at the beginning of Day 1;

- At the end of Day 1, all participants reported a 'High' level of motivation;

- The participants' average level of motivation decreased after 'Stage 3' and 'Stage 7';

- About a third of the participants felt less motivated at the end of Day 2 than at the beginning of the Day 2;

- Challenges related to using *GameSalad* and tiredness were factors that decreased the participants' level of motivation during Day 2.

The participants' levels of motivation toward designing their games were collected throughout the Game Jams during seven interventions. The levels of motivation throughout Day 1 of the participant are illustrated in *Box Plot 5.14*, where 5 refers to 'Very high' and 1 to 'Very low' motivation.
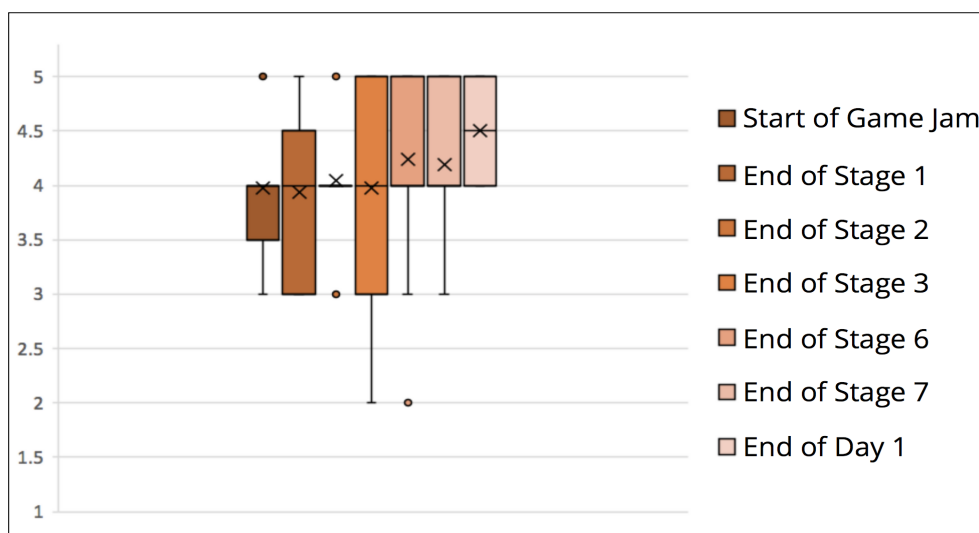
Figure 5.14: *Level of motivation throughout Game Jams during Day 1*

First of all, this Box Plot illustrates that, on average, participants finished Day 1 with

higher levels of motivation than at the beginning of the day. Analysing individual responses has shown that all participants expect from P2 and P7 finished Day 1 with higher or equal levels of motivation than at the beginning of Day 1. Lastly, by the end of Day 1, no participant reported a level of motivation that was less than 4, which suggests that all participants finished Day 1 feeling at least with a high level of motivation.

The Box Plot also suggests that the average level of motivation decreased after the stage on educational game design 'Stage 3: Discussions on educational game design' and after the stage on the 'Stage 7: Review of the prototype' in comparison to their previous activity. The group interviews transcripts (see *Section 5.6.2* and *Section 5.6.3*) and observation notes have illustrated that clarifications regarding the activities during these two stages were asked, which might explain this decrease of motivation.

Only one participant, B-G4-P14, added a comment on her responses which stated "I am motivated to learn how to do this, but I find it challenging since it seems so complex. A lot of people say making a game is difficult so it can be hard, but nonetheless, I am motivated".

Moving on to Day 2, the average level of motivation throughout the day increased slowly until 16:00 when they dropped by 0.5 points on average, they then went back up to reach the higher average level at the end of Day 2 (3.91), as illustrated in *Box Plot 5.15*.

In total, seven participants felt less motivated at the end of Day 2 than at the beginning of the day. Only three responses were found to the open-ended questions for comments on the fluctuations of motivation during Day 2, and were provided by participants who reported lower levels of motivation at the end of Day 2 than at the beginning of Day 2. Two of them, A-G1-P2 and B-G4-P14, reported that they were tired and that this impacted their motivation. The other participant, A-G1-P3 said that "The programming part could be tricky and that can bring motivation down. Maybe next time there is
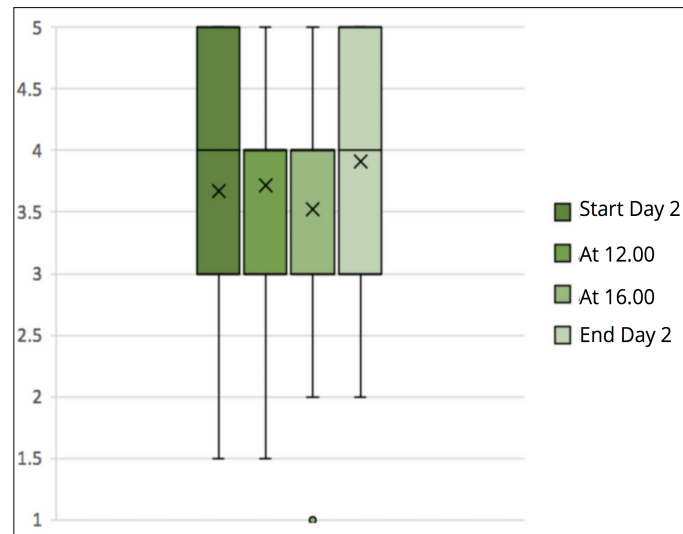
Figure 5.15: *Level of motivation throughout Game Jams during Day 1*

an expert, maybe someone from *GameSalad* to come and help." These results suggest that challenges related to *GameSalad* and tiredness could be factors that decrease the participants' level of motivation during Day 2.

5.7.1.8 Confidence

Summary

- The confidence levels of most participants increased by the end of Day 1 in comparison with the beginning of Day 1, except from three participants whose levels remained the same;

- About half of the participants (14 participants) reported higher levels of confidence at the end of Day 2 in comparison with the beginning of Day 2, while six others reported identical and three lower levels;

- The level of confidence of the participants during Day 2 was associated to the participants' abilities to translate their game prototype into a game using *GameSalad*.

The participants' levels of confidence toward designing educational games on everyday

sexism was collected throughout the Game Jams. The results found on the levels of confidence are shown in following *Box Plot 5.16.* for both days, where 1 corresponds to 'Not confident at all' and 5 to 'Very confident'.
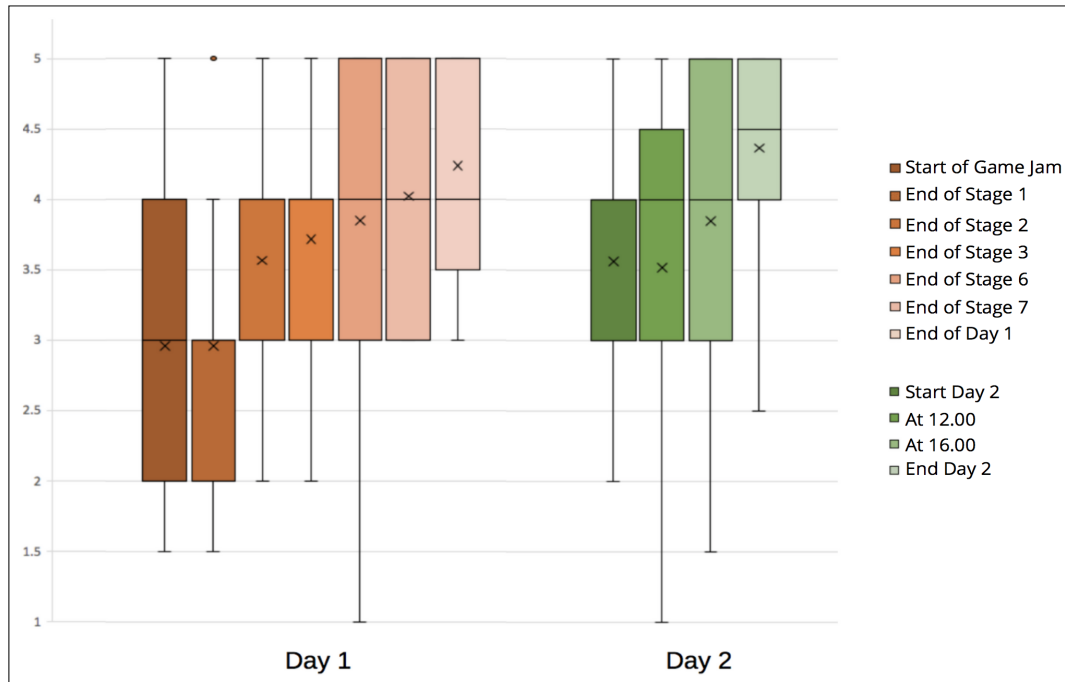
Figure 5.16: *Level of confidence throughout Game Jams*

The confidence levels of most participants increased by the end of Day 1 except for three participants, namely P4, P9 and P19, whose levels stayed the same. One of these three participants, P19 justified this by reporting the following: "Though my confidence was high and I was still very excited about the tasks, I had no energy and felt mentally drained. I think the day started too early." while the other participants did not provide additional insights on their levels of confidence in the follow-up question.

Moving to Day 2, the average level of confidence gradually increased after 12:00 to reach its highest average level of the Game Jam at the end of Day 2, in total 14 participants reported higher levels of confidence at the end of Day 2 in comparison to the beginning of Day 2 while six reported same levels and three lower levels. The confidence average level at the end of the *GameSalad* tutorial (Stage 2: Familiarisation with game engine) is

similar than at the start of Day 2, with the same average of 3.56 and with 18 participants reporting the same levels of confidence after these two stages. Given that the participants did not use *GameSalad* after 'Stage 2: Familiarisation with game engine' during Day 1, this similarity suggests that the level of confidence during Day 2 is assimilated to the participants' abilities to translate their game prototype into a game with *GameSalad*.

5.7.2 Group Interviews

During the group interviews, the reported levels of motivation and confidence were directly discussed with the groups, as well as their general impressions on the framework.

5.7.2.1 Motivation

Summary

- Consolidating ideas into a prototype at the end of Day 1 increased the motivation;

- The lack of clarity on the instructions of Stage 3 and Stage 7 contributed toward decreasing the motivation of four groups;

- Using *GameSalad* during Day 1 increased the levels of motivation of two groups;

- Not being able to merge the scenes of their games demotivated three groups during Day 2;

- Four groups mentioned that their levels of motivation decreased during Day 2 due to bugs or crashing issues on *GameSalad*.

The interviews transcripts collected on the participants' levels of motivation during the Game Jam were classified into three themes, namely the consolidation of game ideas, the lack of clarity of two stages and *GameSalad*.

Consolidation of game ideas: all groups mentioned that consolidating their ideas into a prototype at the end of Day 1 increased their levels of motivation during the Game Jam. This is exemplified by B-G3-P16 who said "It's great to have time to discuss and then to consolidate. The consolidation motivated me, I knew where we were going, it is a good process for game creation." and P23 who mentioned "I felt really down at some points we had endless conversations. And then we figured out a plan for our prototype and what to do and this took my motivation up and I felt great".

Lack of clarity of two stages: the interviews transcripts also suggested that four groups, G1, G3, G4 and G5, agreed that their motivation decreased at the beginning of two stages, namely the 'Stage 3: Discussions on educational game design' and 'Stage 7: Review of prototype', which was justified by a lack of clarity on the instructions provided for these two stages. The other group, G3, mentioned that their group felt less motivated because they were tired after lunch, which took place just before Stage 3, and after having created a prototype, which was placed before Stage 7.

GameSalad: two groups, namely G2 and G3, reported that learning how to use *GameSalad* was a factor that increased their levels of motivation during Day 1. This is illustrated by B-G2-P10 who said "It was quite rewarding to do the *GameSalad* thing today, it motivated me", B-G3-P16 "I loved *GameSalad* so I felt motivated" and B-G3-P17 "When we started working with the software my motivation went up - I was like yes I can do it. I kind of get this!". Moving on to day 2, an issue faced merging the scenes that each participant developed on their computer was directly mentioned by three groups, G2, G3 and G4, as a factor that decreases their motivation. Frustrations toward *GameSalad* were also expressed by four groups, G1, G2, G3 and G4, who mentioned that their motivation decreased when faced with bugs or crashing issues. One participant did not agree with his group, B-G2-P11, by saying "I have been working with games so I am used to the crashing etc. I didn't feel unmotivated, I am used to it. Any software crashes, Sometimes

you need to get back from scratch, imagine you lose everything".

5.7.2.2 Confidence

Summary

- Learning about everyday sexism, educational game design and *GameSalad* positively influenced the confidence of participants in three groups;
- The fluctuation on the participants' level of confidence during Day 2 was associated with the use of *GameSalad*.

Analysing the interview transcripts on the participants' levels of confidence toward designing an educational game on everyday sexism were categorised using two themes, namely the participants' learning and *GameSalad*.

Learning: Regarding the participants' learning and how they felt they influenced their levels of confidence, three groups, G1, G2 and G4, described their acquired knowledge about everyday sexism, educational game design and *GameSalad*, as factors that increased their confidence positively during Day 1. While the other participants of G1 and G2 agreed on that, one participant in G4 had different views. This is illustrated by B-G4-P15 who said "It was mostly about the knowledge. More knowledge I got, the more I felt more confident.", which was followed by B-G4-P18 responding that acquiring knowledge contributed toward making him understand how complex it was to design educational games, which impacted his confidence negatively.

GameSalad: During Day 2, all the comments collected on the fluctuations on the participants' levels of confidence referred to *GameSalad*. More precisely, four groups, G1, G2, G3 and G5, justified the fluctuations on their levels of confidence with the use of *GameSalad*. This is illustrated by A-G2-P6 who said, "When I was using *GameSalad*, it was fun and interesting and I could do what I needed, I felt confident.", A-G2-P6 who said

"We learnt from each other on *GameSalad* and this made me feel confident", B-G3-P9
expressed that "The more the day went on the more I felt confident with *GameSalad*,
it's just practice really." and B-G5-P23 who mentioned "My confidence decreased when I
was frustrated with *GameSalad* but by the end of the day I was super good at it so I felt
great".

5.7.2.3   General Impressions on the Framework

Summary

- As previously illustrated in *Section 5.7.1.1*, both groups who participated in
  Game Jam A mentioned that two stages should be swapped;
- The structure provided throughout the Game Jams was praised by three
  groups;
- Four groups mentioned feeling control over the creation of their games because
  they were not relying on external people to design their games.

The analysis of the interview transcripts about the framework revealed two themes, the
Order of the stages and *General impressions on the Game Jams:*.

Order of the stages: both groups of Game Jam A mentioned that the order of the frame-
work should be changed to place the stage 'Discussion on educational game design' before
the stage 'Definition of the game idea'. In both groups, all participants agreed on the
fact that they needed to discuss the topic of educational game design before being able
to discuss a game idea. In addition, two participants, A-G1-P3 and B-G4-P16 mentioned
that they appreciated having the tutorial on *GameSalad* early in the Game Jam, which
was illustrated by B-G4-P16 who said "I was wondering how we were going to get it to the
point where we have a game. The tutorial helped with this because we could understand
what is actually achievable quite early in the process."

General impressions on the Game Jams: in the interviews during Day 2, three of the five groups, G1, G2 and G5, mentioned enjoying the structure of the Game Jam and A-G2-P8 provided additional details with the following comment "I feel really accomplished and enjoyed the step structure of the Game Jam. We created an educational game on everyday sexism without relying on the help of other people who know about gender, education or games". The second aspect mentioned in this citation was echoed by three groups, G1, G3 and G4, who mentioned that they felt they were in control of their games because external people or experts were not involved in their group discussions, which is exemplified by B-G4-P17 who said: "I liked the independence of this Game Jam, it was only us and we created a game without people helping us". Lastly, two participants expressed additional views, which are presented here:

– B-G3-P11: "I think for me it's what made this Game Jam interesting, that it was opened to anyone, people who had never designed games at all. And then you learn about other things from other people and you see connections with games and this is why I came here and not to another Game Jam."

– B-G3-P9 "I joined this Game Jam because of the educational side of it. I have been to other Game Jams where I had no experience, in these Game Jam I just say I'll do whatever you want me to do to the game developers. But I enjoyed this more, I learnt more, I felt empowered to participate in creating a game this time and enjoyed it more, especially when we defined the structure of our game to reach our educational objectives."

5.7.3   Observation Notes

Summary

- All groups managed to finish all the activities of Day 1 on time, with the exception of Stage 3 which needed an extra 15 minutes;
- All groups of Game Jam B were interrupted at the end of Stage 4 to move on to Stage 5.

In 'Stage 1: 'Discussions on educational topic', the observation notes reported that most groups finished on time, with the exception of A-G1 who finished five minutes earlier.

Regarding 'Stage 2: Familiarisation with game engine', it was reported that the timing of this stage for both Game Jams enabled the completion of the tutorial with 10 minutes of discussions on the potential and limitations of *GameSalad* at Game Jam A and 15 minutes at Game Jam B.

The observation notes of the stage 'Stage 3: Discussions on educational game design' reported that four groups requested additional time to discuss the cards, more precisely groups A-G1, B-G3 and B-G4 expressed needing an additional 10 minutes and B-G5 expressed needing an additional 20 minutes. Extra 15 minutes were added to this stage at both Game Jams, allowing all groups to conclude the activity. All groups managed to finish the other stages' activities on time and tall participants were present to the venue on Day 2 by 9:30am, which suggests that the last participant to arrive was 30 minutes late.

Regarding the stage 'Stage 4: Definition of a game idea', in Game Jam A both groups reported issues in coming up with a game idea at this point. In Game Jam B the order of two stages were changed, as illustrated in *Section 5.7.1.1*, and the three groups who participated in this Game Jam could discuss game ideas without reporting any issues.

These three groups were, however, interrupted to move on to Stage 5 and they were told that they will have time to discuss their game ideas during the prototype stage.

The Game Jams were concluded by each group presenting their games in 'Stage 9: Presentation' and the coaches provided observation notes stating that each of the group presented their games in 5 to 10 minutes and that each participant presented the scene or art resources they developed.

5.7.4   Artefacts Created

Summary

- In total 5 stories, 5 prototypes and 5 games were created;
- All the groups used the story created during the first stage to create their prototypes and games;
- The use of the everyday sexism and educational game design cards chosen is evident in all of the stories, prototypes and games created by the groups as some information presented on the cards are clearly identified in these artefacts.

The prototypes and games created by A-G1 and B-G5 are examples that best illustrate the elements of the cards consistently used along the design process and will be presented as examples in this section.

5.7.4.1   Example 1

This section presents the story, prototype and game designed during the first Game Jam by the group A-G1. The story created will be presented first before illustrating the prototype and game created.
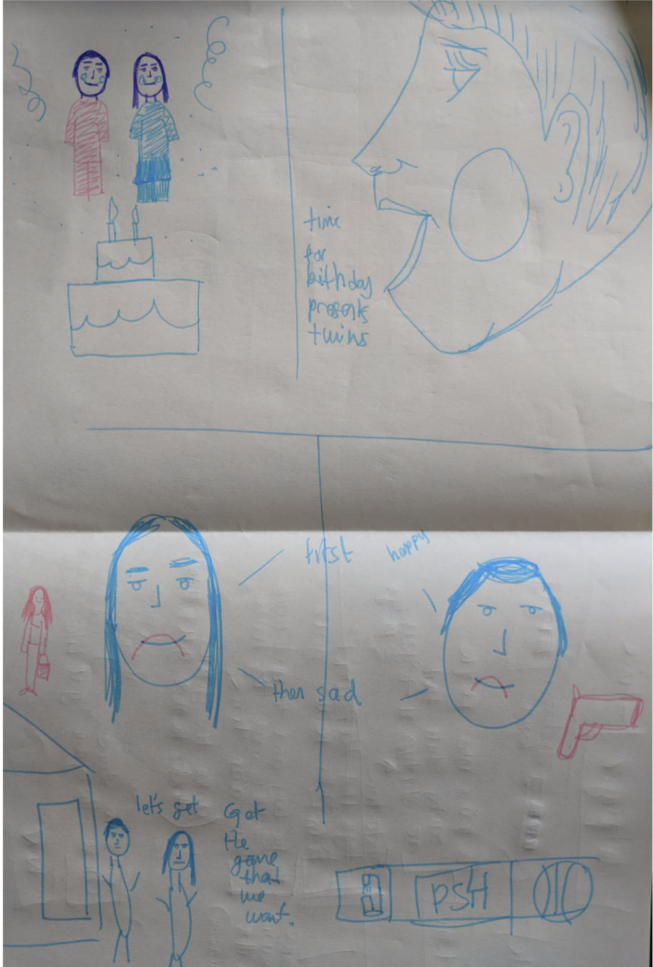
Story

Description	Story
The story created by A-G1 illustrates two twins, one boy and one girl, who each receive a stereotyped present for their birthday. The story then describes the two twins being sad because they did not like the present. The intervention proposed to this story is illustrated as the twins going to the store to choose a present that would make them happy. This story aimed at raising awareness about gender-based toys.	

Table 5.24: *Story created by A-G1*

Prototype and Game

For evidencing the evolution of the stories into the prototype and then into the game, in the tables below the prototype artefacts are presented together with the game outcomes.

Description	Prototype	Game
The first scene introduces the game that is titled 'Blue or Pink'.		
The next scene illustrates the birthday of the twins. They are happy at first and then discover their presents, which makes them sad. At the end of this scene, the twins have the option to go to the toy store.		
In the next scene, the players are assigned the appearance of their characters.		

Table 5.25: *Prototype and game created by A-G1 - Part I*
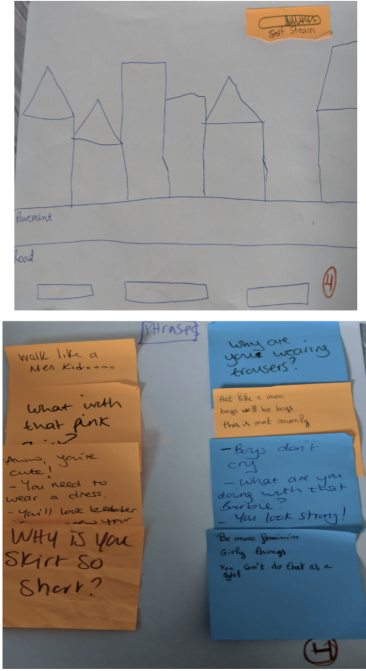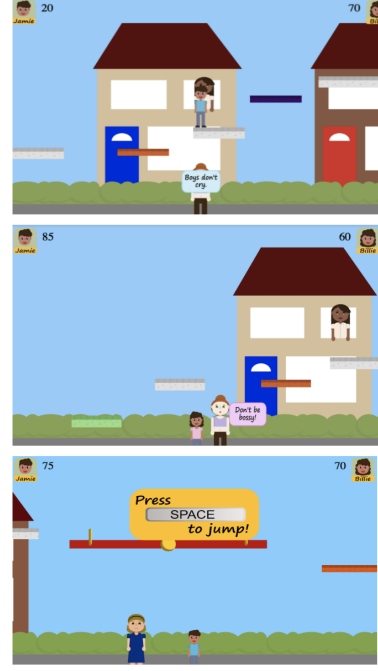
Description	Prototype	Game
The game then turns into a platform-type game where the characters need to avoid people throwing stereotyped sentences at them. When the characters come in contact with these sentences, the player loses self-esteem points.		
The last scene illustrates the characters at the toy store and they can choose the toy they want based on how many self-esteem points they have after the platform game. The group did not manage to finish this scene in their game.		

Table 5.26: *Prototype and game created by A-G1 - Part II*

Use of everyday sexism cards

The cards chosen by A-G1 to create this story were 'Gender Stereotypes' and 'Sexist Language'. As *Figure 5.17* illustrates, on the 'Gender Stereotypes' cards, issues related to gender-based toys are presented. The 'Sexist Language' card presents examples of certain

adjectives and words that are used to address women and children. The information that was identified directly in the story, prototype and/or game is highlighted in red in the following figure.

Figure 5.17: *Everyday sexism cards chosen by A-G1*

First, the topic of gendered toys was directly illustrated in the 'Gender stereotypes' card, both in the illustration and in the keywords. Second, in the prototype the following two sentences could be found "You look strong" and "Aww you're cute", which can be directly connected to the illustration of the 'Gender stereotypes' card. Third, in the 'Sexist language' card the word "bossy" is presented and was used in the game in one of the sentences ("Don't be bossy") thrown at the female character. Lastly, in the game developed sentences such as "This is not manly" and "Girl things" were found and are connected to the third story presented on the 'Sexist language' card, which describes a story about a man liking 'feminine' things.

Use of educational game design cards

Group A-G1 chose a total of 3 educational game design cards, namely 'Identity (1)', 'Information (8)', and 'Skills as strategy (11)'.

The 'Identity' card was implemented by providing a function that allocates randomly the appearances of the characters and by requiring players to play both the female and male versions of the character. This was facilitated with the intention to enable players to explore different identities and to experience the issue of gendered toys from different gender perspectives throughout their game.

The 'Information' card was used to present educational content in the game, which took the form of stereotyped sentences. The game also provides hints messages for players, for instance on how to avoid the stereotypes sentences and how to switch characters. The 'Skills as Strategy' card was used by inviting players to avoid gender stereotyped sentences as a strategy not to lose self-esteem points and to be able to choose a present in the last scene of the game.

5.7.4.2   Example 2

This section presents the story, prototype and game designed during the second Game Jam by the group B-G5. The story created will be presented first before illustrating the prototype and game created.

Story

Description	Story
The story created by B-G5 illustrates a professional environment where an individual whose gender is hidden has a female supervisor who says "come to me when you have questions". The individual ends up asking a question to someone who is introduced as a "random person". This story aims at raising awareness about the challenges that people face in the workforce due to gender discrimination.	

Table 5.27: *Story created by B-G5*

For evidencing the evolution of the stories into the prototype and then into the game, in the tables below the prototype artefacts are presented together with the game outcomes. The story created by B-G5 was expanded as the group decided to create different scenarios where issues of gender discrimination in working environments are explored. The character's gender is altered throughout the game and in some scenes the gender of the character is hidden. This was also illustrated in the story created as the character' gender was not revealed (i.e. see dashed lines used to draw the character).

Prototype and Game:
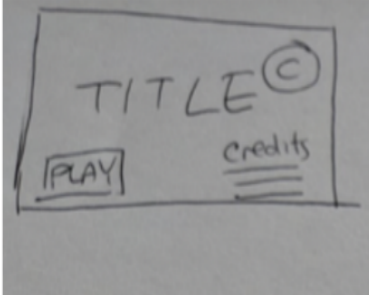
Description	Prototype	Game
The opening scene presents the title of the game and invites people to start playing.		
The next scene illustrates a scenario where a male protagonist is given the option to open the door for his female colleague. The players are then asked why they have decided to open or not open the door.		

Table 5.28: *Prototype and game created by B-G5 - Part I*
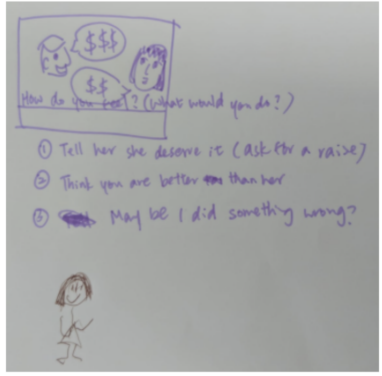
Description	Prototype	Game
The third scene illustrates a socialising event where the players do not know if they are playing a male or female protagonist. It describes an email where men are invited to play football and women to go to a nail salon.		
The fourth scene is on issues related to the gender gap and describes a woman who got a salary raise. The players are put in the shoes of a male protagonist.		

Table 5.29: *Prototype and game created by B-G5 - Part II*

Description	Prototype	Game
The next scene is on offensive comments based on physical appearances.		On Fridays we dress casually at work. My colleague is wearing super cool jeans. A loud comment is made about their 'cute butt'.
The last scene presents four possible endings, each representing different levels of awareness of everyday sexism. The choices of the players in the previous scenes define which ending is shown. The group also added a scene describing the research behind each scene of the game.		Congratulations on completing the game! You showed you know a little about gender inequality and sexism in everyday life but doing a bit more research and reading would definitely improve your contact with these affected by the problem.

It is a good idea that you look closer at everyday gestures and rituals and try to ask what they really mean? Were do they come from? How would you feel if you did something out of your usual routine?

Do you think it is important to care about how others feel around you? What could you do to make sure that women are treated with respect they deserve? We hope this game makes you reflect on that.

NEXT

There are different ways in which gestures are interpreted across cultures. In some of them opening the door is perceived as nice but others see it as a sign of treating women as weaker.

Studies show that socialising at a workplace increases employees' engagement, loyalty and happiness, decreasing their level of stress at the same time. After hours activities targeted at one geneder are thus not giving everybody an equal ground to bond with a firm.

Global Pay Gap
Last year's World Economic Forum (2018) report states that it will take 202 years to close the global pay gap. At the moment, an avarage woman makes 63% of what an avarage man does. There is no country in the world where women make the same amount of money as men do, Laos being the closest (91%).

Sexual harrassement and physical violence is reported to affect 35% of all women in the world. The level of abuse varies between countries and cultures from North America (25%) to South Africa (75%) and South America (80/90%). In Europe it varies from 35% in Germany to 52% in Denmark.

credit   replay |

Table 5.30: *Prototype and game created by B-G5 - Part III*

Use of everyday sexism cards

The cards chosen by B-G5 were 'Benevolent Sexism' and 'Gender Stereotypes'. These cards presents information about gender discrimination in the workforce. The information that was identified directly in the story, prototype and/or game is highlighted in red in the following figure.
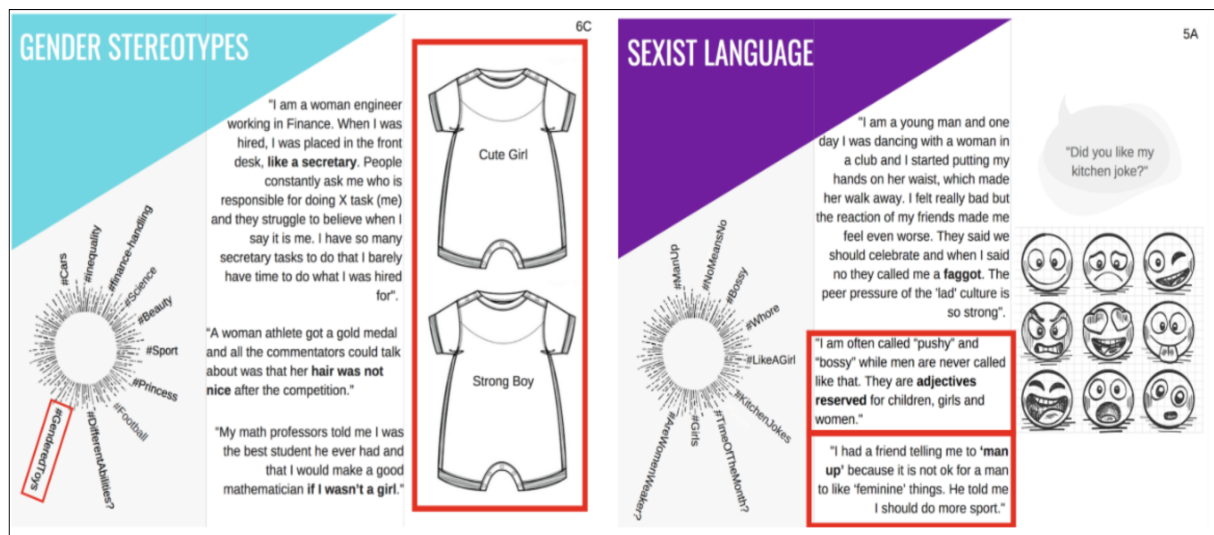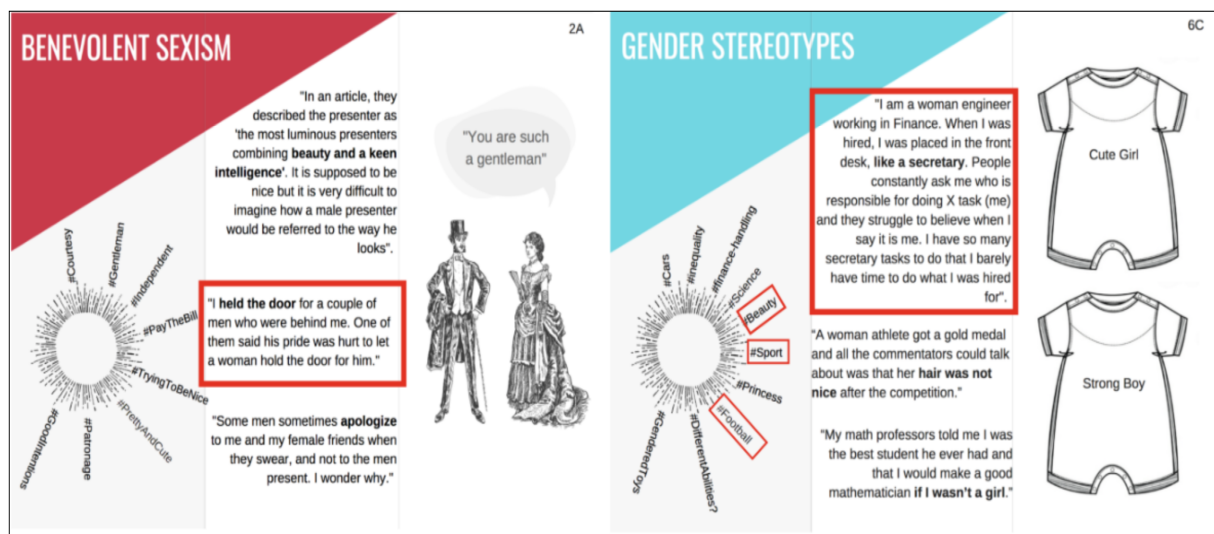

Figure 5.18: *Everyday sexism cards chosen by B-G5*

The second story of the 'Benevolent sexism' card is about opening doors to women, which is the topic illustrated in the second scene of the game. The first story presented on the 'Gender stereotypes' card is about a woman who explains that some people struggle to believe that she is responsible for the tasks that her job involves, which presents similarities with the story created by B-G5. Lastly, the gender stereotypes illustrated in the keywords of this card, namely 'beauty', 'sports' and 'football', can be directly seen in the third scene of the game.

Use of educational game design cards

Group B-G5 chose a total of 3 educational game design cards, namely 'Identity (1)', 'Information (8)', and 'Well-ordered problems (5)'.

The Identity card was used by enabling people to play both male and female characters. Players also experience scenarios where the gender of their character is not revealed, which intends to make them question their choices and reflect on how their responses would change depending on their character's gender. The Information card was implemented by enabling players to access research on each of the everyday sexism issues presented in each scene. This information is presented in an on-demand manner that can be accessed by the players at the end of the game. The 'Well-ordered Problem' card was used to increase the level of difficulty of each scene. The game starts with issues related to opening doors and finishes with a scene that invites reflections on sexual harassment.

5.7.5   Implications

Overall, the results presented here validated the proposed framework for the democratisation of educational game design on social issues during Game Jams. It was found that applying the proposed framework facilitated balanced contributions among participants as well as positive levels of satisfactions with the created prototypes and games. The results also evidenced that most participants would highly recommend participating in the Game Jam and felt empowered with the capacity and willingness to design other educational games on social issues by the end of the Game Jams. It was also found that the proposed cards, both the sets on everyday sexism and educational game design, were consistently used by the groups to create their games.

The demand for guidance and support to design educational games on social issues was evidenced by the participants. The results also pointed out that participants appreciated the structure of the activities as well as feeling a sense of agency over their group discussions and the creation of their games. This sense of agency was associated with perceptions that they were not relying on experts to design their games. This implies that facilitating sequential activities supported by adequate resources, without relying on

the involvement of experts in groups, is a suitable form to provide support to democratise educational game design on social issues.

Participants associated their increasing levels of confidence in their abilities to design educational games on everyday sexism to their learning about everyday sexism, educational game design and game development during the first day of the Game Jams. This suggests that facilitating stages for the exploration and conceptualisation of these three topics is necessary to make participants feel they can design educational games on social issues. Following this, the order of proposed activities was reviewed, evidencing the need to separate the games conceptualisation from the design. This implies that activities where participants feel they are exploring and learning about these topics without yet creating their games are relevant as first steps to democratise the design of educational games on social issues.

In addition, the results showed that the most anticipated challenge by the participants was to develop a game using *GameSalad*, suggesting that game development was the main perceived barrier by the participants to democratising educational game design on social issues. This highlights the necessity to provide supportive opportunities to learn about game development during such Game Jams as well as to communicate these opportunities when Game Jams are promoted to enable anyone to feel that they can participate. Following this, the results also pointed out that while participants reported that the main challenges they faced were related to *GameSalad*, they also reported that learning how to develop games using *GameSalad* was the most fruitful aspect of the Game Jam. Taking into consideration the satisfactory levels of perceived learning about everyday sexism (see *Section 5.4.1.1*), educational game design (see *Section 5.5.1.1*) and game development (see *Section 5.6.1.1*), these results suggest that acquiring game development skills was valued by participants by the end of the Game Jams. It also confirms that the game engine chosen fulfilled the purpose of enabling participants to acquire game development

skills, despite some participants reporting negative comments about it.

Regarding the timing of the proposed activities, the results suggest that an additional 15 minutes should be added to 'Stage 3: Discussions on educational game design' and that, as recommended by participants, coaches could provide additional guidance to groups by communicating the available time for an activity at the beginning of each one of them. Additionally, the coaches should be prepared to interrupt groups at the end of the available time of 'Stage 4: Definition of game idea', reminding them that, at this point, it is a preliminary result with a brief idea for the game. Lastly, managing time during the second day of the Game Jam was perceived as a challenge to develop a game, which suggests that it might be relevant to remind groups, especially during the prototyping stage, to conceive simple game ideas that do not require more than a day to develop, as mentioned as a piece of advice participants would give to future participants.

Learning about educational game design was the most reported response on the participants' expectations of the Game Jam, motivations to participate and reasons why they would recommend people to participate in the Game Jam. Aligned with *Section 5.5*, these results highlight the relevance of providing access to information about this topic as well as to facilitate stages for exploration, conceptualisation and development of educational games as a process to support learning about educational game design during Game Jams. Thus, learning about sexism was not a main expectation nor motivation to participate in the Game Jam. However, it was reported as one of the main reasons why participants would recommend participating in the Game Jam. This was unexpected as creating engagement with this topic was one of the objectives of this Game Jam and intended to be used in the communication material to attract potential participants. The results pointed out that one of the main motivations to participate was also to have fun and this was also found as a reason why participants would recommend participating in the Game Jam. As the activities were not designed specifically targeting fun, this result,

although positive, was unexpected. Additional research could be conducted to expand on this aspect by exploring how fun could be facilitated during Game Jams intending to democratise the design of educational games.

Regarding the aspects of the Game Jam that impacted the participants' motivation, it was found that consolidating game ideas into prototypes contributed toward increasing their motivation. In addition, both the lack of clarity of the instructions of 'Stage 3: Discussions on educational game design' and 'Stage 7: Review of prototype' and their levels of tiredness were aspects that decreased the motivation of the participants. These aspects can be considered in cases where participants seem unmotivated during the Game Jams, for example by telling them that they will have an educational game prototype by the end of the first day or that they can take a break or go for a short walk if they feel tired. The results also reveal the importance of providing clear and simple instructions for each of the activities. The limitations of *GameSalad* (i.e. merging scenes and bugs) that participants experienced also influenced their motivation negatively during the second day of the Game Jam. This suggests that additional support could be facilitated, perhaps by discussing the topic of bugs in game development during the conversations on the game engine at the end of 'Stage 2: Familiarisation with game engine' to ensure that participants are prepared to face bugs when they develop their games.

5.8 Chapter Summary

This chapter presented results drawn from applying the proposed framework during two Game Jams where groups of participants designed educational games on everyday sexism. The chapter started by presenting the design of this evaluation study in *Section 5.1*. Then, the next section introduced the Game Jams' participants in *Section 5.2* and provided an overview of the created games in *Section 5.3*. Following this, the results were grouped by the objective of each of the framework stages, namely Engage with social

issue (*Section 5.4*); Support with educational game design practices (*Section 5.5*); and Acquire game development skills (*Section 5.6*) and presented sequentially. The last section presented the results on the general impressions and perceptions of the framework (*Section 5.7*). The results were summarised and discussed at the end of these sections (in subsection called 'Implications') where preliminary insights on how these results are used to answer the research questions and problem statement of this thesis are presented (see *Section 5.4.4* - *Section 5.5.4* - *Section 5.6.1.1* and *Section 5.7.5*).

Chapter 6

Discussion

This chapter presents the findings of this thesis related to each of its Research Questions and Problem Statement. Each Research Question is discussed in the following three sections. After this, *Section 6.4* presents insights on the Problem Statement of this thesis. The revised version of the proposed framework is then presented in *Section 6.5*. Lastly, final reflections on the research questions are presented in *Section 6.6*.

6.1 Engaging with Social Issues

This section seeks to answer the first Research Question, 'What support do Game Jam participants need to engage with social issues?'. To this end, findings on resources and activities that could be used to create engagement with social issues during Game Jams are discussed. *Section 6.1.1* explores how stories and questions can be used to support inclusive participation in group discussions about social issues. *Section 6.1.2* illustrates the use of diverse perspectives to create inclusive engagement with a social issue. Following this, *Section 6.1.3* discusses engagement at an individual level. Next, *Section 6.1.4* addresses supportive information that can be used to create engagement with social issues through the creation of artefacts.

6.1.1   Inclusive Participation

Inviting participants to discuss everyday sexism based on experiences is seen as a factor that facilitates inclusive participation, as formal knowledge of this topic is not necessarily needed to contribute to such discussions. These results are in line with the literature on Critical Pedagogy presented in *Section 2.4*, which points to the relevance of using lived experiences on social topics to enable participants to relate to and contextualise their learning. The results add to this literature by portraying the use of stories illustrating life experiences as resources to trigger participants to share experiences of a social issue with each other. Building on this, it is argued that it is important to ensure that these resources present diverse stories, and stories that happened indirectly to the story protagonist, which can be used to ensure that participants feel they have had experiences with a social issue that they could share.

Following this, the shared lived experiences were used to create additional discussions about sexism using the provided questions. Using questions targeted at collective reflection is seen as a key factor to facilitate inclusive participation as this leads participants to the sharing of reflections, ideas and/or opinions, without necessarily needing expertise about this topic to participate in such discussions. Aligned with the literature on Critical Pedagogy (see *Section 2.4*), which argues that the use of questions and dialogue can be used to facilitate egalitarian participation, the results revealed that the questions structure proposed by Daudelin (1996) (see *Section 2.4.2*) is suitable to shift conversations about personal experiences to discuss a social issue in a more general and still egalitarian manner.

6.1.2   Diverse Perspectives

The results presented in *Section 5.4.3* captured that participants perceived learning on everyday sexism from diverse perspectives. These results are aligned with the work of

hooks (2014) (see *Section 2.4.3*) who argued that discussing sexism with diverse groups contributes toward creating collaborative learning. To support groups' engagement with social issues, diversity in age, ethnicity, sexual orientation and gender, is needed within these groups. People's age, background, sexual orientation and gender can shape the type of experiences that are faced with a social issue, therefore influencing their unique perspectives. This diversity promotes an opportunity to reflect on experiences that they might not have encountered individually.

As previously introduced, the diversity of perspectives were first triggered by discussing the stories presented on the cards. The results from the Game Jams illustrated the relevance to balance the presentation of stories on the cards that are relatable and unknown to participants, which highlights the need to ensure diversity when co-designing these cards. Indeed, the co-design strategy was a factor that contributed toward balancing stories that were, subjectively, relatable and unknown to the participants. Furthermore, the participants evidenced they understood the cards and would highly recommend them to others designing educational games on social issues. Building on the literature on Participatory Design that argues that co-designing resources contributes toward presenting understandable and diverse information (see *Section 3.3.1*), this research contributes with a design process to create such cards (presented in *Section 4.1*). These results confirmed that this process is applicable to co-design cards on a social issue for the democratisation of educational game design.

6.1.3 Individual Reflection

The results pointed out that the provided resources accommodated opportunities to learn from both collaborative and individual activities, using particularly the stories and questions in the cards. Although reducing the amount of information presented on the cards was a recommendation captured during the Game Jams, providing enough information

that could support learning without relying only on group discussions is also important for democratising knowledge of everyday sexism. Encouraging collective discussions while giving participants the possibility to use the cards individually is a factor that considers that participants might have a preferred learning style, which influences their learning and engagement during an activity. This was discussed in the study of Deng et al. (2014) in *Section 2.1.3*. In that study, the authors argued that participants with little knowledge of a topic would need more textual information than knowledgeable participants to be able to participate in group discussions. In this research, instead, some participants independently of their prior knowledge of everyday sexism preferred to learn and reflect on everyday sexism relying on their own using the cards. Other factors, such as the participants' affinities with each other, their interpersonal skills or their willingness to have conversations on personal experiences with unfamiliar people might have influenced these decisions. Therefore, it is argued that evaluating the co-designed resources individually (see *Section 4.1.2*) as well as collectively (see *Section 4.1.3*) as part of the formative design studies contributed toward proposing resources that were suitable to both individual and collective engagement. As a result, to support participants engaging with a social issue, it is argued that the information presented should also be suitable to trigger individual reflection.

6.1.4   Creation of Artefacts

The results pointed out that some information presented on the cards, namely the keywords, stories and illustrations, were used consistently for the stories, prototypes and games created. In line with the work of Iacovides et al. (2019) and Falcão et al. (2018) (see *Section 2.3.2*), that illustrated the relevance of providing information about the topic of games as part of frameworks intending to democratise educational game design, this research illustrates that stories, keywords and illustrations can be used as supporting information to create game artefacts. This information can be used to trigger ideas for

stories and branching stories about social issues, that can then be used for creating prototypes and games. This is also aligned with the research of Dickey (2005), Zook and Riedl (2013) and Rouse III (2010), presented in *Section 2.1.3*, who argued that creating branching stories can be used as a starting point to design games as they reflect the tree structure of games. Arguably, using branching stories also enables groups to start perceiving social issues as transformable, as suggested by Critical Pedagogy (see *Section 2.4*) as well as to start understanding how to illustrate such game structures. These results add to the literature by illustrating the use of information of a social issue, which are presented as stories, illustrations and keywords, in order to create engagement with a social issue while supporting participants in early stages of educational game design.

The results found in *Section 5.4.3* illustrated that engagement was also triggered when groups were looking for further information about statistics on sexism to create their game prototypes. This engagement, taking the form of online research, was spontaneously initiated by groups and was based on discussing information on everyday sexism that could be presented in a game. This suggests that once groups started to feel they were creating a game, which was, arguably, not the case when they were creating stories, they felt the need to complement their game ideas by providing information presented as statistics on everyday sexism to their potential players. Adding to the findings presented above, this implies that manifestations of a social issue can be facilitated as supporting information to trigger game ideas through the creation of stories. Following this, these stories can then be used to create additional engagement by transforming them into a game prototype. This engagement takes the form of active engagement looking for information about a social issue that could be presented in a game.

6.2   Supporting Educational Game Design Practices

This section seeks to answer the second Research Question, 'What resources and processes can be used to democratise educational game design practices?'. To this end, findings on resources and processes that could be used to democratise educational game design practices are discussed here. *Section 6.2.1* explores how information about educational game design can be democratised. *Section 6.2.2* illustrates the role of defining a game's objectives in processes intended to democratise educational game design. Following this, *Section 6.2.3* presents findings to shape resources to democratise the creation of educational game prototypes. Next, *Section 6.2.4* presents insights on practices to review educational game prototypes and *Section 6.2.5* on practices to evaluate educational games.

6.2.1   Access to Information

Accessing specialised information about educational game design was reported as relevant to democratise the design of educational games. Most participants recognised they learnt about educational game design by accessing this information and felt that it was also useful to design their games. In line with Gee (2005)'s principles on educational game design that are intended to be understandable by people who might not have knowledge of this topic (see *Section 2.2.3* and *Section 4.2*), this research illustrates that the information proposed on the cards was adequate to democratise educational game design by enabling groups to explore, understand and implement research-based concepts of educational game design on social issues. In accordance with the intended design of these cards, this research contributes to the literature on educational game design by presenting insights on what kind of information is needed to democratise knowledge of educational game design on social issues. It is argued that this information should address what could be done to trigger learning in games by presenting principles of educational game design; why this learning could be facilitated, from both educational and gaming perspectives and; how to

implement these principles into a game.

This research also illustrates the relevance of using the principles proposed by Gee (2005) as foundations to democratise educational game design and to merge them with Critical Pedagogy to democratise the design educational games specifically on social issues. The synergies between the principles of Gee (2005) and the principles of Critical Pedagogy (see *Section 2.4*) were identified by recognising that the ideas they presented were based on related educational approaches and were targeted at similar educational outcomes (see *Section 4.2*). It was also identified that these principles were complementary, given that the principles of Gee (2005) presented insights on how to trigger learning in games and Critical Pedagogy illustrated how to raise awareness of social issues. This research argues that aligning each principle, considering their similarities and complementarities with Critical Pedagogy, contributed toward presenting relevant information to democratise knowledge of educational game design on social issues.

6.2.2 Definition of Objectives

The results confirmed that the groups relied on the defined educational and gaming objectives to shape their prototypes and games. Therefore, it is argued that requiring groups to define their games objectives when they start conceptualising them is valuable to guide their decisions throughout the Game Jam. In line with Marfisi-Schottman et al. (2010) and Brian (2008) who placed the definition of games' objectives as one of the first stages of their educational game design processes (see *Section 2.2.4*), this research confirms that this practice is also relevant in processes intended to democratise educational game design. Arguably, framing the educational and gaming objectives of a game provides a common understanding of what a game is intended to achieve, which in turn supports design decisions within groups. This also points out the crucial role of these objectives in the processes of educational game design, suggesting that it might be relevant to explore

adding activities or resources aimed at reviewing these objectives or ensuring that they are coherently defined as future work.

6.2.3   Prototyping

It was evidenced in the results from 'Stage 6: Prototype' that groups engaged with the provided information on educational game components and that they defined art assets while creating their prototypes. Building on the study of Zook and Riedl (2013) (see *Section 2.1.3*), who shed light on the relevance of encouraging and supporting groups to create prototypes during Game Jams, this research illustrates that to democratise educational game design supporting information about educational games components and art assets facilitates groups creating prototypes. As the educational game components illustrate the main units that are encompassed in an educational game, it is argued that accessing information about them can trigger groups to reflect on some aspects of their games that they might not have considered if they did not have access to such information. Regarding the art assets, it is argued that choosing them during the prototyping stage contributes toward conceiving ideas that are realistically translatable to games, as the art assets chosen could be used directly in the games.

The results showed that the prototype stage relied on certain resources previously facilitated in the Game Jams, more precisely, the everyday sexism stories created, the educational game design cards selected, as well as the educational and gaming objectives defined, were used to create the prototypes. Aligned with the study of Mitgutsch and Alvarado (2012), who presented a framework that invite designers to shape educational games in relation to the game's objective (see *Section 2.2.5*), these results illustrate that to create their prototypes the groups accessed resources on the educational topic and educational game design together with the games' objectives. Regarding the resources used on the educational topic of the game (i.e. the created stories on everyday sexism and the

defined educational objectives), it is argued that these resources are needed to democratise the creation of educational game prototypes as they facilitate a common understanding within groups on the educational topic chosen for a game together with what intends to be taught about this topic. Moving on to the used resources on educational game design (i.e. the selected educational game design cards and defined gaming objectives), it is argued that these resources are also needed to democratise the creation of educational game prototypes as they enable groups to align information on educational game design with an intended gaming objective, which could also be used to support groups make design decisions that are informed by the objectives of their games.

6.2.4 Review of Prototype

The results pointed out little engagement with the activity and resources in 'Stage 7: Review of prototype'. The groups communicated that the instructions were complicated and none of them engaged in expected discussions to review their prototypes during this stage. These results suggest that using the proposed adaptation of the SGDA template first created by Mitgutsch and Alvarado (2012) (see *Section 2.2.5*) and reviewing the created prototypes at this point in the framework did not seem to help groups improve or validate their prototypes. It is argued that the lack of engagement with the proposed activity might have come from participants being tired as this activity was the last one of the first day of the Game Jam, the instructions being not clear enough and/or that reviewing their prototypes immediately after having created them was perceived as irrelevant by the groups.

Aligned with the ideas of Mitgutsch and Alvarado (2012), this research supports that iterative reviewing and evaluation as well as adopting holistic approaches to evaluating educational games are practices that should be translated to the democratisation of educational game design. These practices could arguably significantly improve the design

of the games by supporting and guiding groups to discuss the coherence of their design ideas. Additional research is needed to explore the relevance of simplifying this activity, for instance by asking groups to review their prototype by reflecting on the coherence between each of the previously defined educational game components, and/or placing this activity at another point in the framework, for instance at the beginning of the second day. Additional research is also needed to explore how to improve the use and/or the design of the SGDA template to be usable during Game Jams and/or initiatives aimed at democratising educational game design.

6.2.5   Iterative Evaluations

The results on 'Stage 8: Development and iterative evaluations', illustrated that requiring groups to evaluate their games early in processes of game development was unsuitable to trigger discussions on how to refine or improve their games. Arguably, in the early stages of game development groups are defining how to translate their prototypes into a game and might not yet be thinking of potential modifications to their prototypes that might be needed to develop their games. It was also reported that facilitating group interviews to evaluate games by exploring how confident groups felt toward their game reaching their educational and gaming objectives was not suitable to either create engagement or refine games, even later in the process of game development. As illustrated in the previous section (see *Section 6.2.4*), facilitating iterative practices to evaluation is, arguably, considered important to democratise educational game design. Based on these results, it is argued that additional research is needed to define how to improve these activities. This research could be targeted at, for instance, exploring the relevance of explaining to participants why iterative evaluations could be important for their games, evaluate only the modifications proposed to the game prototypes, simplifying these activities by asking groups to evaluate the current version of their games considering their objectives and/or to give them agency over when these evaluations are taking place to avoid interruptions.

6.3 Acquiring Game Development Skills

This section seeks to answer the third Research Question, 'What support do participants need to acquire game development skills during Game Jams?'. To this end, the resources and activities that could be used to support participants acquire game development skills during Game Jams are discussed here. *Section 6.3.1* presents findings on the use of *GameSalad* to democratise game development. *Section 6.3.2* presents findings on the facilitation of tutorials on game engines. Following this, *Section 6.3.3* presents findings that can be used to shape egalitarian opportunities to develop games during Game Jams.

6.3.1 GameSalad

The results showed that *GameSalad* seemed suitable to facilitate learning about game development to participants who have different levels of experience with computer programming, game design and/or *GameSalad*. Aligned with the literature presented in *Section 2.3.3*, which introduces game engines as tools that can be used to simplify game development and enable people to learn about computer programming concepts, this research presents findings on the use of *GameSalad* to democratise the development of games during Game Jams. Participants perceived that *GameSalad* was simple for them to use and that there was relevant online information available to help them develop their games. Building on these results and in line with the the rationales that have informed the choice of using *GameSalad* (see *Section 4.3.1.1*), this research first argues that to support participants acquiring game development skills during Game Jams, the concepts needed to start using a game engine should be simple to grasp and accessible to participants who have no computer programming knowledge. Following this, it is argued that online platforms, such as tutorials and forums, are needed to enable participants to expand on these concepts to develop more complex game ideas, which then support them to acquire additional skills on game development.

The results also pointed out the participants' perceptions of the lack of collaborative features in *GameSalad*, including issues to merge scenes individually developed into games, and the differences between the version on PC and MAC of this game engine. These are significant limitations of this engine that could, arguably, restrict learning opportunities in addition to negatively impact the creation of games. Collaborative features and uniformity in the versions of a game engine could enable participants to support each other in learning how to use an engine, which could in turn help them to collaboratively acquire game development skills.

Lastly, as illustrated in *Section 2.3.3*, the use of certain game engines represent a barrier to democratise game design during Game Jams as prior experience in game development and computer programming might be needed to use them. The choice of *GameSalad* was also informed by its cost (with a free trial) and potential to enable any participants to use it, to acquire game development skills and to learn about educational game design. First, regarding the game development skills, the results showed positive impressions on participants perceiving learning about game development using *GameSalad*. It is argued that this is due to engine reflecting the building logic and structure of game development, such as the use of rules (i.e. often described as conditional statement of 'if - then - else' statement), the use of behaviors given to objects (e.g. make characters move) and variables (i.e. objects that change in value when certain events takes place). As presented in *Section 5.7.5*, the choice of *GameSalad* was based on its features that are aimed toward enabling people to create any type of 2D games but multiplayers and to learn about game development while creating such games. Second, regarding learning about educational game design, *GameSalad* was also chosen based on the games that could be created with this engine. As presented in *Section 4.3.1.1*, using a game engine that enables the creation of very simple games, such as interactive stories (i.e. the game engine Twine), would restrict learning opportunities about educational game design. This

is due to the fact that some of the principles presented on the cards on educational game design cannot be implemented using certain game engines, which would have resulted in omitting some of these principles to participants. By choosing a game engine that enabled the implementation of the principles introduced by Gee (2005) (see *Section 2.2.3*), this research could facilitate such information to participants and therefore create learning about a larger range of principles of educational game design.

6.3.2 Tutorial

This research presents findings on the facilitation of tutorials that could be used to enable anyone to participate in developing a game during Game Jams. The results illustrated that all participants managed to finish creating a test game during the tutorial, which was exclusively used to learn and practice how to use *GameSalad* and that encompassed the main concepts needed to start using the game engine. The results also showed that all participants who used *GameSalad* during the second day of the Game Jams managed to create a game scene by implementing and expanding on these concepts. Building on this, this research argues that to democratise game development, Game Jams need to accommodate opportunities for participants to learn how to use a game engine and provide activities where they can practice using a game engine without impacting their games, such as developing a test game.

6.3.3 Egalitarian Development

Most participants decided to develop a game scene during the second day of the Game Jams, which implies that they each took on similar tasks in the development of their games. The study of Falcao et al. presented in *Section 2.3.2* illustrated that inviting participants to develop games with experts have led them to rely on the experts' skills to develop their games without trying to understand how to develop them. In this research

it was found that participants allocated tasks on the development of their games by dividing their games in sequences and each taking one part (i.e. game scenes), suggesting that they did not distribute tasks based on their skills. This is, arguably, different from Game Jams where participants rely on experts or form groups with participants who each have complementary skills needed to develop a game (see *Section 2.1.2* and *Section 2.3.2*). This research argues that facilitating a tutorial on a game engine and forming groups by considering the participants' diversity instead of their skills can be used to help participants acquire game development skills in an egalitarian manner. This can enable participants to apply the skills they acquire during the tutorial to develop their games, which could be perceived as an incentive to acquire such skills.

6.4 Democratising Educational Game Design on Social Issues

This section seeks to further explore the Problem Statement of this thesis, 'How to democratise educational game design on social issues during Game Jams?'. To this end, discussions about facilitating support and guidance during Game Jams are presented in *Section 6.4.1*. Following this, *Section 6.4.2* discusses how agency could be enhanced to Game Jam participants. Next, *Section 6.4.3* explores the main expectations of people who attend a Game Jam to design educational games on social issues and *Section 6.4.4* presents discussions of the outcomes of the Game Jams.

6.4.1 Support and Guidance

The Game Jams organised were in majority attended by people who did not have any experience designing educational games. As anticipated, most participants reported needing guidance and support to design an educational game on everyday sexism. To indeed

democratise the design of educational games on social issues, the availability of guidance and support needs to be clear in the promotion of the event. Arguably, this could enable novice groups not to feel that they are expected to have prior skills to participate and they would find a supportive structure at the Game Jam. As presented in *Section 2.1*, Game Jams claim to be open to anyone mostly because the multidisciplinarity of game design suggest that multiple skills could be used to design a game during such events. However, as illustrated in the studies of Borg et al. (2019) (see *Section 2.1.2*), they are typically attended by experienced game developers. Following this, it was also illustrated in *Section 2.1* that Game Jams tend to be events where little support or guidance is provided, as participants usually are given freedom to decide how to develop their games. Arguably, the findings presented here could be used to further evidence the relevance of providing and communicating a supportive structure to attract broader audiences to Game Jams.

The findings of the study of Zook and Riedl (2013) presented in *Section 6.4.4* argue that the main challenge faced by Game Jam participants tend to be related to game development, and are aligned with the results found in this research. The results suggested that the most anticipated challenge and actual challenge faced by the participants were related to developing their games. Building on the study of Meriläinen and Aurava (2018) (see *Section 2.1.2*), who pointed out that the main reason for the non-participation of novice individuals in Game Jams was their lack of game development skills, in this research the participants acknowledged that developing a game could be challenging to them but still decided to participate because they were told that they would learn how to use a game engine and that they did not need game development skills to participate. These findings reinforce that the main barrier to democratise participation in Game Jams to design educational games on social issues is mostly related to game development. Providing support on game development as well as communicating that learning opportunities about game development will be provided during the Game Jam and that no game development

skills are necessary to participate contributes toward lowering this barrier.

Following this, to frame support and guidance the results suggested that facilitating initial stages aimed at exploring the topics of everyday sexism, educational game design and game development enabled groups to conceptualise and develop their games. The results also illustrated the necessity of separating stages intended to support learning by exploring these topics in stages where participants feel they are starting to create games. Aligned with the studies of Iacovides et al. (2019) and Falcão et al. (2018), introduced in *Section 2.3.2* , which presented frameworks with initial stages targeted at supporting learning about the topic of a game and game development, this research presents a process to democratise educational game design on social issues. This research indeed evidenced the suitability of targeting initial stages at learning about a social issue, educational game design and game development to enable groups to conceptualise and then develop educational games on social issues.

6.4.2 Agency

The results showed that most participants appreciated the structure of the activities as well as felt a sense of agency over their group discussions and the creation of their games. It was also found that this sense of agency was associated with participants perceiving that they were not relying on experts to design their games. Building on the idea that relying on the participation of experts is a barrier to the democratisation of educational games (see *Section 1*), these results evidence that providing support through activities and resources can be used to make groups feel agency over the design of their games. Arguably, not relying on experts nor differentiating participants based on their expertise could enable a participant to perceive that designing a game depends on his/her own contributions, which in turn might affect a participant's willingness and motivation to learn.

Furthermore, the results illustrated that contributions among participants in each group were perceived as balanced. It is argued that applying the Process of Conscientisation, presented in *Section 2.4.2*, which presents steps to facilitate egalitarian learning and participation, to create the proposed framework contributed toward facilitating these balanced contributions. It is first argued that relying on the participants' learning and the resources facilitated during the Game Jam were factors that contributed toward creating balanced contributions, leading each participant to feel supported to take part in group discussions. Second, it is argued that the principles of Critical Pedagogy (see *Section 2.4*) to enhance equitable collaboration and dialogue throughout the Game Jams also boosted participants' confidence to contribute to group discussions. More specifically, creating common experiences that enable equitable participation by using dialogue, giving each participant an identical role in the game design process and promoting collaboration throughout a Game Jam were key to enable participants to feel a sense of agency and that they can each contribute in group discussions.

6.4.3 Expectations

The most frequent response to the participants' expectations for the Game Jam, motivations to participate and reasons why they would recommend people to participate was to learn about educational game design. In *Section 2.1.4*, the educational opportunities that Game Jams present were introduced in the studies of Preston (2014) and Arya et al. (2013), and the latter also argued that one of the main reasons why people would attend Game Jams was to learn. Echoing the findings of these studies, this research illustrates that participants who attend Game Jams aimed at democratising educational game design on social issues mostly expect learning about educational game design and use this as a motivation to participate. This research argues that the short duration of Game Jams, which usually take place during weekends (see *Section 2.1*), and perceptions on the complexity of designing educational games, could contribute toward shaping expectations

around learning instead of creating educational games, and especially with participants who might not have experience of designing games.

These results also showed that participants did not expect to learn about everyday sexism and did not report that learning about this topic was the main motivation for them to take part. They, however, reported that learning about everyday sexism was the main reason why they would recommend participating in the Game Jam. The gap between their expectations and perceived learning suggest that additional research could be conducted to explore the relevance of presenting these learning opportunities more extensively or clearly when promoting such a Game Jam as part of the strategy to recruit participants. However, it is important to repeat that this research used communication material that specifically illustrates that during the Game Jam participants would be invited to design games on gender issues (i.e. See *Appendix B.7*) where the event was titled 'The Gender Game'. Based on this and aligned with the research of Eberhardt (2016) (see *Section 2.1.5*) who introduced Game Jams as spaces that could facilitate discussions about social issues by giving groups a principal common goal that is to design a game, these results suggest that the proposed framework could be used to create engagement with social issues to people who do not necessarily have great motivation to learn about social issues but who are motivated with the idea to learn about educational game design.

Having fun was described as one of the main reasons to participate in a Game Jam in the study of Arya et al. (2013), which was echoed with the results of this research. Arguably, the weekend format of Game Jams as well as creating games could be perceived as factors that contribute toward presenting fun experiences. This was not extensively explored in this thesis, which suggests that additional research could be conducted to further analyse how to promote fun throughout Game Jams' activities.

6.4.4   Outcomes

As introduced in *Section 6.4.4*, the outcomes of Game Jams are usually accounted for in terms of the learning participants acquire and the games they create. Regarding the learning of the Game Jam participants, evidence suggesting that they learnt about everyday sexism (see *Section 5.4.4*), educational game design *Section 5.5.4*) and game development (see *Section 5.5.4*) were found. The participants also reported that the most fruitful activity of the Game Jam was related to acquiring game development skills using *GameSalad.* This suggests that acquiring game development skills was particularly valued by participants, which was expected as, arguably, acquiring technical skills could be perceived as an attractive learning opportunity given the popularity of video games and the career aspirations that could be found in the game industry (see *Section 1*).

Regarding the games created, one game was completely developed during the Game Jams, two games were not finished in time and two games could not be finished due to a limitation of *GameSalad* (i.e merging scenes). In line with the literature, this result could be expected. According to Kaitila (2012) and Preston et al. (2012) (see *Section 6.4.4*), only about one-third to half of the games participants work on during Game Jams are actually finished. The results are also aligned with the research of Zook and Riedl (2013) (see *Section 6.4.4*), who illustrated that the main challenge to finish games during Game Jams was related to game development. This thesis reinforces that Game Jams are suitable to promote learning opportunities about educational game design on social issues but considerations regarding the limiting potential of Game Jams to enable groups to create finished games should be acknowledged by organisers. Nevertheless, the results also reveal that most participants finished the Game Jams feeling capable and willing to design other educational games on social issues. This suggests that even if some groups did not manage to have a finished game by the end of the Game Jam, they did feel empowered to design other educational games on social issues by the end of the event. Building on

this, this thesis argues that Game Jams have a suitable format to democratise the design of educational games on social issues and can be used to empower participants through enabling them to learn and experiment designing such games, and potentially to create other games in the future, even when the outcome is not a game as a finished product.

6.5   Revised Framework

Overall, the results presented in the previous chapter and discussed here confirm that the framework proposed in *Section 4.3* was indeed suitable to achieve its intended objectives (see *Section 5.7.5*). Nevertheless, some results extracted from applying and assessing this framework pointed to ideas for improvement, which will be presented in this section. *Figure 6.1* presents an overview of the framework. The last version of the framework, which is presented in this section, is available at this URL: https://doi.org/10.21954/ou. rd.12458285.v1.

Achieving diversity starts from properly promoting the Game Jam. The findings presented in this research lead to three recommendations for advertising the Game Jam:

- State that the Game Jam is open to anyone and that no skills are needed to participate, mentioning that support and guidance will be provided;
- Highlight that a tutorial on game development will be provided during the Game Jam, including for people who have never designed a game before; and
- Make clear that the Game Jam will facilitate opportunities to learn about a social issue, educational game design and game development.

This framework could be used with other social issues than sexism, such as racism, islamophobia or discrimination against the LGBTQ+ community (see *Section 2.4.3*). As personal experiences about a social issue are used to create engagement, the only requirement is to choose a social issue that influences, directly or indirectly, the potential
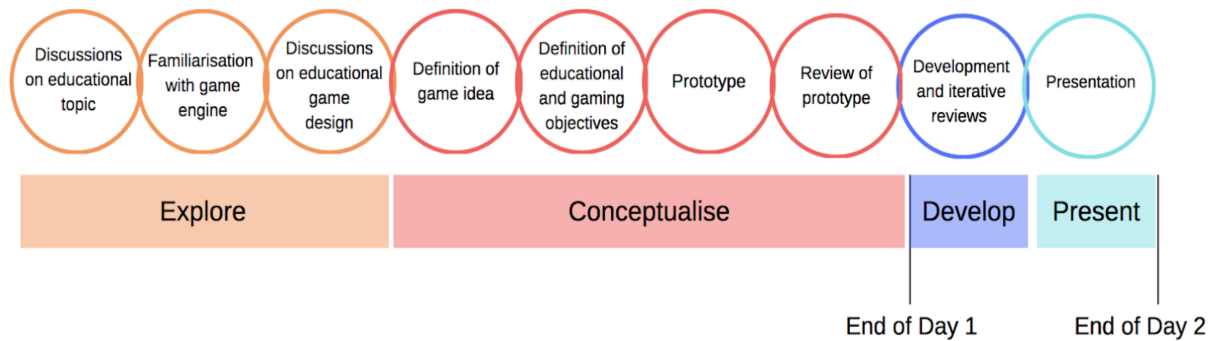
Figure 6.1: *Final version of the proposed framework*

participants. Other game engines than GameSalad could also be used with this frame-work. As seen in this chapter, to apply another game engine, it is mainly recommended to ensure that the game engine does not require knowledge of programming languages to be used, can be learnt within the timeframe of a tutorial (i.e. two to three hours during a Game Jam), reflects some of the technical logic and structures of game development, includes access to online help and resources (e.g. online tutorials) and to consider its price. To use another game engine, it is also advised to explore whether the principles presented on the educational game design cards (and especially the game elements) could be implemented with the game engine and or remove the principles that are not sup-ported. Further information to support the choice of another game engine was presented in *Section 6.3.1*.

6.5.1 Explore

As first introduced in *Section 4.3.1.1*, the first three stages of the proposed framework intend to structure discussions toward exploring a social issue, game development and practices of educational game design. At the end of these three stages, each group should have created a branching story raising awareness of a social issue, developed a test game using a game engine and selected educational game design principles from the provided cards for their games.

6.5.1.1   Discussion on Educational Topic

This stage lasts 90 minutes and is divided in three activities of 30 minutes (see *Figure 6.2* below). Activity 1 invites groups to discuss the provided cards and choose up to three cards before discussing the questions presented at the back of the selected cards. Activity 2 requests groups to create a story that illustrates an issue related to the social topic presented on the cards and, in Activity 3, groups have to transform the story into a branching story that presents an intervention to tackle the presented issue. A set of cards on the issue of everyday sexism is presented in Section 4.1, a design process that could be used to create cards on another social issue is described in *Section 4.1* and an example of a story and branching story is provided in *Appendix C.1*.

Activities:

1. Discussion on cards and selection of card(s) - *30 minutes*
2. Creation of story - *30 minutes*
3. Transformation of story into branching story - *30 minutes*

Resources:

1. Cards on social issue or Everyday sexism cards
2. Example of story and branching story

1 Discussions on educational topic

Figure 6.2: *Activities and resources for stage 1 of the revised framework*

The one proposed modification to the initial version of this stage (see *Section 4.3.1.1*) is presented below:

- Additional Instruction is facilitated to coaches explaining that if groups cannot create their stories at the beginning of Activity 2 because they report having too many cards or express to be overwhelmed, they should require groups to prioritise two cards.

As presented in *Section 5.4.4*, some groups expressed difficulties to choose a topic for their stories in Activity 2. These difficulties were reported from groups who selected three cards and that no difficulties were reported from groups who selected two cards in Activity 1. The decision to enable groups to access and use various categories of everyday sexism

was based on providing participants with learning opportunities, giving them agency over what aspects of this social issue are discussed and presented in their artefacts, as well as enabling them to grasp the interconnections between the facets of the social issue. As a result, it is argued that the modification maintains these opportunities while proposing a solution to the reported difficulties.

6.5.1.2 Familiarisation with Game Engine

This stage lasts 180 minutes in total (see *Figure 6.3* below). Activity 1 invites participants to read brief descriptions about 10 games developed with a game engine in 20 minutes. Activity 2 is a two-hours long tutorial on the game engine where participants develop a test game. Activity 3 is a 10 minutes discussion on the potential and limitations of the game engine. This stage is supported by a manual of the game engine and free art-game assets that participants could use in their games (see *Appendix A.3*). If another game engine than *GameSalad* is chosen, *Section 6.3.1* provides insights on the characteristics of a game engine that are arguably needed to democratise educational game design. For *GameSalad*, an overview of the manual is in *Appendix A.2* and the tutorial followed can be found at this URL: http://learn.gamesalad.com/course/the-absolute-beginners-guide-to-gamesalad/. This tutorial was found on the *GameSalad* website and is called 'The absolute beginners guide to GameSalad'.

Activities:

1. Reading game examples using game engine - *20 minutes*
2. Tutorial with creation of test game- *120 minutes*
3. Discussion on potential and limitation of engine - 1*0 minutes*

Resources:

1. Game engine
2. Presentation of tutorial
3. Manual on game engine
4. Document with access to art assets for games

2 Familiarisation with game engine
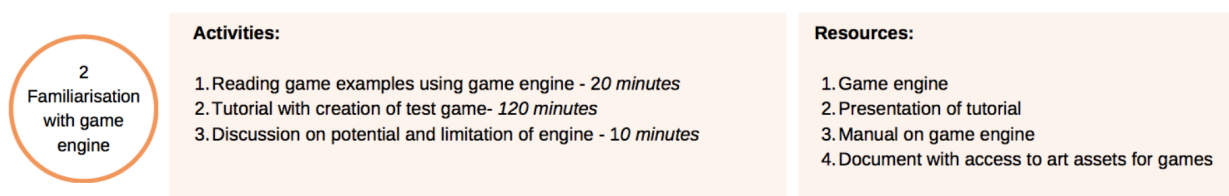
Figure 6.3: *Activities and resources for stage 2 of the revised framework*

No modifications are proposed from the initial version as both the outcomes and the participants' feedback suggested that the proposed activities and resources were adequate

(see *Section 5.6.4*).

6.5.1.3   Discussions on Educational Game Design

This stage lasts 80 minutes and is organised into three activities (see *Figure 6.4* below). Activity 1 is based on a five minute presentation supported with examples and facilitated by one of the coaches which illustrates how to use the provided cards to design educational games. Activity 2 lasts 45 minutes and invites each group to discuss the cards collectively. Activity 3 lasts 30 minutes and requests groups to choose a maximum of four cards they want to use for their games and to select some game elements, presented at the back of each card, to implement the principles presented on the cards they selected. The set of cards created for this stage are introduced in *Section 4.2*.

Figure 6.4: *Activities and resources for stage 3 of the revised framework*

Two modifications are proposed to the initial version of this stage (see *Section 4.3.1.1*), which are presented here:

- A brief presentation supported with examples is facilitated to illustrate how to use the educational game design cards at the beginning of this stage;
- The timing of the stage is increased by 20 minutes, adding five minutes for this presentation and 15 minutes for Activity 2.

Section 5.5.4 presented the feedback by participants requesting additional guidance on how to use the educational game design with a short presentation supported by examples. It is argued that this presentation could be used to ensure that participants understand

the aim of such cards and how to use them to design educational games. In addition, it was also found (see *Section 5.5.3*) that groups needed an additional 15 minutes to discuss the cards, which is implemented in the revised version of the proposed framework.

6.5.2 Conceptualise

As first introduced in Section *Section 4.3.1.2* the next four stages of the proposed framework intend to structure group discussions toward conceptualising an educational game on the social issue. At the end of these four stages, each group should have created and reviewed an educational game prototype, as well as have defined educational and gaming objectives for their games.

6.5.2.1 Definition of a Game Idea

This stage lasts 20 minutes, as illustrated in *Figure 6.5*, and requests groups to come up with a brief game idea. An example is provided which was "Our game follows the life of a female athlete who faces discrimination. The player learns about the history of sports and has to challenge gender stereotypes to win the game".
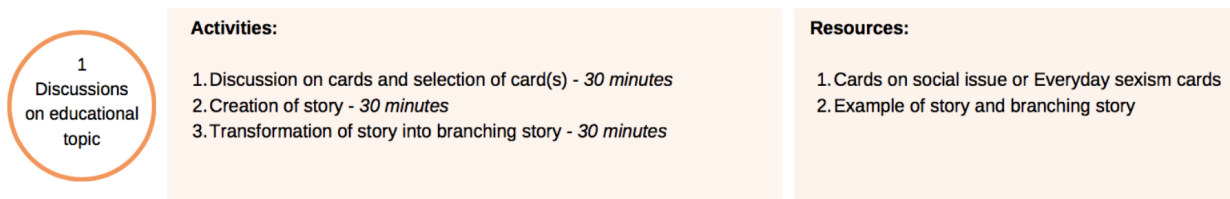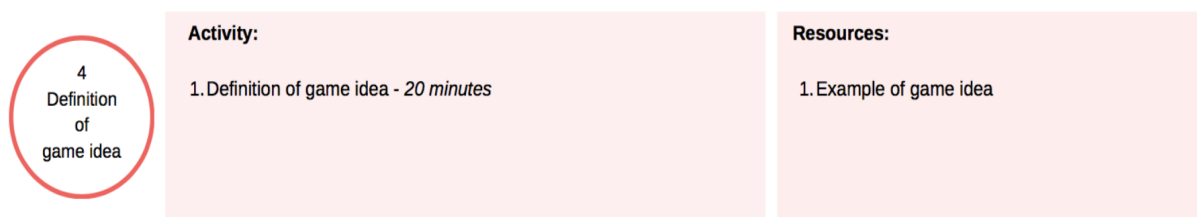

Figure 6.5: *Activities and resources for stage 4 of the revised framework*

The one proposed change to improve the initial version of this stage is presented below:

- Additional instruction is provided to coaches for reminding the groups that they should only define a preliminary brief game idea at this point and interrupt the discussion if necessary.

As described in *Section 5.7.3*, the initial version of this stage led groups to discuss a brief idea as well as details about their games. It is argued that requiring groups to restrict the discussion around the initial game idea is necessary to enable groups to achieve an agreement that will be crucial for the following stages. It is also considered suitable to discuss details about a game only when the game objectives are defined. As a result, this modification intends to provide additional support to ensure that groups define a brief game idea without discussing their games in detail at this stage.

6.5.2.2   Definition of Educational and Gaming Objectives

This stage lasts 25 minutes and is divided in three activities (see *Figure 6.6* below). Activity 1 invites groups to define the gaming objective of their games in 10 minutes. To support groups in this activity it is stated that not all games aim at being fun in an amusing manner and that they should define what feelings they intend to enhance through their games, with the possibility to create fun and/or uncomfortable feelings to the players of their games (see *Section 4.3.1.2*). This is also supported by game examples extracted from the educational game design cards, for instance the game 'Depression Quest' was used to exemplify a game that invites players to experience depression and sadness. Activity 2 invites groups to determine the educational objective of their games in 10 minutes. The groups are provided with supporting information that the educational objective(s) of their game should describe what they would like players to learn about a social issue. In Activity 3 groups are required to evaluate the extent to which their defined objectives are coherent. The checklist consists of two questions, namely 'Does the gaming objective you defined describe fun and/or uncomfortable feelings that you intend to convey to the players of your game?' and 'Does the educational objective you defined present what you intend players to learn about [social issue in question, e.g. everyday sexism] through your game?'. The groups are requested to write these objectives in the provided Yin and Yang template, introduced in *Section 4.3.1.2*.
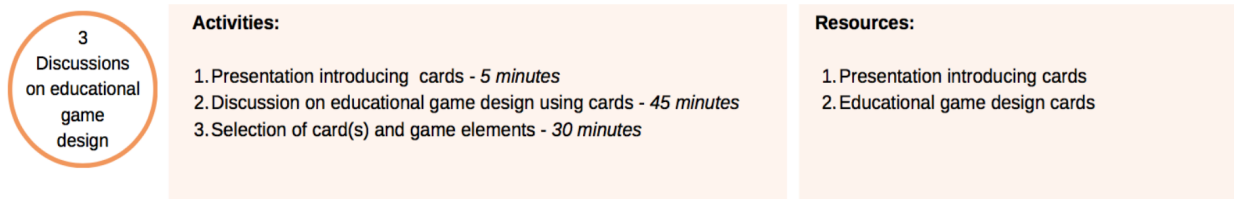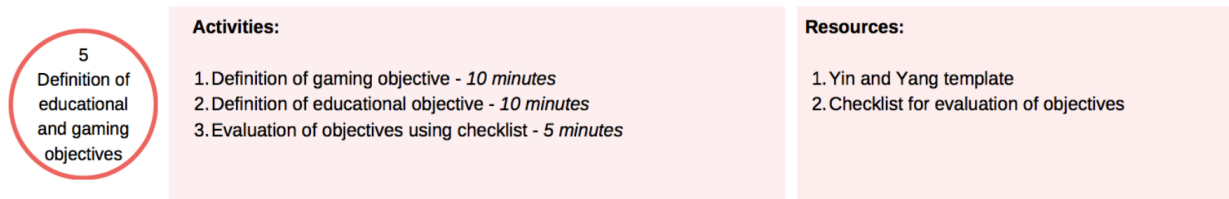
Figure 6.6: *Activities and resources for stage 5 of the revised framework*

One change is proposed to the initial version of this stage, which is presented here:

- Activity 3 is added to ensure that the gaming and educational objectives defined are coherent.

This activity was added based on the results presented in *Section 6.2.2* indicating that the educational and gaming objectives played a significant role in shaping the prototypes and games created throughout the Game Jams. It is important to add that in the Game Jams, all groups managed to define gaming and educational objectives that were considered coherent (see *Section 5.3.1*). This checklist is proposed to help replicate this in other Game Jams by providing an opportunity for groups to further reflect on the objectives of their games.

6.5.2.3 Prototype

The prototype stage, illustrated in *Figure 6.7*, has one activity which is to create an educational game prototype in two hours. This activity was supported by a document listing the main components of educational games, namely the simplified version of the SGDA framework, which is provided in Section *Section 4.3.1.2*. A document with available art assets, which are images and animations that can be used in games, is provided again in this stage (see *Appendix A.3*).

No modifications are proposed from the initial version of this stage as both the outcomes and the participants' feedback suggested that the proposed activities and resources were effective (see *Section 5.5.4*).
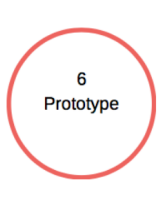
| 6 Prototype | **Activity:** 1. Creation of a prototype - *120 minutes* | **Resources:** 1. Description of game components (simplified version of SGDA framework) 2. Document with access to art assets for games |

Figure 6.7: *Activities and resources for stage 6 of the revised framework*

6.5.2.4   Review of the Prototype

The next stage presented in *Figure 6.8* lasts 20 minutes and invites groups to step back from the prototypes they just created and adopt a holistic view to review them. The groups are instructed to review that the game conceptualised would not send mixed messages to potential players by ensuring that all the defined components are consistent between them and toward the game objectives. Examples are provided, for instance 'Depression Quest' illustrates that dark colors were chosen for the appearances of the game to invite participants to experience sadness and depression as its gaming objective.

| 7 Review of prototype | **Activity:** 1. Reflection about coherence of game prototype - *20 minutes* | **Resources:** None |

Figure 6.8: *Activities and resources for stage 7 of the revised framework*

One modification is proposed to the initial version of this stage, which is presented here:

- Activity 1 replaces the review activities in the previous version of this stage in order to simplify it.

As presented in *Section 5.5.4*, it was found that the groups did not engage with the activity and resources initially provided due to their perceived complexity and the fact that this stage is the last one of the first day of the Game Jam, which implies that participants

might feel tired at this point. As a result, this stage was considerably simplified for the revised version of the framework.

6.5.3 Develop and Present

As first introduced in Section *Section 4.3.1.3*, the next two stages aim at translating the prototypes conceptualised to the development of a game using a game engine and presenting their games to all the participants.

6.5.3.1 Development and Iterative Evaluation

This first stage of the second day of the Game Jam invites participants to develop in 10 hours their games based on the prototypes, as illustrated in *Figure 6.9*. This stage is supported by the use of a game engine and a reflective question inviting participants to consider potential modifications when transforming the prototype into a game, for instance if a participant cannot develop a feature with the game engine as conceptualised. The groups are invited to use this question to consider the objectives of their games when they potentially implement a modification, 'Does the modification you are proposing to your game align with the objectives of your game?'.
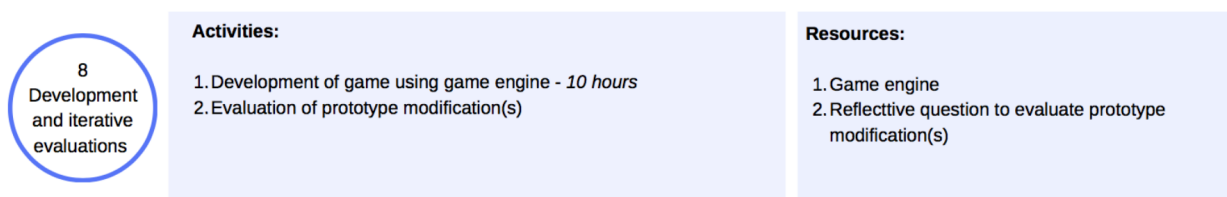
Figure 6.9: *Activities and resources for stage 8 of the revised framework*

One modification is proposed to the initial version of this stage, which is presented here:

- A reflective question is used to replace group interviews in order to evaluate games.

As presented in Section *Figure 5.5*, the results suggested that the group interviews to evaluate the games being developed was perceived as an interruption as they were con-

centrating on developing their games and did not implement any modifications while developing their games. However, evaluating potential modifications is important as it can enable groups to ensure that the games they develop are aligned with the objectives they conceptualised for their games. As a result, this activity was replaced by inviting groups to reflect only on the potential modification they propose to their game prototypes when they develop such modifications.

6.5.3.2   Presentation

This is the last stage of the Game Jam and each group is invited to present their games to the other participants. The time allocated is five minutes per group, as presented in *Figure 6.10*.
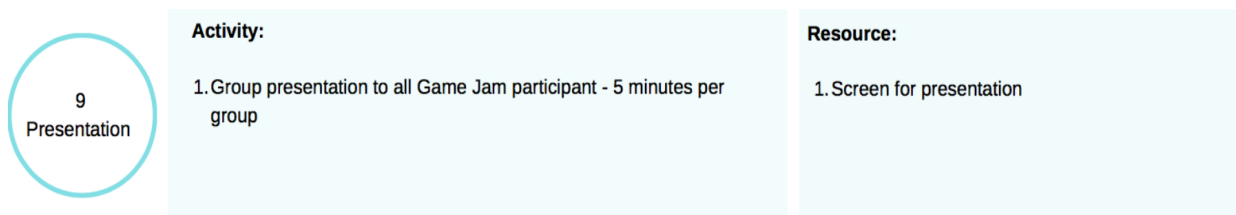
Figure 6.10: *Activities and resources for stage 9 of the revised framework*

No changes are proposed for this stage as both the outcomes and the participants' feedback about this stage suggested that the proposed activities and resources were adequate (see *Section 5.7.5*).

6.6   Final Reflections on Research Questions

Regarding the RQ1 (i.e. 'What support do Game Jam participants need to engage with social issues?'), overall, it was evidenced that the resources and activities on everyday sexism were suitable to create engagement with this issue among participants. The findings presented here illustrate that stories are relevant to reach inclusive participation in group

discussion, as they enable Game Jam participants to contribute based on their personal experiences with the issue. Using personal experiences also enables Game Jam participants to contextualise and relate to the social issue discussed, which in turn creates engagement. This research illustrates that this initial engagement can then be complemented with adequate questions to shift discussions from the personal level to more general discussions of the social issue. In addition to encouraging group discussions, it was also found that diversity within groups should be ensured, as it contributes toward creating opportunities to learn from diverse experiences and perspectives. This diversity should also be reflected in the resources provided, and especially when stories about a social issue are presented, enabling participants to both learn and relate to the provided information. As evidenced, co-designing these resources was an adequate solution to reach such diversity. For these reasons, to support participants' engagement with a social issue, collective discussions should be encouraged during a Game Jam. However, to ensure engagement among all participants, the co-design of resources on social issues should also consider evaluating how the information presented could be used to facilitate individual learning, as some participants may feel more comfortable with this strategy. Lastly, regarding engagement through the conceptualisation of games, it was found that keywords, illustrations or stories, can be used to both facilitate engagement with a social issue and to support groups in the early stages of educational game design by creating branching stories. Also contributing to engagement, this research also revealed that prototyping the game may lead groups to research additional information on the social issue as they want to feature it in their games.

Regarding RQ2 (i.e. 'What resources and processes can be used to democratise educational game design practices?'), the resources and activities proposed to democratise educational game design practices were found to be suitable to support groups accessing information on educational game design on social issues, defining educational and gaming

objectives, and creating educational game prototypes. However, the resources proposed to review educational game prototypes and to evaluate games demanded a critical assessment in order to be considered suitable to support groups improving or validating their games. The findings presented here suggest the pertinence of incorporating the principles of Gee (2005) with Critical Pedagogy (see *Section 2.4*) to democratise the design of educational games specifically on social issues by presenting information that illustrates why and how learning about a social issue could be facilitated in games. It was also found that defining the educational and gaming objectives of the game can help groups inform their design decisions throughout Game Jams, suggesting that these objectives play significant roles in the process of democratising educational game design. These objectives are particularly important to support groups creating educational game prototypes as they can be used to help groups conceptualise games based on the games' intended objectives. In addition, to democratise the creation of educational game prototypes, supporting resources should also invite groups to consider the main design decision that they face when creating such prototypes (assuming that groups have previously defined the topic related to the social issue and explored the game engine that will be used to develop it). These decisions lead to a plan to integrate learning opportunities about a social issue in a game, and to determine each of the components that are encompassed in an educational game and to choose art assets. Lastly, although the proposed resources and activities for reviewing the educational game prototype and evaluating the games among groups resulted in little engagement, adopting an holistic and collective approach to evaluate the game should be still considered in the democratisation of educational game design. This implies that future research may be needed to assess the modifications proposed.

Regarding RQ3 (i.e. 'What support do participants need to acquire game development skills during Game Jams?'), it was found that, overall, *GameSalad* and the tutorial were suitable to help participants acquire game development skills to develop games. The

beneficial characteristics of *GameSalad* to democratise game development included its simplicity of use within a Game Jam timeframe, the access to adequate online tutorials, its building logic and structure that reflects concepts of game development, and its potential to be used to develop any type of single-player 2D games. Its negative characteristics that, arguably, limited the learning opportunities of participants, included its lack of collaborative features and inconsistency between the MAC and PC versions. Following this, it was also demonstrated that providing tutorials on the game engine during a Game Jam can be used to support participants to learn about game development. Building on this, inviting participants to create a test game was suitable to enable them to practice and learn how to develop games, suggesting that facilitating an activity that does not directly impact the games designed by the groups is adequate to support participants acquire game development skills. Lastly, it was found that democratising game development by forming groups based on diversity and not on the participants' skills contributed toward creating egalitarian learning opportunities on game development. Providing opportunities that make participants feel that they rely on the skills they acquire to develop a game could be an incentive to learn about game development during Game Jams. Indeed, forming groups based on participants' skills could lead some participants to feel they can rely on other participants, leading them not to try to learn how to develop games.

Regarding the Problem Statement (i.e. 'How to democratise educational game design on social issues during Game Jams?'), this thesis evidences that providing support and guidance, as well as communicating that such support is provided, contributes toward enabling diverse and novice individuals to participate in Game Jams. The findings also reinforce that to democratise participation in Game Jams providing support for game development is particularly needed. Following this, to frame support and guidance to democratise the design of educational games on a social issue, initial stages of design need to be targeted at exploring the topics of a social issue, educational game design and game development,

before starting to conceptualise such games. In addition to enabling participants to feel a sense of agency over the creation of their games, which contributes toward creating learning and engagement as participants perceive that they rely on themselves to design their games, this thesis indicates that providing resources and activities without relying on the participation of experts is necessary. Two main insights to shape such resources and activities are presented: first, this thesis demonstrates that they should be designed considering that participants will rely on them to design and develop their games and, second, it also evidences that the principles of Critical Pedagogy are relevant to shape the egalitarian participation of individuals during Game Jams. More precisely, this thesis evidences that providing the same supportive information as well as the same learning and reflective opportunities to all participants, and encouraging them to use dialogue, reflection and collaboration within their groups, contributed toward enabling egalitarian participation in group discussions and in designing their games.

It was also pointed out that the main expectation, motivation and reason why participants would recommend participating in the Game Jam was to learn about educational game design. It was also revealed that participants felt highly empowered to develop more educational games on social issues by the end of the Game Jams even though most of the games created during the Game Jams were not finished. This evidences that Game Jams to democratise educational game design on social issues were perceived as events to learn and experiment how to design such games, instead of completing fully developed games. Following this, it was also found that most participants did not expect to learn about everyday sexism or were not motivated by this idea, but they would recommend participating in the Game Jam to learn about this topic. This suggests that Game Jams can be used to create engagement with social issues and create social awareness to broad audiences, who might include people who are not initially interested or active in discussing social issues.

6.7 Chapter Summary

This chapter presented the findings of this thesis related to each of its Research Questions and its Problem Statement. Each Research Question was discussed in *Section 5.4*, *Section 5.5* and *Section 5.6*, respectively, by drawing on the literature reviewed in *Chapter 2* and the results found in *Chapter 5*. Following this, *Section 6.4* presented discussions around the Problem Statement. The revised version of the proposed framework was presented in *Section 6.5*. Lastly, summative remarks and final reflections on the research questions and problem statement of this thesis were presented in *Section 6.6*.

Chapter 7

Conclusion

This chapter first presents the limitations of this thesis in *Section 7.1*. After this, the contributions of this Ph.D are presented, starting with the theoretical contributions in *Section 7.2*, the practical contributions in *Section 7.3* and the social contribution in *Section 7.4*. This chapter then presents opportunities for future work in *Section 7.5*.

7.1 Limitations

The findings of this study have to be seen in light of some limitations. The first concerns the evaluation of the learning acquired by the participants of the Game Jams. The analysis of learning was conducted using responses based on the participants' perceptions. Therefore, the results can only be used as indicative measures and not as an objective evaluation of learning. Perceptions on learning were considered relevant for this research since the proposed framework was developed to make participants feel empowered to create educational games on social issues.

While this thesis included a total of 191 people as participants, the Game Jams themselves were attended by 8 and 15 people, respectively, and were evaluated in one context, namely in central London and with people who had personal computers. The frame-

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work is considered suitable for similar contexts, where computers and Internet access are an integral part of people's everyday lives and where diversity in participation could be reached. Arguably, applying the proposed framework in different contexts, such as rural communities in emerging countries, brings additional issues that would need to be considered to adapt the use of the framework. These might include different levels of computer literacy, greater difficulties in ensuring that each participant has access to a computer during the Game Jam, challenges related to social mobility that could present difficulties in reaching diversity in participation, and the translation of the framework to another language. In addition to exploring each of these issues, this research recommends co-designing the cards on a social issue (see *Section 4.1*) within the context in question (i.e. even if the social issue chosen is everyday sexism it is recommended to create new cards since the manifestations of this social issue can be significantly different in other contexts) and considering diversity related to the context where the framework intends to be used (e.g. the inclusion of indigenous people in contexts where they are historically marginalised).

Another limitation of this Game Jam is related to the multidisciplinarity of educational game design and the limited time available for Game Jams, which limited the scope of potential activities by prioritising certain learning opportunities. For instance, the study of Falcão et al. (2018) (see *Section 2.3.2*) presented a framework where training on the use of a graphical editor was provided to enable participants to create art assets. This research prioritised learning about a social issue, fundamentals of educational game design and game development by using a game engine. Other learning opportunities could have been included about music in games, the development of a multiplayer game or writing game narratives, for example.

The two Game Jams organised for this research were identically replicated to ensure consistency in the collected data. This led to an additional limitation, which is that the

framework was applied by the same team of coaches, including the leading coach being the researcher of this Ph.D. Enabling the Game Jam to be run by other people could have presented valuable insights on the clarity of the instructions and the potential of the framework to be used by people who do not have the same level of understanding of the framework as the leading coach.

This thesis relied on analysing the results gathered during two Game Jams and did not collect any data after the events. The participants said they intended to design more games after attending the Game Jam. Exploring whether participants kept on working on their games or developed other games after attending the Game Jam could further corroborate the potential of Game Jams as empowering for novices to design educational games, but was not considered at the time.

7.2   Theoretical Contributions

The theoretical contributions this thesis presents, are as follows, which are further described in the following subsections.

1. Application of Critical Pedagogy to facilitate agency and egalitarian participation in Game Jams;
2. Alignment of Gee's principles with Critical Pedagogy to democratise knowledge on educational game design on social issues;
3. A process to co-design cards on social issues.

7.2.1   Critical Pedagogy for Game Jams

One of the theoretical contributions this thesis presents is the application of Critical Pedagogy as an educational approach for democratisation to support learning through agency and egalitarian participation among Game Jam participants. All the educational game

design initiatives found in the literature that involved novice individuals (see *Section 2.3*) relied on defining the information that should be provided to facilitate learning and support groups designing educational games. This thesis adds on these studies by introducing the application of Critical Pedagogy to shape Game Jams by enhancing learning through using personal experiences, involving participants as equal learners, endorsing diversity, promoting constant dialogue and collaboration, reinforcing the role of participants as agents of social change, and restricting the participation of experts. The application of Critical Pedagogy to shape both the process and each stage of the proposed framework, led to enhanced learning outcomes by facilitating balanced contributions among participants, as well as giving them agency over their group discussions and the design of their games.

7.2.2 Educational Game Design on Social Issues

The literature presented conceptual models and principles to support individual understanding and define how to facilitate learning in games. Conceptual models were reviewed as unsuitable for novice groups due to their complexity and due to the fact that their use relies on people's expertise. While principles were considered suitable to be used by broad audiences, the principles found in the literature were not targeted at providing information on how to facilitate learning through gaming specifically about social issues, which was needed for this research. Following this, the 13 principles of learning in games proposed by Gee (2005) were used as a foundation to democratise knowledge of how to facilitate learning about social issues through gaming. Validated in an interview with James Paul Gee, this thesis presents a theoretical contribution of integrating these principles with Critical Pedagogy to democratise knowledge of educational game design on social issues. This contribution first relies on identifying similarities between Gee's principles and Critical Pedagogy to then adapt each of the 13 principles to the design of educational games on social issues. This contribution also relies on recognising the complementarities of Criti-

cal Pedagogy to Gee's principles, which were based on using information on how to raise awareness of social issues that Critical Pedagogy provides, to further support people's understanding of these principles.

7.2.3   Co-design Process

A co-creation process used to design the cards on everyday sexism was presented in *Section 4.1*. This process is applicable to create cards on other social issues. All the information, questions used in the questionnaires and resources needed to apply this process have been made available in *Section 4.1*. This process is based on the following steps:

- A collaborative workshop to inform the content of cards (see *Section 4.1.1*);
- Individual evaluations to improve the cards (see *Section 4.1.2*);
- A collaborative workshop to further improve and validate the cards through story-telling activities using them (see *Section 4.1.3*).

This co-creation process could be appliedto create cards on other social issues, and use them to design educational games through applying the proposed framework. The cards created could also be used during other activities intending to create engagement with a social issue among groups.

7.3   Practical Contributions

The following practical contributions of this thesis are further described in the following subsections.

1. Framework to democratise educational game design on social issues during Game Jams;

2. Resources to democratise practices of educational game design as well as insights on beneficial and negative aspects of GameSalad to democratise game development;

3. Illustration of the role of support and guidance to diversify participation in Game Jams;

4. A set of cards and activities to create engagement with everyday sexism.

7.3.1 Framework

The first practical contribution of this thesis is the presentation of the framework (see *Section 6.5*), which could be used to enable people to engage with a social issue and acquire game development skills by supporting them in the creation of educational games on social issues during a Game Jam. This framework could be used with other social issues, such as racism, islamophobia or discrimination against the LGBTQ+ community (see *Section 2.4.3* and *Section 6.5*). Other game engines than *GameSalad* could also be used (see *Section 6.3.1* and *Section 6.5*).

This framework fills a literature gap related to understanding what learning outcomes could effectively be facilitated during Game Jams and how to use principles of democratisation to achieve such outcomes. As presented in the literature review chapter (see *Chapter 2*), Game Jams were identified as having potential to create learning opportunities about social issues and game development. However, the extent to which these learning opportunities could be reached, and how, was presented as a literature gap (see *Section 2.1.6*). To define how these learning opportunities could be facilitated and to enable diverse groups to have access to these opportunities, the literature suggested the relevance of using principles of democratisation (see *Section 2.4.4* and *Section 2.3.4*). This framework contributes to the literature by presenting a framework that achieves three learning outcomes during a Game Jam (see *Section 4.3*) and by presenting the rationales of the framework stages to facilitate these outcomes through democratisation (see *Section 4.3.1*).

7.3.2   Game Design

All the resources to democratise practices of educational game design created for the framework were made available in *Section 4.2* and *Section 6.5*:

- The educational game design cards to democratise knowledge on educational game design on social issues;

- The Yin and Yang template with examples to provide guidance in defining a game's objectives;

- A simplified version of the SGDA framework to create a prototype considering the main components of an educational game (Mitgutsch and Alvarado, 2012);

- A checklist to review the objectives of an educational game; and

- A reflective question to evaluate an educational game.

In addition, the use of GameSalad during the Game Jams presented insights on the beneficial and negative features of this game engine to democratise game development (see *Section 6.3.1*). These insights could be used to inform decisions on choosing a game engine to enable democratised audiences, including novice individuals, to develop games.

7.3.3   Game Jams

The literature illustrated that Game Jams are mostly attended by experienced game developers and by males (see *Section 2.1.2*), which suggests that efforts need to be undertaken to make these events attractive to broad and novice audiences. To diversify the participation of Game Jams, solutions were proposed in the literature (see *Section 2.1.2*), which were to use communication to recruit female participants and to organise Game Jams exclusively for women. The literature also presented insights suggesting that not having game development skills is the main reason why novice individuals would not participate in Game Jams. This thesis advances these discussions by evidencing that providing support and guidance in educational game design, as well as communicating

that such support is given, contributed toward enabling novice and diverse individuals to participate in the proposed Game Jams, where diversity was not only considered in terms of gender but also ethnicities, age and sexual orientation (see *Section 5.2*). This contributes to the literature of Game Jams by suggesting that the most popular model of Game Jams, where participants have freedom to design games the way they choose, needs to be adapted by providing support and guidance to make them attractive to novice individuals from under represented groups.

This thesis also presents insights on the potential of Game Jams to be used as learning experiences to empower broad and diverse audiences to design educational games. This thesis found that, aligned with the main motivation of game developers to attend Game Jams (see *Section 2.1.2*), the participants of this research attended the proposed Game Jams to learn about educational game design and concluded the weekend with intentions to design more educational games. This contributes to the literature of Game Jams by evidencing that Game Jams have the potential to attract broad audiences aspiring to learn how to design educational games on social issues, which could be then used as first steps towards enabling broad and diverse audiences to design educational games. In addition to the contributions presented in the previous paragraph, this thesis presents additional practical contributions on how to attract broad and novice audiences to such events by introducing findings and recommendations related to communication strategies (see *Section 6.5*).

7.3.4 Everyday Sexism

The cards on everyday sexism and activities to facilitate the use of the cards were made available in *Section 4.1*. As the content of the cards and the proposed activities were validated, they could also be applied by other groups intending to create engagement with everyday sexism, not necessarily aimed at designing games. As seen in the limitations of

this research (see *Section 7.1*) the presented set of cards could be used in similar contexts where participants could relate to or experienced some of the presented stories.

7.4   Social Contributions

This research directly involved 138 people to discuss the social topic of everyday sexism, including people with low levels of understanding on this topic and engineering students taking part in a day-long event to raise awareness of gender equality. In addition, this research also contributed toward enabling 22 people to feel empowered as educational game designers after participating in a Game Jam. This thesis presented social contributions in terms of including diverse groups in processes of educational game design on social issues. The Game Jams organised 53% of the participants were from black, asian or minority ethnic backgrounds, 26% of participants had another sexual orientation than heterosexual, and their ages varied across adult range categories (from 16-to-21 to over 52).

7.5   Future Work

In light of the suggestions to improve the proposed framework, for instance to avoid facilitating punctual interviews to evaluate games (see *Section 6.5*), future investigation is necessary to evaluate the relevance of these suggestions toward the objectives of the framework. The framework could also potentially be applied to other social issues and another game engine, following the recommendations presented in *Section 6.5*. In addition, other people orchestrating the Game Jams could help explore its suitability to be replicated by others and to further refine it.

This thesis validated the use of the educational game design cards to support Game Jam participants learning about principles of educational game design and implementing such

principles in their games. Future investigation could build on these findings and explore the use of cards to support groups fully developing educational games on social issues, perhaps in a context different from a Game Jam, where the games are more likely to be completed.

As illustrated in the limitations of this thesis (see *Section 7.1*), the proposed framework targets a limited scope of learning outcomes. The multidisciplinarity of educational game design presents other learning opportunities that could be facilitated in a Game Jam. Future work connecting Critical Pedagogy to Game Jams could expand the pursued set of learning opportunities related to other aspects of game design.

This thesis evidenced the relevance of providing structured guidance and support to design educational games on social issues to facilitate diversity in Game Jam participation. This could be used to explore the use of guidance and support to diversify the participation of other Game Jams, such as the GGJ, where participants design many different types of games. Building on this, future investigation could be targeted at further exploring how to accommodate the demand of game developers, who currently attend these Game Jams and choose a game engine to develop their game, and novice individuals, who can only use certain game engines to participate in such events. The benefits of diversity within groups to facilitate collaborative learning about social issues and the relevance of using Game Jams to encompass additional learning opportunities than acquiring skills in game development (e.g. learn about educational game design) were illustrated in this thesis, and could be used to tackle this question.

Lastly, this thesis presented results indicating that Game Jams could be used as preliminary steps to enable people to acquire knowledge and skills to further develop educational games on social issues. An avenue for future research is to explore if people continue developing games, may they be new games or further develop the ones created during

Game Jams, after participating in a Game Jam.

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Appendices

Appendix A

Appendix Formative Design Studies

A.1 Template for Creation of Cards on Everyday Sexism

Title	3. Reflective questions
1. Keywords 5 min — Feedback	What-question (5min) — Feedback
	How-question (5min) — Feedback
	Why-question (5min) — Feedback
2. Illustration 5 min — Feedback	What-question (5min) — Feedback
	4. Comment and sugg. 3 optional minutes — Feedback
3. Lived Experiences 15 min	5. Feedback on the workshop

Figure A.1: *Template used to inform on the creation of cards on everyday sexism*

A.2 Manual on GameSalad
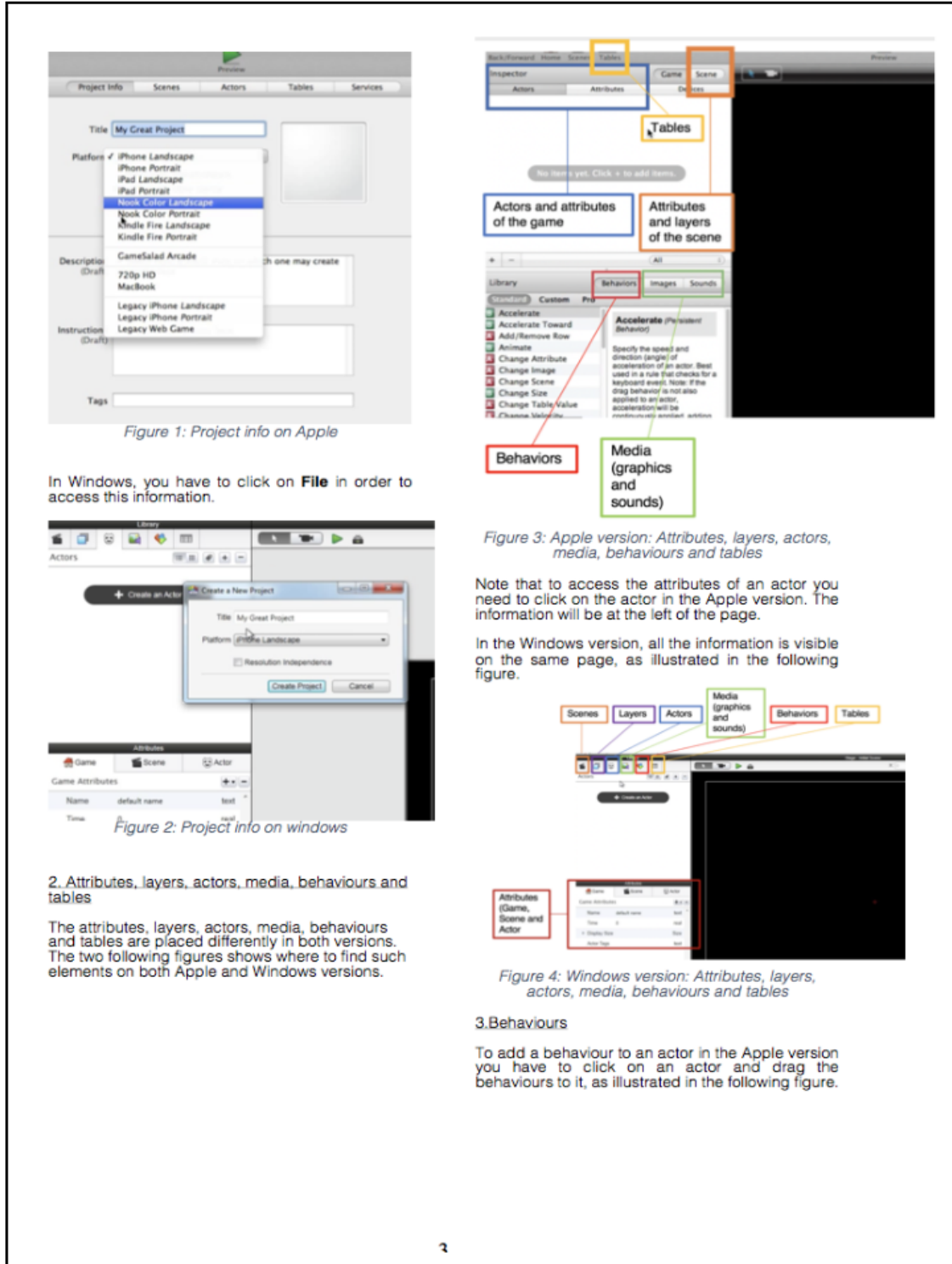
Figure A.2: *Screenshot of a page of the provided manual on GameSalad*

A.3   Overview of Art Assets
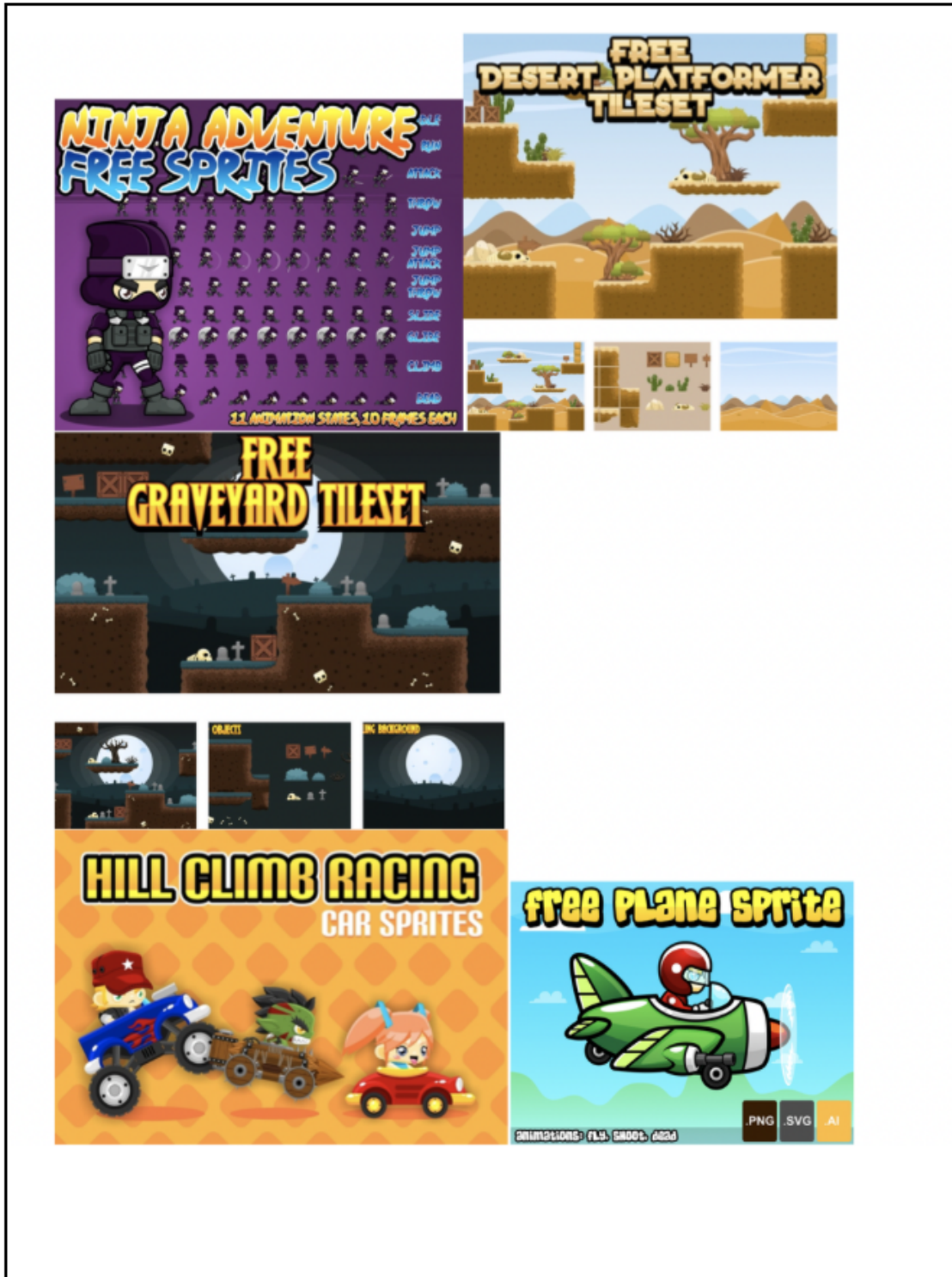
Figure A.3: *Screenshot of a page from document on art assets*

A.4   SGDA Components Simplified

Appearances of your game:

This component refers to the visual and aesthetic aspects of your
game (aesthetic, imagery, sounds, graphics, etc.).

Your story

This component refers to the storytelling aspects of your
game, which is mainly composed of the game story, its context/environment
and the characters.

Your players

This component refers to the target audience of your game and
their understanding on the topic or their ability to play a game like yours.
This component aims at defining who your players will be and what characteristics
they have.

Actions and rules

This component describes the potential actions, usually illustrated by verbs, that a
player can perform in your game. These actions are
governed by rules which describe how to play the game.

Reward system and win/lose conditions

With this component, you should define the rewarding system of your
game, which is how your player will win and lose points or be rewarded.
You should also define the win/lose conditions of your game, if you want any.

Information and Data

This component refers to the written information and data presented in the game
about the educational topic, which is everyday sexism.
You should write down what information and data on everyday sexism you
provide in your game (if you provide any).

Table A.1: *Educational game components for SGDA simplified*

Appendix B

Appendix Evaluation Study

B.1 Observation Notes

Observation notes for Day 1:

- Report all questions asked

- Report all issues reported

- Report when groups finish earlier or take additional time on activities

- Report how participants use resources

- Report all additional research conducted (and collect material created e.g. if document with additional research on a topic is created, included if document is virtual)

SECTION 1: Everyday sexism and cards on everyday sexism:

- How the participants started using the everyday sexism cards

- Report of questions asked (on both activities and cards)

- Card(s) chosen

- Moment the participants stopped using the cards

- Difficulties reported to create story or branching story

- Research on everyday sexism conducted on the internet

SECTION 2: *GameSalad*:

- Questions asked during tutorial on *GameSalad*

- Test games completed on *GameSalad* (with participant's name)

- Help provided to other participants during tutorial on *GameSalad*

- Report on time and discussions on limitation and potential of *GameSalad* (what aspects are discussed, what questions are asked, what resources are accessed etc)

SECTION 2: SECTION 3:Educational game practices and cards on educational game:

- How the participants started using the cards on educational game design

- Report of questions asked (on both activities and cards)

- Card(s) chosen

- Game elements chosen

- Moment the participants stopped using the cards

- Research on games or educational game design conducted on the internet

- Report if participant use the card during prototyping exercise

SECTION 4: Other stages:

- Timing on each of the stages - additional time asked? - Managed to finish activities on time?

- General observation on each activity and how resources were used

- Questions asked (with reference of participant, time and stage in question)

- Issues reported

- Report if and when one of the cards is used after activities (and what card)

- Report if the participants created a game idea by the end of stage 3 (Game Jam A) or stage 4 (Game Jam B)

- Report if participants managed to create gaming and educational objectives during Stage 5

<u>SECTION 5: Prototype:</u>

- Additional research conducted during prototype stage (with picture on material created or access to document)

- Report if additional research conducted

- Report if groups access resources (and report on which ones)

- How stage started (reading game components? Discussing game idea?)

- What game components were discussed and in what order - report if the groups discuss each of the game components

Observation notes for Day 2:

- Use of the cards (and which one) during Day 2

- Questions asked

- Role of each participant (work on a scene individually or collectively? or what task each participant take?)

- Detail on task that each participants works on

- Report if participant access to tutorials on GameSalad (with reference of participant)

- Report if participant conducts additional research on GameSalad on the internet (with reference of participant)

- Report if participant uses the manual given on GameSalad (with reference of participant)

- Details on help given between participants / groups

- Report difficulties and issues reported (with reference of participant)

B.2 Group Interviews

Interview 1 (Afternoon Day 1):

<u>SECTION 1: Everyday sexism and cards on everyday sexism:</u>

- What are your impressions of the cards on everyday sexism?

- How have you used the cards? Have they helped to support group conversations? If yes

how?

- How much do you have learnt from group discussions?

- How much have you learnt on everyday sexism using the cards? And from group discussions? How?

SECTION 2:Educational game practices and cards on educational game:

- How have you used the cards? Have you found them useful to understand better educational game design?

- What was the role of the cards in creating your prototype?

SECTION 3: Day 1:

What are your impressions on the process and activities of the first day of this Game Jam? Why? Would you change anything? If yes what?

Interview 2 (Afternoon Day 2):

- How much you learnt on everyday sexism today? How?

- How much you learnt on educational game design today? How?

- What are your impressions on the process and activities of this Game Jam? Why? Would you change anything? If yes what?

- What are your impressions on GameSalad? Why? What are the needed features of an engine to design educational games with groups who might not have developed a game before?

B.3   Group Interviews for Game Evaluation

- What is the educational objective of your game? (open-ended question)

- How confident are you that future players will reach the intended educational objective of your game? (scale)

- What is the gaming objective of your game? (open-ended question)

- How confident are you that future players will reach the intended gaming objective of your game? (scale)

B.4 Individual Questionnaires

Questionnaire 1 (Beginning of Day 1):

- How much do you know about everyday sexism? (scale)

- How much experience do you have using Gamesalad? (scale)

- What are the reasons that motivated you to participate in this game jam? (list)

- Which of the following options do you think are going to be the top three challenges when designing an educational game aimed at raising awareness about everyday sexism during the Game Jam? (list)

- What is your main expectation for this game jam? (list)

- How much guidance and support do you think you will need to design an educational game on everyday sexism? (scale)

- Any additional experiences or comments you would like to add about the previous questions (open-ended question)

Questionnaire 2 (End of Day 1):

SECTION 1: Everyday sexism and cards on everyday sexism :

- How much do you think you have learned about everyday sexism today? (scale)

- What three activities have most contributed to your learning on everyday sexism today? (list)

- How much would you recommend using the everyday sexism cards with the storytelling activities with people who intend to design educational games on everyday sexism? (scale)

- How important was it to learn about everyday sexism to create your game prototype? (scale)

- Additional comments and/or suggestions about the everyday sexism cards and the storytelling activities (open-ended question)

SECTION 2: Educational game design and educational game design cards :

- How useful were the cards at supporting you with ideas on how to design educational games? (scale)

- How much would you recommend using these cards to design educational games on social issues? (scale)

- Why? (open-ended question)

- How much do you think you have learned about educational game design discussing the cards with your group? (scale)

- Additional comments or suggestions about the cards and the exercises with the cards: (open-ended question)

- How much do you think you have learned about educational game design today? (scale)

- How important was it to learn about educational game design to create your game prototype? (scale)

SECTION 3: Questions on day 1:

- Did you feel you needed additional support today? (yes/no)

- If yes, could you specify? (open-ended question)

- How much did you enjoy your first day of the Game Jam? (scale)

- Would you change the order of the activities of today? (yes/no)

- If yes, how and why? (open-ended question)

- In general, how adequate was the timing of the activities? (scale)

- Please explain why? (open-ended question)

- Additional comments and/or suggestions about this activity and the resources provided today(open-ended question)

Questionnaire 3 (Beginning of Day 1):

- How satisfied are you with your game prototype so far? (scale)

- Why? (open-ended question)

- How balanced were the contributions of the participants of your group yesterday? (scale)

- Why? Please specify (open-ended question)

- How balanced were the contributions to discussions of the participants of your group yesterday?

Questionnaire 4 (End of Game Jam):

- How much would you recommend using Gamesalad to develop educational games including to people who have never designed games before? (scale)

- Please explain why? (open-ended question)

- How much do you think you have learned about everyday sexism during this game jam? (scale)

- How much do you think you have learned about developing games with Gamesalad at this game jam? (scale)

- How much do you think you have learned about designing educational games at this game jam? (scale)

- How satisfied are you with your game? (scale)

- Why? (open-ended question)

- Do you think you needed additional support to design your game during the game jam? (yes/no)

- If yes, please specify (open-ended question)

- Do you think all the activities and resources were necessary to enable you create your game? (yes/no)

- If no, could you specify which ones were not necessary?

- How much would you recommend participating in this game jam to other people? (scale)

- Why? (open-ended question)

- What was the main challenge you faced during the Game Jam? (open-ended question)

- What was the most fruitful activity or aspect of the Game Jam for you? (open-ended question)

- How likely is it that you will design another educational game on a social issue in the future? (scale)

- How capable do you feel towards designing another educational game on a social issue? (scale)

- How likely is it that you will work more on the game created during this game jam in the future? (scale)

- Do you think that with more time and with the knowledge that you acquired during this game jam you could design an/another educational game? (yes/no)

- If No, why? (open-ended question)

- Would you change the order of the activities of the game jam? (yes/no)

- If yes, how and why? (open-ended question)

- What advice would you give to other people participating in this game jam in the future? (open-ended question)

- Any additional suggestions or comments about the game jam (open-ended question)

B.5 Questionnaires on Motivation and Confidence

Each participant had to fill two graphs each day, one on their motivation levels and the other one on their confidence levels. The graphs were followed with an open-ended question that stated "Any additional comments you would like to add about your levels of motivation and confidence?".

Instructions for Day 1 and Day 2:

Motivation: Please fill this graph with your levels of motivation to design your game.

You will have to come back to this graph a few times today!

Confidence: Please fill this graph saying how confident you feel towards being able to design an educational game on everyday sexism. You will have to come back to this graph a few times today!
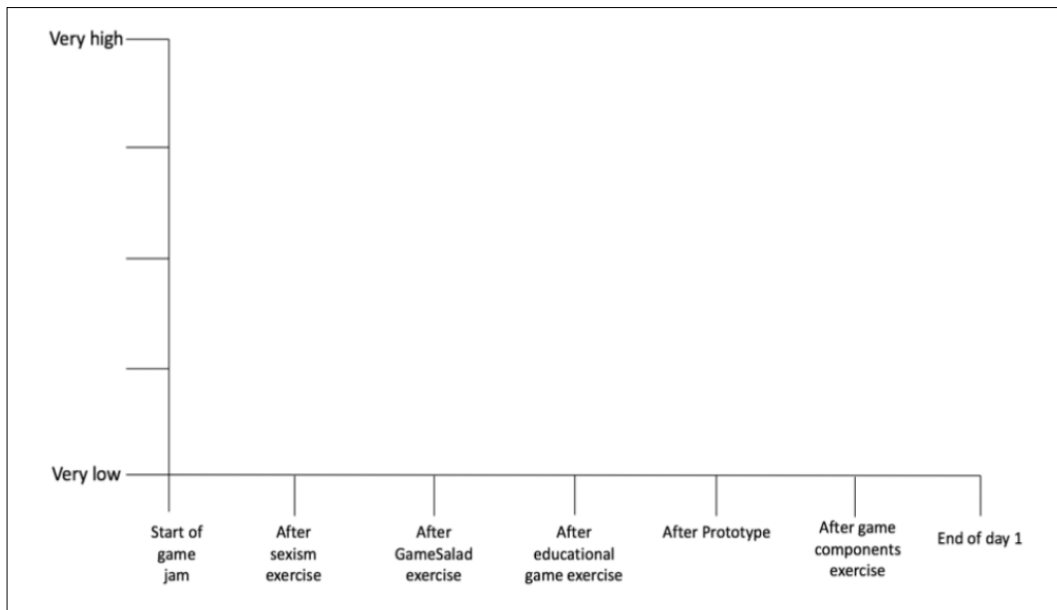
Figure B.1: *Template to collect levels of motivation and confidence throughout Day 1*
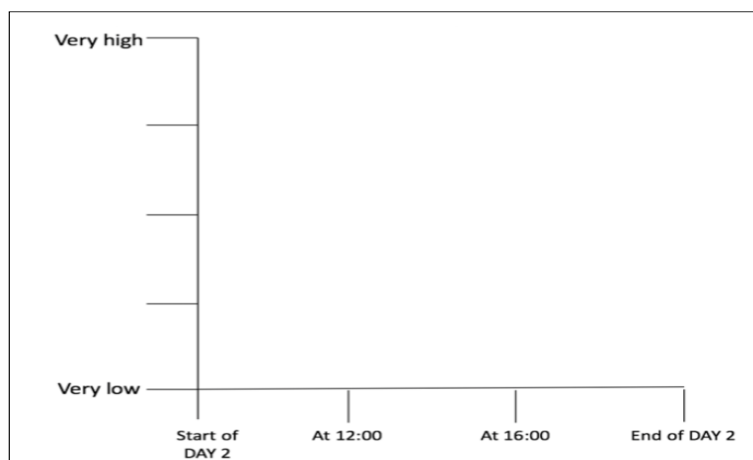
Figure B.2: *Template to collect levels of motivation and confidence throughout Day 2*

B.6   Individual Questionnaires Pre-Game Jam

Questionnaire 0:

- What is your name? (open-ended question)

- What is your email address? (open-ended question)

- What is your gender? (list)

- What is your age? (list)

- To which of the following groups do you consider you belong? (background list)

- Which of the following options best describes your sexual orientation?

- Have you ever participated in a game jam? (yes/no)

- If yes, how many times? (open-ended question)

- Have you ever designed a game?(yes/no)

- If yes, approximately how many? (open-ended question)

- If you have ever used Gamesalad please also specify it here (open-ended question)

- Have you ever designed an educational game?(yes/no)

- If yes, approximately how many? (open-ended question)

- Do you have a laptop and could you bring it to the Game Jam? (yes/no)

- Do you have experience using a/some Computer programming languages?(yes/no)

- If yes, could you explain which ones and how much experience you have (open-ended question)

B.7 Advertising Poster for Game Jams

Figure B.3: *Advertising poster for Game Jams*

B.8 Cards on Everyday Sexism Chosen by Groups

	Everyday sexism cards selected
A-G1	Gender stereotypes (6C) - Sexist Language (5A)
A-G2	Downplay gender discrimination (1A) - Gender stereotypes (6C) - Benevolent sexism (2C)
B-G3	Sexist Language (5A) - Benevolent Sexism (2A) - Feminism (3C)
B-G4	Gender stereotypes (6A) - Benevolent Sexism (2A) - Feminism (3C)
B-G5	Benevolent sexism (2A) - Gender stereotypes (6C)

Table B.1: *Cards on everyday sexism chosen by groups*

B.9   Cards on Educational Game Design Chosen by Groups

	Educational game design cards selected
A-G1	Identity (1) - Information (8) - Skills as Strategies (11)
A-G2	Identity (1) - Manipulation and distributed knowledge (4) - Meaning as Action (13)
B-G3	Information (8) - Fishtanks (9) - Sandboxes (10)
B-G4	Customisation (2) - Well-ordered problems (5) - Meaning as Action (13)
B-G5	Identity (1) - Well-ordered problems (5) - Information (8)

Table B.2: *Cards on educational game design chosen by groups*

Appendix C

Appendix Discussion

C.1 Example Story and Branching Story

Figure C.1: *Example story and branching story*

Appendix D

Everyday Sexism Cards

DOWNPLAYING GENDER DISCRIMINATION

#LetItGo
#DifferentBuSameRights?
#SexismToday
#Exaggerate
#WomenCanVote
#Normalisation
#SameOpportunities?

"I grew up wondering why there were so few female leaders and thought we didn't have the talent. Every time I asked, people would tell me that sexism is an issue of the past and that today women have the **same opportunities** as men."
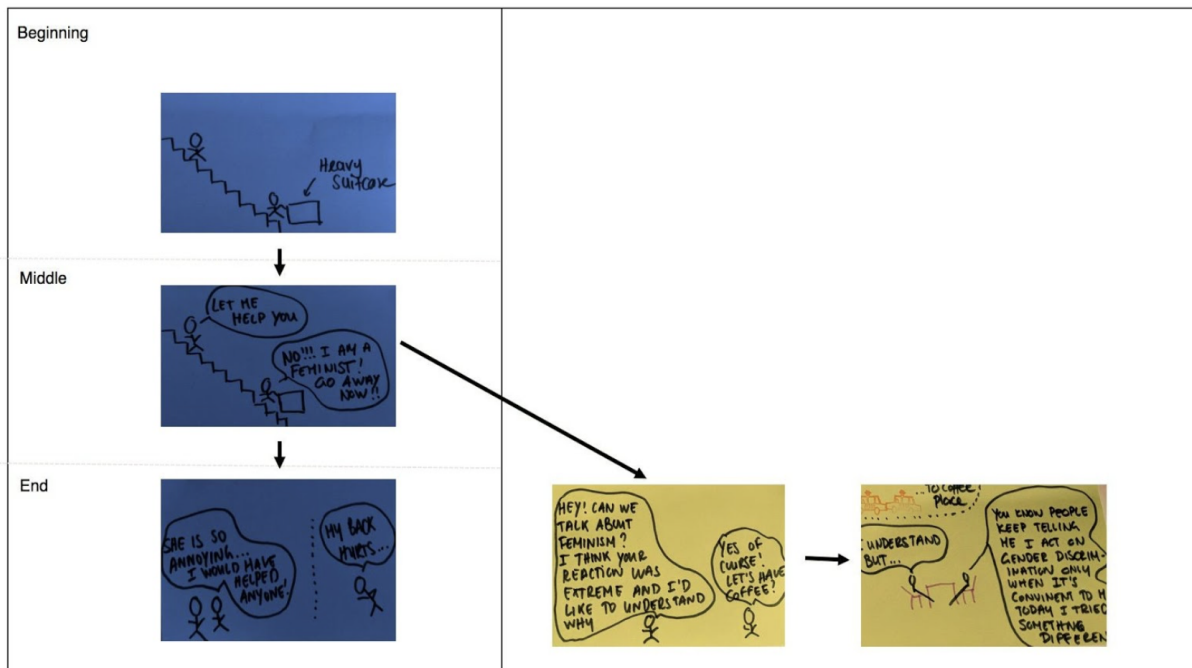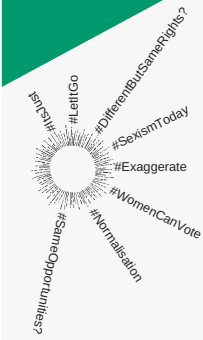
"There are many people who deny the existence of sexism in the UK. They think that it only happens in emerging countries. I am constantly asked my bra size. I refuse to **normalise** this kind of behaviour"

"I explained to my boyfriend how sexism was still an issue in today's world. He asked me if I was on my period and said sexism **could happen to men too**."

"Women can work and vote. Sexism does not exist anymore"

DOWNPLAYING GENDER DISCRIMINATION

What is **downplaying** gender discrimination?

Why would people **downplay** gender discrimination?

How could downplaying gender discrimination **contribute** to gender inequality?

What could you do to **respond** to gender discrimination in a constructive way?

DOWNPLAYING GENDER DISCRIMINATION

#FlagSexism
#LetItGo
#NoFuss
#Responsability
#Normalisation
#Exaggerate
#Diminishing

"I studied in a class where females were a minority. During a practical experiment, the male professor asked me and another female student to be the 'glamorous assistants'. **Should I say 'Thank you'?"**

"A man grabbed my breast and after 7 years I still feel terrible about it. I realised that **I was scared of people telling me that I am uptight** when I would share this story".

"When I flag sexism, people say that I exaggerate or that I am being dramatic. I am tired of having to tell people that is not OK to assume that my boss is a man. These **"little" everyday incidents** shape the bigger picture of gender discrimination".

"It is just a compliment. Relax".

DOWNPLAYING GENDER DISCRIMINATION

What are the potential **obstacles** to reporting gender discrimination?

Why could downplaying gender discrimination make these obstacles **bigger**?

How could downplaying gender discrimination **contribute** to gender inequality?

What could you do **to challenge** downplaying gender discrimination?

BENEVOLENT SEXISM

#Courtesy
#Gentleman
#Independent
#PayTheBill
#TryingToBeNice
#PrettyAndCute
#Patronage
#GoodIntentions

"In an article, they described the presenter as 'the most luminous presenters combining **beauty and a keen intelligence'**. It is supposed to be nice but it is very difficult to imagine how a male presenter would be referred to the way he looks".

"I **held the door** for a couple of men who were behind me. One of them said his pride was hurt to let a woman hold the door for him."

"Some men sometimes **apologize** to me and my female friends when they swear, and not to the men present. I wonder why."

"You are such a gentleman"

BENEVOLENT SEXISM

What is **benevolent sexism**?

Why could benevolent sexism affect males and females **differently**?

How could benevolent sexism **contribute** to gender inequality?

What could you do to **challenge** benevolent sexism?

BENEVOLENT SEXISM

"I could easily be OK without a big man **protecting me**. I am a 20 years-old woman and I am stronger and older than my brother but he is the one who is constantly asked to protect me."
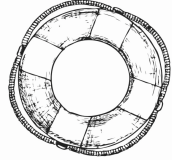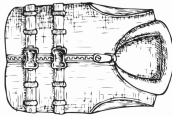
"I am a 35 years-old man and when I go to the restaurant with my girlfriend the bill is usually given to me. I am happy to pay but **women work too**, right?"

"One of my customers called me 'pretty little lady'. When I told my father about this story, he told me he was probably **trying to be nice**. I wish they could understand how disrespectful this is."

"Women and children first!"

#Courtesy #Gentleman #NeedProtection #Patronage #SecretaryRoles #TryingToBeNice #IndependentWoman #PrettyAndCute #Annoying

---

BENEVOLENT SEXISM

What are the potential obstacles **to reporting** benevolent sexism?

Why might it be difficult to **identify** benevolent sexism?

How does sexism **influence** some people's benevolent actions?

What could you do to **challenge** benevolent sexism?
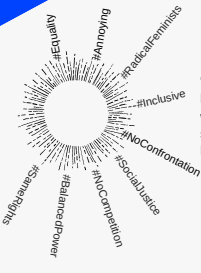
FEMINISM

"My sister refuses to talk about **'feminist exaggerations'** whenever I mention sexism. I tried to explain why I think feminism is important for social change. I told her I was being rational and she said I was oversensitive."

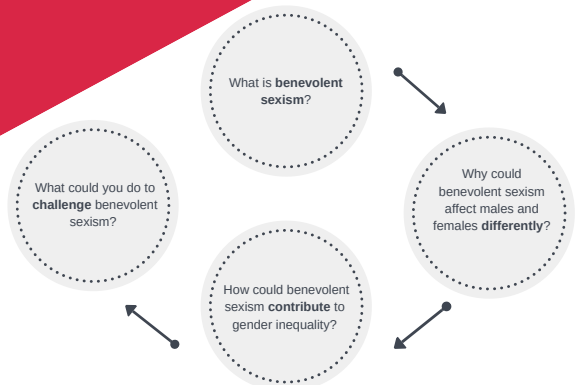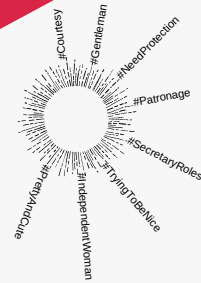"When I was in 8th grade I had to learn what the meaning of feminism was. I had to ask why it was supposed to be negative. The word has such a **bad connotation.**"

"I was in a meeting and someone told me I don't look like a feminist. I am not sure I knew what a feminist was **supposed to look like**".

"Could we be different but have the same rights?"

#Extremist #Annoying #RadicalFeminists #Inclusive #NoConfrontation #SocialJustice #NoCompetition #Balancedpower #SameRights

---

FEMINISM

What are the **connotations** of feminism?

Why might people understand feminism in **different ways**?

How might people's understanding of feminism affect their **behaviour**?

What could you do to show what feminism is in a **constructive way**?

FEMINISM

"I was told twice in a week that **I was a lesbian**. I have no problem with that but people thought that because I fight for women's rights to be considered equal".

"I joined a discussion about racism that two men were having. I introduced the topic of sexism. They could not understand how black women would **also be** subject to sexism".

"I heard a friend saying that he was a **'male feminist'** and he was mocked for trying to get into girls pants."

HELLO my name is

Chris

HELLO my name is

~~Chris~~ Feminist

#Equality #SocialChange #DifficultConversations #Oppression #Control #Fear #Hate-MenAssumptions #DoubleOppressions

---

FEMINISM

What are your perceptions of a **feminist**?

Why could feminism be **important** for everyone?

How could you best explain why some people **do not relate** to feminism?

What could you do to **tackle this issue**?

GENDER-BASED ABUSE

"I was raped by two men in a nightclub. When I told my friends they asked me **if I was drunk**. When I said that I had a few drinks, they told me that I could not complain and that it was my fault."

"I reported a sexual assault when I was 13. I remember people and a police agent asking me how **short my skirt was**."

"My boyfriend forced me to have sex with him. When I started asking for help the assumptions were that **I owed him sex** because we were together and because I am a woman."

"He was not physically violent."

#Object #Oppression #RapedByFamily #PersonalStigma #Isolated #BoxedIn #GenderPerceptions #Dress #SexualExpectation #RepeatAtHome
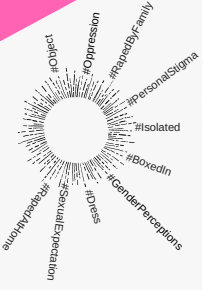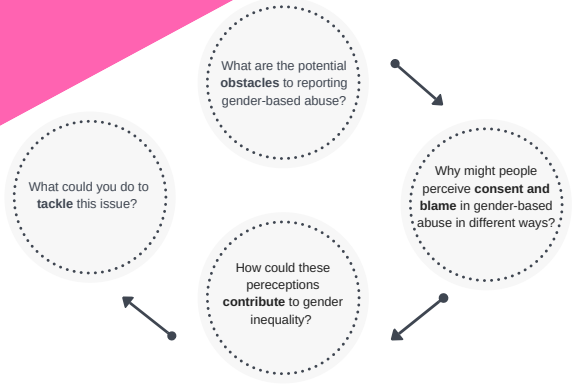
GENDER-BASED ABUSE

What are the potential **obstacles** to reporting gender-based abuse?

Why might people perceive **consent and blame** in gender-based abuse in different ways?

How could these pereceptions **contribute** to gender inequality?

What could you do to **tackle** this issue?

GENDER-BASED ABUSE

"I was **physically and emotionally** abused during 6 years by my husband. My friends recently asked me if I would mind sleeping in a room with him. They don't understand how traumatised I am."

"I told a friend about a man who grabbed strongly my breast on the street and he said 'that's **not really** sexual assault."

"My friend went out to the movies with a man who insisted to pay for her ticket. After the movie, he told her that **he deserves a blowjob** because he paid for her."

"She is at home, she is safe."

#Object #Oppression #IWasTooYoung #Alone #BelieveMe #GreyZone #SexualRoles #Shame #SexualExpectation #RepeatAtHome

GENDER-BASED ABUSE

What is gender-based **abuse**?

Why might it be important to **question** what gender-based abuse is?

How could a **limited understanding** of what gender-based abuse is contribute to gender inequality?

What could you do to **share** what gender-based abuse is in a constructive way?
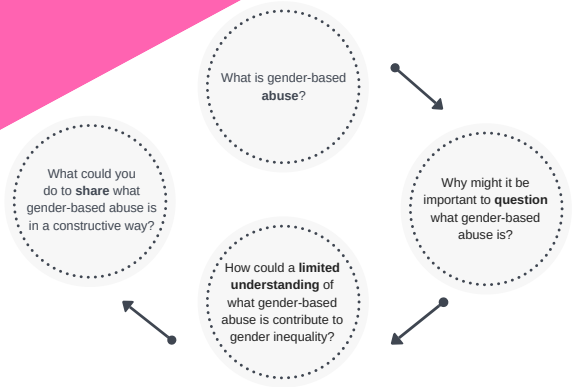
SEXIST LANGUAGE
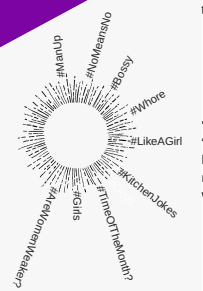
"I am a young man and one day I was dancing with a woman in a club and I started putting my hands on her waist, which made her walk away. I felt really bad but the reaction of my friends made me feel even worse. They said we should celebrate and when I said no they called me a **faggot**. The peer pressure of the 'lad' culture is so strong".

"I am often called "pushy" and "bossy" while men are never called like that. They are **adjectives reserved** for children, girls and women."

"I had a friend telling me to **'man up'** because it is not ok for a man to like 'feminine' things. He told me I should do more sport."

"Did you like my kitchen joke?"

#ManUp #NoMeansNo #Bossy #Whore #LikeAGirl #KitchenJokes #Girls #TimeOfTheMonth? #AreWomenWeaker?

SEXIST LANGUAGE

What is **sexist language**?

Why might people speak **differently** to males and females?

How could sexist language **contribute** to gender inequality?

What could you do **to tackle** sexist language?

SEXIST LANGUAGE

#Leadership #Insults #CatCalling #Music #Jokes #SexWorkerInsults #Girls #TimeOfTheMonth? #Traffiction
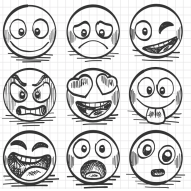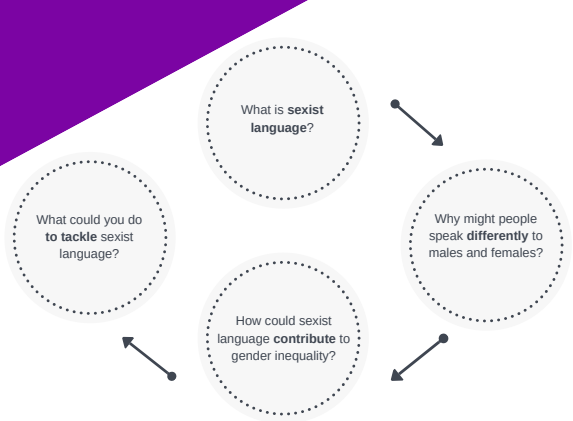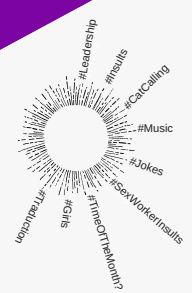
"My mother had fallen and had given herself a black eye. She keeps joking about how she got it because she did not make my father's tea ready on time. People keep telling her that they respect my father. I personally don't find domestic violence **jokes** funny."

"The **music** I listen to makes me uncomfortable sometimes, it can be really sexual and sexist, especially rap music."

"Anytime I mention my boss the other person asking what **'He' is like**".

"I saw a girl and a man walking. "

SEXIST LANGUAGE

What are **examples** of sexist language?

Why might sexist language affect males and females **differently**?

How could sexist language influence **other aspects** of gender inequality?

What could you do to **challenge** sexist language?

GENDER STEREOTYPES

#Inequality #Finance-handling #household #Doctors #Marriage #ChangeRoles #DifferentAbilities? #GenderedToys

"When I met my boyfriend's family the first question I was asked was: "Do you know how to iron?" I wanted to talk about so many things but they only cared about my **'housewife skills'**."

"I read a story where a princess had to save the prince in order to marry him. The male characters were portrayed as the servant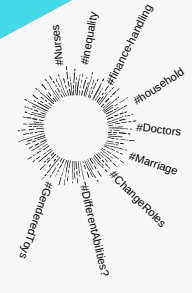s and were subject to constant harassment. I understood my **own bias**, and how degrading women in stories has been normalised. When it was happening to men I felt really sorry for them and it seemed cruel but when it happens to women it seemed normal."

"People assume I am a nurse. When I say I am a doctor they usually call me the **woman doctor**."

"I dream of having a princess' wedding."

GENDER STEREOTYPES

What are **gender stereotypes?**

Why might gender stereotypes affect males and females **differently**?

How could gender stereotypes **contribute** to gender inequality?

What could you do to **challenge** gender stereotypes?

GENDER STEREOTYPES

#Cars #inequality #finance-handling #Science #Beauty #Sport #Princess #GenderedToys #DifferentAbilities?

"I am a woman engineer working in Finance. When I was hired, I was placed in the front desk, **like a secretary**. People constantly ask me who is responsible for doing X task (me) and they struggle to believe when I say it is me. I have so many secretary tasks to do that I barely have time to do what I was hired for".

"A woman athlete got a gold medal and all the commentators could talk about was that her **hair was not nice** after the competition."

"My math professors told me I was the best student he ever had and that I would make a good mathematician **if I wasn't a girl**."

Cute Girl

Strong Boy

GENDER STEREOTYPES

What are **examples** of female and male stereotypes?

Why might people be **influenced** by gender stereotypes?

How could gender stereotypes **contribute** to gender inequality?

What could you do to **challenge** gender stereotypes?

ONLINE GENDER DISCRIMINATION- GAMES

#NotAllMen
#DeathThreats
#FemaleCharacters
#Mansplaining
#GamerGate
#HideGender
#MeToo
#WomenDevelopers
#SexualThreats
#AttackingWomen
#Miller
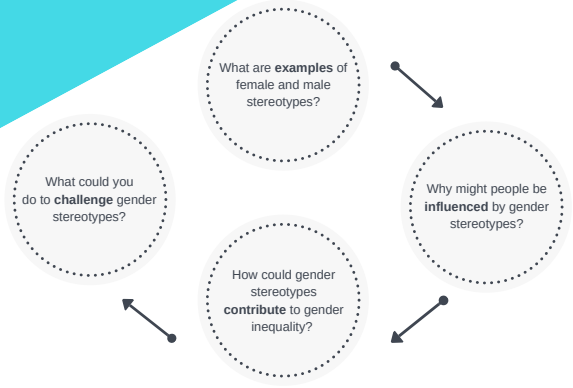
"I am a woman and I was playing video games with my friends against a group of guys who immediately started to tell us how we shouldn't play video games and should get **back to the kitchen**. My friend started to cry and did not play in days."

"I was playing a game online and a player called me a 'cum dumpster'. I was playing and refused to heal him when he told me that he would find me and **threatened** me to penetrate me with a knife because 'women like that'."
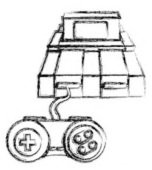
"I don't think some social media platforms are **safe places** anymore. I saw a picture where people would rate the 'rape-ability' of a woman."

"I will play 'Peach' the princess character of Mario Kart"

ONLINE GENDER DISCRIMINATION - GAMES

What are **examples** of online gender discrimination in games?

Why are female characters in games often **sexualised?**

What elements of games could you change to be **more inclusive** for any gamer?

How does gender influence people's **choice** of which games to play?

Appendix E

Educational Game Design Cards

MEANING AS ACTION

Understanding

Concepts and words are more meaningful when they are tied to personal experiences

Example

People's understanding of pollution is based on their own experiences of it

Applied to games

Games enable concepts and words to be understood through the player's experiences

Applied to social change

Using examples from everyday life experiences helps people understand inequalities

Game example

'Depression Quest' lets people play the role of someone living with depression. The game raises awareness of depression and suicide prevention.

MEANING AS ACTION

Understanding

Concepts and words are more meaningful when they are tied to personal experiences

Cool things to try in your game

Personalised game experience	**Cut scenes to recap and set goals**	**Storytelling**
Personalised character names	Video clips	Introduction of a protagonist
Player chooses character's appearance	Flashbacks	Introduction of the story
Personalise game environment	Journal entries	Story plot (e.g. conflict, implications and resolutions)
	Book chapters	Perspective of storyteller
	Overview images	Skip scenes
	Broadcasts audio	Emotional stories
		Dramatic scenes
		Story premise
		Atmospheric music
		Sound effects
		Characters' voices

SYSTEMS THINKING

Understanding

Understanding how skills, strategies and ideas fit into the big picture help people learn

Example

Understanding climate change helps people explain the importance of recycling

Applied to games

Knowing the objective of the game helps players to understand how to play it

Applied to social change

Understanding the shape of society helps people explain everyday inequalities

Game example

'Parable of the Polygons' is a segration simulator used to explore the interation between social group size and proximity. The players move four types of polygons to form happy groups.

SYSTEMS THINKING

Understanding

Understanding how skills, strategies and ideas fit into the big picture help people learn

Cool things to try in your game

Rules	**Game description and outcome**	**Designers' transparency**
Game rules	Description of rules	Designers' voices
Clear communication of rules	Access to instructions	Hints on available actions
Player tutorial	Game instruction	Consequences of actions
	Questions and answers	

SKILLS AS STRATEGIES

Problem Solving

People learn and practice skills better when they understand them as strategies for accomplishing their goals

Example

Understanding the importance of practice and training everyday helps athletes win competitions

Applied to games

A player learns and practices specific skills as a strategy to win the game

Applied to social change

People learn and practice ways of treating people fairly as a strategy to reduce social inequalities

Game example

In the 'Citizen Science' game, players learn about responsible actions to save a lake from pollution.

SKILLS AS STRATEGIES

Problem Solving

People learn and practice skills better when they understand them as strategies for accomplishing their goals

Cool things to try in your game

Strategy
Overview of strategy
Description of characters' duties
Illustration of progress in game
Illustration of character's progress

Wining and losing
One way to finish the game
More than one way to finish the game
Incomplete or unresolved endings
Hints on available actions

Goals
Definition of goals
Short-term goals
Long-term goals
Illustration of goals and sub-goals
Missions within the game
Fun goals within the game
Learning goals
Map of the game

SANDBOXES

Problem Solving

Sanboxes are realistic learning spaces where risks are managed to encourage discovery

Example

Architects create models of houses before building them

Applied to games

Games offer sandbox levels where players can explore the game without risks

Applied to social change

Discussing diferent perspectives encourages people to explore social issues and learn without fearing failure

Game example

'Bury me, my love' is a game where a Syrian couple communicates by phone message. The player messages his wife to help her while she flees to Europe as a refugee.

SANDBOXES

Problem Solving

Sanboxes are realistic learning spaces where risks are managed to encourage discovery

Cool things to try in your game

Risk-taking attitudes
Encouraging actions by a reward or penalty
Tutorials levels with no consequences
Repeat task or level when player loses
Re-entry level

Rewards
Self-evaluation score
Information on playing outcomes
Information on learning outcomes
Reward categories (e.g. gifts and lives)
Game levels
Recovery time
Remedial actions

Gaming atmosphere
Fantasy adventure
Trusting environment
Realistic atmosphere
Everyday interactions
Authentic speech and dialogue
Letters from characters
Photos from the past

FISHTANKS

Problem Solving

Fishtanks are used to manage complex problems by controling separate elements of the problem

Example

Scientists study river ecosystems by analysing fish in a fishtank and gradually adding more elements from the river environment

Applied to social change

Discussing acts of institutional discrimination helps people understand the causes of social inequalities

Applied to games

Games use fishtanks to avoid overwhelming players

Game example

'1979 Revolution' is a game about the Iranian revolution. Players take the role of a photo journalist to explore the moral dilemmas of increasing complex situations.

FISHTANKS

Problem Solving

Fishtanks are used to manage complex problems by controling separate elements of the problem

Cool things to try in your game

Different gaming spaces
Tutorials
Game level
Scene change
Houses and rooms

Decomposition of problems
Repeat challenges
Time limited tasks
Interviews with characters
Review characters' answers

Interactions
Increasing complexity of interactions
Interaction between characters
Interaction between objects

Reflective opportunities
Creative writing
Collection of souvenirs
Personal spaces for writing
Pause the game
Character alone time

INFORMATION

Problem Solving

Providing information when needed enhances learning (e.g. information just-in-time or on-demand)

Example

Road signs are examples of just-in-time information and web-search is an example of on-demand information

Applied to social change

Encouraging curiosity and reflection helps people make use of available information

Applied to games

The rules of the game are available on-demand as a manual or just-in-time as instructions

Game example

'Spent' is a game about surviving poverty and homelessness. Players are given facts about homelessness and poverty to inform their decisions in the game.

INFORMATION

Problem Solving

Providing information when needed enhances learning (e.g. information just-in-time or on-demand)

Cool things to try in your game

Information
Information about the game
Description of the game rules
Information on characters
Educational purpose
Educational content

'On Demand' information
Encourage curiosity (e.g. unusual situations or analogies)
Web-search
Surprises

'Just In Time' information
Signs
Reminders
Indications
Hints

CYCLE OF EXPERTISE

Problem Solving

Developing expertise through practice

Example

Musicians progress through their grades by practicing and performing set pieces of music

Applied to social change

Learning through cycles of reflection (theory) and action (practice) helps people understand social issues

Applied to games:

Games create cycles of expertise through levels where players develop expertise at solving challenges

Game example

'Code Combat' is a game where players learn how to program. Every line of code written has a direct consequence in the game that the players observe.

CYCLE OF EXPERTISE

Problem Solving

Developing expertise through practice

Cool things to try in your game

Cycle of expertise
Developing expertise through levels

Link theory to practice
Test skills in the game
Gain of character's accessories (e.g. badges)
Access to explanations and training
Mentoring by other characters

Repetitions of actions
Repetition of actions in different contexts
Motivational support
Illustrate progression
Feedback and hints

PLEASANTLY FRUSTRATING

Problem Solving

Creating challenges that feel hard but achievable enhance learning

Example

Playing sports against people at a similar level makes the competition pleasantly frustrating

Applied to social change

People feeling empowered to learn and act is essential for social change

Applied to games

Games adjust the level of difficulty of challenges and give feedback to players

Game example

'Just dance' is a dancing game with increasingly complex moves.

PLEASANTLY FRUSTRATING

Problem Solving

Creating challenges that feel hard but achievable enhance learning

Cool things to try in your game

Feedback
Feedback as motivation and information on performance
Opportunity to learn from mistakes
Feedback given by the game, characters or objects
Self-evaluation feedback
Progress bar

Adjustement of difficulty
Customisation
Time adjustement
Increase or reduce the number of hints
Tracking performance
Gaining or losing lives
Accessories to help the player

WELL-ORDERED PROBLEMS

Problem Solving

Solving problems in an increasing order of difficulty enhances learning

Example

Learning dance steps before performing a dance

Applied to games

The first levels of games help players acquire skills that are needed later in the game

Applied to social change

Starting by reflecting on inequalities in one's own life helps understand larger social issues

Game example

In 'Dragonbox Alegreba 5+' players learn to solve complex calculations. They start with very simple sums before solving more complex equations.

WELL-ORDERED PROBLEMS

Problem Solving

Solving problems in an increasing order of difficulty enhances learning

Cool things to try in your game

Game level design
Tutorials
Increasing levels of difficulty
Use of acquired skills or knowledge

Adaptive approaches
Customisation of difficulty level
Adjusting time available

Structured problems
Overview of the problem
Problems provided by the player, other characters or game events
Multiple ways to solve a problem

MANIPULATION AND DISTRIBUTED KNOWLEDGE

Empowered learners

Manipulating things in an environment supports immersion and facilitates learning through exploration

Example

Understanding cultures can be enhanced by visiting countries as well as reading about them

Applied to games

Controling characters and objects helps a player to become immersed in the game

Applied to social change

Critically engaging with other people and objects in different contexts enables people to question and extend their knowledge

Game example

In 'Quandary' players lead a new human colony where they need to make ethical decisions based on the testimonials of characters they meet.

MANIPULATION AND DISTRIBUTED KNOWLEDGE

Empowered learners

Manipulating things in an environment supports immersion and facilitates learning through exploration

Cool things to try in your game

Player's Control
Control over characters
Control over objects
Clear description of characters' skills
Clear description of objects' attributes

Use of tools
Educational tools (e.g. access to book pages)
Tools for play (e.g. puzzles, games, mazes)

Different perspectives
Compare characters' perspectives
Questioning of characters' knowledge
Reflection
Information revealed by characters or objects

Gaming environment
Different contexts in the game
Description of boundaries within the game

CO-DESIGN

Empowered learners

Learning as an active process involving interaction with other people

🔍 Example

Asking questions and discussing topics helps people develop their own understanding

🎮 Applied to games

Players' actions with characters or other players shapes their gaming experience

Applied to social change

Social interaction enables people to learn from one another

▶ Game example

The game 'Nanocrafter' is a scientific discovery game that invites players to explore biology and develop research ideas in an online community of experts and other players.

CO-DESIGN

Empowered learners

Learning as an active process involving interaction with other people

👓 Cool things to try in your game

Consequences of actions
Illustrations of the consequences of player's actions
Irreversible consequences
Replay opportunities

Interaction between players
Community building activities
Integration with social media platforms

Interaction between characters and objects
Dialogue within the game
Development of friendships between characters or players

Sharing of knowledge
Diary entries
Questions and answers in discussion forums

CUSTOMISATION

Empowered learners

People have different preferences about how they process and remember information

🔍 Example

Some people learn better from visual representations than from text

🎮 Applied to games

Games can offer a range of different learning and playing styles

Applied to social change

Flexibility over how to learn a topic helps people discover ways of learning that suit their skills and abilities

▶ Game example

In the football game 'FIFA', players can customise the level of difficulty and competition within their games.

CUSTOMISATION

Empowered learners

People have different preferences about how they process and remember information

👓 Cool things to try in your game

Player preferences
Playing styles e.g. achievers (winning points), socializers (social interactions), explorer (discovering areas), fighters (competition)
Learning styles e.g. visual learners (visualising information), auditory learners (hearing information), reading or writing learners (using text), kinesthetic learners (hands-on experiences)

Different styles
Different styles during the game
Customisation
Adjust level of pressure
Adjust pace
Adjust level of explanation
Adjust time

Different learning activities
Writing and reading activities
Audio statments
Creative expression
Web-quest
Incomplete statements

IDENTITY

Empowered learners

People's sense of identity changes as they learn

Example

Studying engineering helps people develop their identity as an engineer

Applied to games

Players develop an identity through their characters experiences

Applied to social change

Learning about inequalities changes the way people see themselves and others

Game example

'The Sims' is a simulation game that allows players to project their identity through their characters. It also invites players to explore different identities by playing multiple characters.

IDENTITY

Empowered learners

People's sense of identity changes as they learn

Cool things to try in your game

Customisation
Character's appearance and accessories
Character's personality
Character's abilities and skills
Game environment (e.g. location, music, background)

Intriguing characters
Unexpectted skills or abilities
Counterstereotype characters
Unpredictable character personalities
Character's secrets

Clear character goals
Descriptions of character's goals
Tutorials about character's goals
Pop-up information and reminders

Evolution of identity
Developments in character's identity
Developments in player's identity
Physical changes in characters and objects
Characters gaining titles and accessories