Beyond the Jam: Women's Experiences and Career Pathways in Game Development

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Abstract. *This thesis examines women's experiences in game jams and how these events influence their professional trajectories. Using a multiphase mixed-methods design, four empirical studies combined descriptive quantitative analyses with inductive qualitative coding. By profiling women game jam participants, systematizing their recurrent difficulties into a taxonomy, identifying gender-specific difficulties, and analyzing how game jams influence career pathways, this thesis reveals these events as inherently ambivalent spaces. On the one hand, game jams foster learning, experimentation, and professional exploration; on the other hand, they reproduce exclusionary dynamics present in the game industry. The findings further indicate that women mobilize coping strategies that may alleviate immediate barriers but often shift the responsibility for inclusion to the individual level, i.e., to themseleves. Moreover, game jams emerge not only as entry points, but also as mechanisms of retention, motivation, and, in some cases, disengagement from the industry. Taken together, these results reposition game jams as critical sites for advancing women's inclusion in the game industry.*

1. Overview

The video game market is continuously expanding and offers fertile ground for innovation and economic development [Abragames 2023]. However, despite its size and continuous growth, gender inequality remains a significant challenge in the game industry [Ahmadi et al. 2019, Ahmadi et al. 2020]. Globally, women represent a substantial portion of the gaming audience, for example, in the United States (US) approximately 47% of video game players are women and half of gaming personal computers (PCs) are owned by women players [Oliver 2024].

Following these international trends, gender disparity also remains a persistent issue in the game development field in Brazil. In 2014, women made up only 15% of the industry's workforce. This figure rose to 20% in 2018 and reached 29.8% in 2022 [Fortim 2022]. However, in 2023, there was a slight decline, with women representing just 24.3% of positions in game development [Abragames 2023]. These numbers reflect the broader global pattern of uneven gender participation and reinforce the need for more inclusive and equitable practices in the industry.

In response to this scenario, both academia and industry have proposed a series of initiatives aimed at increasing women's participation in science, technology, engineering, and mathematics (STEM) [García-Holgado et al. 2019, Ballatore et al. 2019]. These actions include structured programs, specialized training, and community-led interventions. In Brazil, for instance, projects linked to the Meninas Digitais initiative, promoted by the Brazilian Computer Society (SBC), seek to broaden girls' and women's access to technology [Maciel et al. 2021].

Parallel to these initiatives, time-bounded collaborative events, such as hackathons and game jams, offer informal learning environments, bringing together participants with diverse skill sets to create software prototypes over short periods [Porter et al. 2017, FIGUEIRA et al. 2018]. Because these events attract not only aspiring developers but also artists, writers, designers, students, educators, and hobbyists, they play a significant role within the broader digital games ecosystem [Almeida et al. 2021, de Almeida Melo et al. 2023], enabling multiple forms of engagement rather than a single pipeline into technical game development roles. Examples of such events include hackathons, game jams, codefests, startup weekends, and makerthons [Than et al. 2018, Filippova et al. 2017], all of which offer valuable opportunities for learning, networking, and professional development.

Some studies investigate how hackathons can contribute to promoting the inclusion of women in STEM [Kamberi 2017, Bonilla et al. 2019, DeWitt et al. 2017, Tapia-González et al. 2021], while others focus on the gender-related challenges that hinder women's engagement in these environments [Kos 2019, Paganini and Gama 2020b, Paganini and Gama 2020a, Dutra and Gama 2018, Ferraz and Gama 2019, Prado et al. 2020]. Within this body of work, *game jams* have gained prominence as particularly promising spaces for experimentation [Cook 2015], learning [Paganini et al. 2021], and the formation of collaborative networks [de Almeida Melo et al. 2023]. Owing to their informal, creative, and collaborative nature, these events can function as entry—or re-entry—points for women into technology and game development fields [Ferraz and Gama 2019, Silva et al. 2022].

Building on this broader context, this thesis seeks to deepen the understanding of women's experiences in game jams and the influence of these events on their career trajectories. To this end, the following central research question was formulated: *"How do women experience game jams, and what role do these experiences play in their career pathways?"*. To address this question, four sequential and complementary studies were conducted, organized around four secondary research questions: (RQ1) - "What is the profile of women jammers?"; (RQ2) "What difficulties do participants encounter during game jams?"; (RQ3) "What difficulties do women face in game jams and how do these difficulties influence their experiences?"; and (RQ4) "How do women perceive the influence of game jams on their career pathways?". Together, these questions enable an integrated understanding of women's participation in game jams by articulating who participates, which obstacles are encountered, how gender mediates these experiences, and how they reverberate across career pathways. RQ2 and RQ3 have been published at Proceedings of the ACM on Human-Computer Interaction (CSCW) and RQ3 is currently under evaluation at the ACM CSCW conference. The next section presents the theoretical background and related work that frame this study.

2. Background and related work

2.1. Women in game development

Gender inequality is a persistent issue in digital game development [Kumar et al. 2022], as well as in the broader software industry [Ahmadi et al. 2020], and has been extensively discussed by scholars over the past decade [Sweetser et al. 2013, Ahmadi et al. 2020, Russo and Stol 2022, Guzmán et al. 2023]. Despite being among the most profitable and fastest-growing segments of the entertainment and technology industries [Abragames 2023], the game industry still displays significant gender imbalances in workforce participation. In 2023, only 31% of professionals working in the sector identified as women [Weststar and Lentini 2024]. To understand this scenario, it is essential to consider the multiple barriers women face to enter [Sweetser et al. 2013] and remain [Ochsner 2019] in the industry. These include gender stereotypes, exclusionary gamer cultures embedded in organizational contexts, unequal evaluation standards, and the persistent invalidation of women's experiences, all of which contribute to a sustained sense of non-belonging and the need to constantly prove competence [Styhre et al. 2018, Ochsner 2019, Ahmadi et al. 2020].

In sum, the low participation of women in game development remains a significant challenge, requiring inclusion-oriented efforts that address not only women's entry into the industry but also their retention [Sweetser et al. 2013]. In this context, the following section examines time-bounded collaborative events, analyzing their benefits for professional development and community building, as well as their role—particularly in the case of game jams—in shaping women's career trajectories.

2.2. Time-bounded collaborative events and women's participation

Time-bounded collaborative events are characterized by bringing participants together to solve a problem, often through the creation of a software solution, typically within a short period of time [Filippova et al. 2017, Nolte et al. 2020], and are often organized around specific challenges or themes [Fowler and Schreiber 2017]. Hackathons and game jams are prominent examples of this type of event. Prior research highlights several benefits of participation in game jams, including the promotion of innovation and experimentation [Goddard et al. 2014], learning opportunities [Faas et al. 2019], social connection [Smith and Bowers 2016], and increased confidence and preparedness among participants [Miller et al. 2019].

Despite these benefits, women's participation in time-bounded collaborative events remains low [Briscoe and Mulligan 2014]. For instance, in a survey conducted during the largest international game jam in 2020, only 20.4% of participants identified as women [Perin et al. 2024]. Previous studies have examined factors contributing to this underrepresentation, identifying toxic masculinity as a key barrier to women's engagement in such events [Paganini and Gama 2020a]. In response, part of the literature has investigated—and, in some cases, actively promoted—initiatives that prioritize inclusion, such as inclusive design approaches for hackathons aimed at women and non-binary participants and participatory formats that seek to incorporate marginalized voices [Kos 2019, Hope et al. 2019]. However, research still focuses more on hackathons than on game jams, despite evidence indicating that these same problems also manifest in

game jams, where women often perceive unwelcoming environments characterized by insecurity, exclusion, and gendered stereotypes [Silva et al. 2022, Ferraz and Gama 2019].

Within this context, game jams have received particular attention for their potential to act as gateways into the game industry. They are frequently described as rites of passage or moments of professional affirmation [Kultima 2021, Turner et al. 2013], contributing to the development of technical and emotional skills and fostering increased self-confidence among women participants [Silva et al. 2022, Ferraz and Gama 2019]. By offering opportunities for creative production in controlled, low-risk environments [Cook 2015], game jams also function as effective pedagogical tools [Paganini et al. 2021] and as supportive spaces that enhance the visibility of women developers [Kennedy 2018, Ferraz and Gama 2019, Silva et al. 2022, Almeida et al. 2025]. However, for this potential to be fully realized, it is essential that these events be genuinely inclusive and free from harassment and discrimination. In this regard, practices such as direct invitations and the intentional creation of safe environments have been shown to strengthen women's sense of belonging and support their sustained participation over time [Silva et al. 2022, Paganini et al. 2021, Ferraz and Gama 2019].

In summary, investigating women's experiences in game jams is relevant for understanding how these collaborative events can both reproduce and mitigate structural inequalities in the game industry, while informing more inclusive practices and strengthening women's sense of belonging.

3. Methodology

To answer this thesis' central research question: *"How do women experience game jams, and what role do these experiences play in their career pathways?"* a multiphase mixed methods design [CRESWELL and CLARK 2017] was adopted. This approach integrates multiple interrelated research phases, combining quantitative and qualitative methods in a sequential and complementary manner. Such a model is particularly suitable for projects that pursue a long-term programmatic research goal and in which new questions may arise at different stages of the investigation [CRESWELL and CLARK 2017]. In this thesis, the design comprises four interrelated studies. Figure 1 summarizes the design and data handoffs across the different studies.

Study 1 addressed (RQ1) *"What is the profile of women jammers?"* through a quantitative analysis of sociodemographic data collected from women participants in the 2020 edition of the Global Game Jam. This study draws on data from a large-scale survey originally conducted by [Almeida et al. 2021], which obtained 3,197 responses, including 652 participants who identified as women (20.4%). Focusing exclusively on women's responses, the analysis examines personal, academic, and professional background characteristics, providing a foundational profile that informs and contextualizes the subsequent phases of the research.

Study 2 addressed (RQ2) *"What difficulties do participants encounter during game jams?"* through a qualitative analysis [Creswell 2013] of 866 valid open-ended responses from the GGJ 2020 (791 responses) and GGJ 2022 (75 responses) about difficulties faced during game jams. To ensure gender balance and updated insights, responses from women, men, and non-binary participants were carefully selected and filtered.

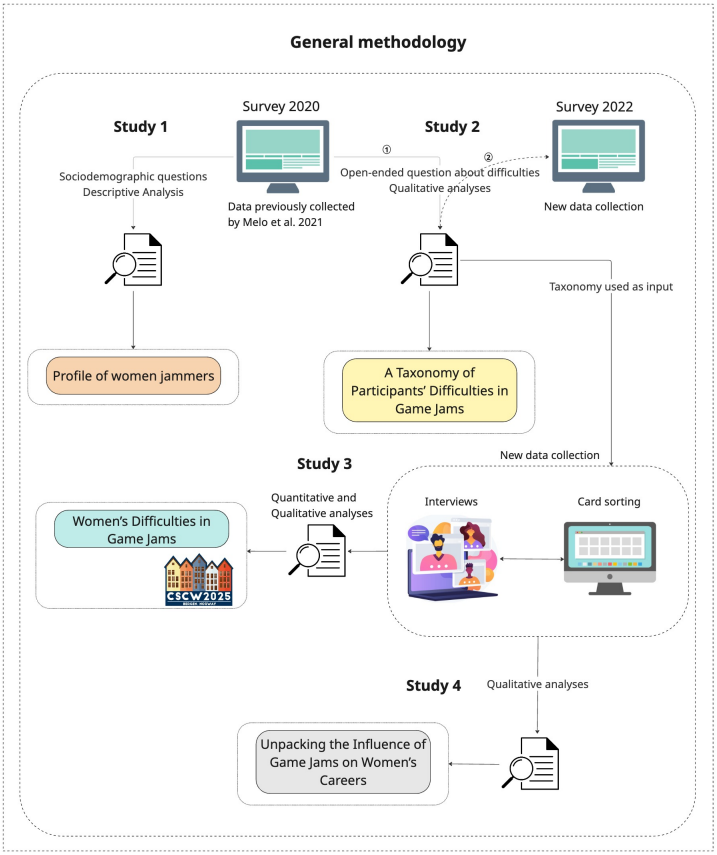

Figure 1. Multiphase mixed methods design

The analysis followed open and axial coding procedures [Strauss and Corbin 1990], enabling the systematic identification and organization of the main difficulties experienced by participants. This process resulted in a structured taxonomy, published in [Almeida et al. 2026], that consolidated these difficulties into an analytical framework used to guide Study 3.

Study 3 addressed (RQ3) *"What difficulties do women face in game jams and how do these difficulties influence their experiences?"* by adopting a hybrid approach that combined card sorting and semi-structured interviews with women participants. This design enabled an examination of how the difficulties identified in Study 2 manifest in practice, as well as the strategies women employ to address and navigate these difficulties. Data analysis was conducted in three stages: (1) analysis of participants' prioritizations to generate an integrated ranking of difficulties; (2) deductive coding [Creswell 2013] based on the discussed difficulties to understand the rationale behind prioritization choices; and (3) inductive qualitative analysis [Creswell 2013], using open and axial coding of interview data to capture women's perceptions of, and responses to, gender-related difficulties. This work has been published in [Almeida et al. 2025]

Finally, **Study 4** addressed (RQ4) *"How do women perceive the influence of game jam experiences on their career pathways?"* by analyzing previously unexplored data from the semi-structured interviews designed in Study 3. These interviews examined participants' profiles, professional trajectories, inspirations, and experiences in game jams,

with particular attention to how such events influenced career decisions and future plans. The analysis followed an inductive qualitative approach, using open and axial coding of the interview data to understand how game jam experiences shape women's perceptions of the game industry and their career pathways, as well as to identify parallels between challenges encountered in game jams and those faced in professional work environments. These results are currently under review at the ACM CSCW conference.

4. Findings

This section synthesizes the main findings from the four empirical studies, showing how they jointly illuminate women's experiences in game jams, the difficulties they face, and the role these events play in shaping career pathways. Figure 2 provides a visual summary of the findings and related scientific outputs, while the following subsections summarize the contributions of each study.

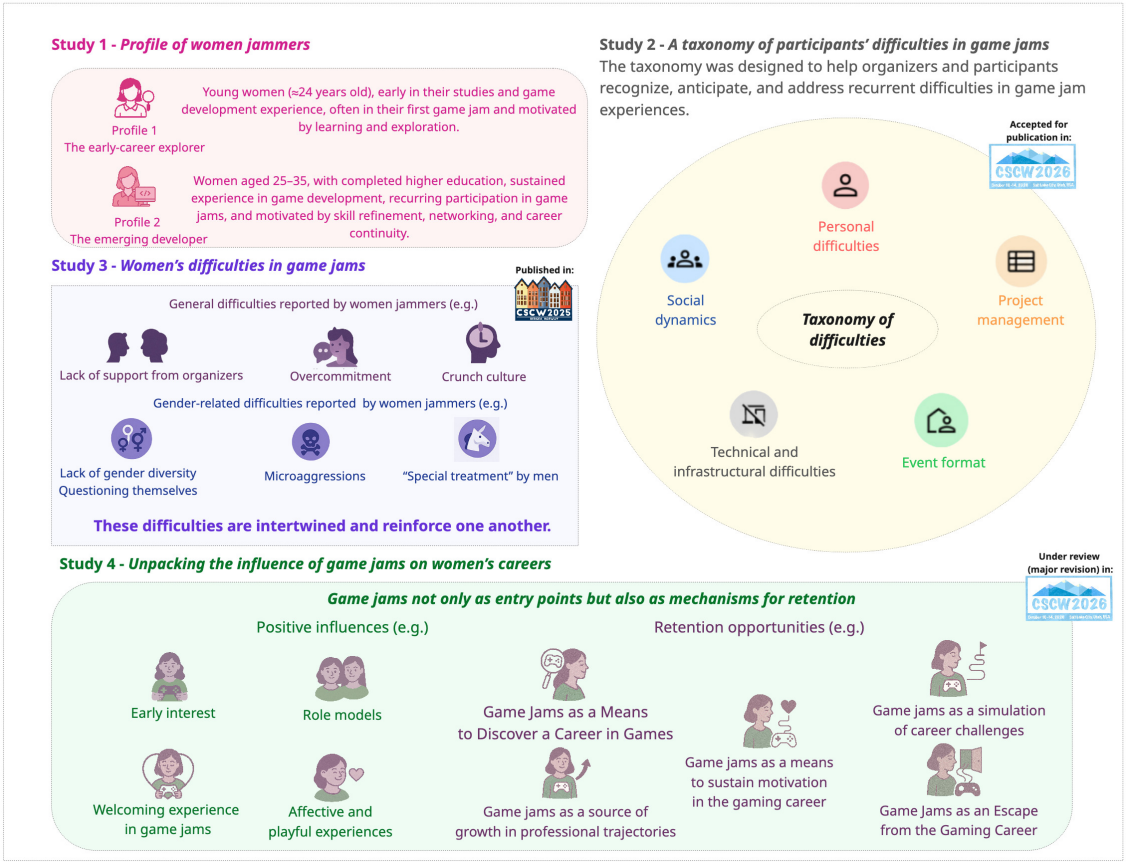

Figure 2. Overview of key findings across the four studies

4.1. Study 1 - Profile of women jammers

Based on the sociodemographic patterns presented in our findings, two representative profiles of women jammers were identified: **Profile 1 — The early-career explorer** and **Profile 2 — The emerging developer**. These profiles synthesize recurring combinations of age, educational background, experience levels, and participation history identified in the data. The early-career explorer corresponds to younger participants who are new

to game development and often are taking part in their first jam, whereas the emerging developer reflects women with more consolidated trajectories in the field, including recurrent participation in game jams and higher levels of experience. More details about each profile are in Figure 2. These profiles provide an interpretive lens for understanding the diversity of pathways through which women engage with game jams and were used throughout the thesis to integrate findings across studies.

4.2. Study 2 - A taxonomy of participants' difficulties in game jams

Our taxonomy comprises **five main categories** [Almeida et al. 2026], 15 subcategories, and a total of 42 codes, each describing a specific difficulty. Together, these categories capture individual, collaborative, and structural aspects of participation in game jams. **Social dynamics** describe difficulties related to team formation and functioning, interactions among teams, and the presence of hostile environments, such as low gender diversity and excessive competition. **Personal difficulties** encompass individual insecurities, lack of experience, technical and interpersonal skill gaps, as well as well-being concerns and external responsibilities that affect participants' engagement. **Project management** refers to challenges in idea conceptualization and work execution, including scope definition and time management. **Event format** covers constraints imposed by the structure of game jams, such as time limitations, online event settings, crunch culture, and misalignments with participants' personal preferences. Finally, **Technical and infrastructural difficulties** include recurrent technical problems as well as limitations related to infrastructure and organizational support.

Taken together, these categories and their subcategories provide a concise and comprehensive overview of the main obstacles faced by game jam participants (regardless their gender), highlighting how individual, social, and organizational factors intersect within these [Almeida et al. 2026]. This general taxonomy establishes the analytical basis for the subsequent gender-focused analyses.

4.3. Study 3 - Women's difficulties in game jams

The third study of this thesis presents the difficulties women experience in game jams from three complementary perspectives. First, drawing on Study 2's taxonomy of difficulties, we constructed a **ranking** from women's perspectives, showing that the most critical challenges are concentrated around overcommitment and time management. These difficulties are followed by issues related to project definition and execution, such as conceptualizing ideas and managing unrealistic scopes, as well as a lack of organizational support, particularly during team formation. The ranking also highlights the relevance of technical and emotional challenges, including technical difficulties, negative emotions, skill comparisons with teammates, sleep deprivation, and crunch culture. Throughout the analysis, we identified interrelationships among these difficulties, which intersect and cumulatively shape women jammers' experiences.

Second, we examine the difficulties that participants directly associate with gender and the strategies they adopt to cope with them [Almeida et al. 2025]. We find that women report different degrees of association between difficulties and gender in game jams: **some do not perceive direct discrimination in these events; others reinterpret general difficulties through a gendered lens; and a third group identifies challenges**

explicitly linked to gender, such as the perceived lack of women's interest in programming. In response, participants used both individual and collective strategies, including encouraging other women to take on technical roles, relying on teamwork, acting as visible role models, leading or mediating team formation, and conditioning participation on having a pre-defined team. Although these strategies may mitigate immediate difficulties, they often produce unintended consequences and reinforce higher-ranked difficulties, such as increased overcommitment, problems in time management, emotional pressure, reduced networking opportunities, and the transfer of responsibility for inclusion onto women themselves—particularly in the absence of adequate organizational support.

Finally, in the third perspective, we identify **a central tension between the inclusive potential of game jams and the persistence of structural diversity problems**. Participants recognize these events as gateways to the game industry, and as spaces for hands-on learning, developing collaborative skills, and for professional validation—including serving as tangible evidence of competence and experience on their résumés. Nevertheless, this potential is consistently undermined by low gender diversity, which remains recurrent and widely normalized. According to the interviewees, women's limited presence continues to be the norm, making sustained participation challenging and, at times, discouraging. Over time, many participants report developing an adaptive stance, or even a sense of defeatism, coming to regard the lack of diversity as an expected feature of both game jams and the game industry more broadly.

4.4. Study 4 - Unpacking the influence of game jams on women's careers

This study identified **six main themes**. The first describes the emergence of interest in games and game development, typically beginning in childhood or adolescence, associated with creative activities and strengthened by welcoming social circles—most notably through the influence of other women (mothers, friends, and mentors) in fostering feelings of belonging and legitimacy. As illustrated in Figure 2, we interpret this theme as a set of positive influences for entering the digital games ecosystem, which also includes women's participation in game jams as formative and affirming experiences.

The remaining five themes examine how **game jams shape women's career trajectories** beyond entry, emphasizing not only access to the ecosystem but also conditions for continued participation and persistence. Specifically, game jams function as (1) a means to discover a career in games, enabling participants to experiment with roles, confirm interests, and reduce uncertainty; (2) catalysts for continuous growth across career pathways, promoting technical and interpersonal learning through learning by doing; (3) simulations of career challenges, i.e., low-risk environments to practice coping strategies, which can both challenge and, at times, reinforce practices such as crunch culture; (4) sources of sustained motivation in the gaming career, by reconnecting pleasure, creativity, and meaning in work; and (5) spaces of escape from the industry, allowing participants to maintain ties to game development without the sector's pressures and value misalignments, while also exploring future possibilities outside formal roles.

5. Discussion

This thesis investigated how women experience game jams and the role these events play in their career pathways, guided by the research question: *How do women experience*

game jams, and what role do these experiences play in their career pathways? Drawing on four complementary studies and adopting a broad perspective of the digital games ecosystem, our findings show that women's experiences in game jams emerge from a complex interplay of supportive influences, persistent difficulties, and career-related opportunities. While game jams can foster interest, skill development, and professional exploration, they also tend to reproduce structural barriers present in the game industry. Consequently, promoting diversity and inclusion in these events requires structural interventions that go beyond individual participation.

Women's early interest in games is shaped by affective and social contexts that validate participation and challenge gendered stereotypes that frame games as "for boys" [Weststar and Legault 2018]. This engagement often precedes explicit career decisions and is strongly influenced by relationships (particularly with other women) fostering identification, motivation, and a sense of belonging [Ahmadi et al. 2019, Harvey 2021]. Inclusive social networks and game jams can reinforce this process by offering identity validation and entry points into game-making communities [Ferraz and Gama 2019, Silva et al. 2022, Paganini et al. 2021]. Conversely, exclusionary dynamics such as invisibilization and microaggressions act as emotional gatekeeping, undermining confidence and creating early barriers to persistence [Capitani 2024].

The transition from initial interest to entry into the professional field depends on contexts that support perceived feasibility and belonging [Lent et al. 1994]. Data from Study 1 indicate that many participants of the GGJ 2020 were in a transitional phase and had little prior experience, positioning game jams as spaces for career exploration [Stumpf et al. 1983] and recurring entry points into the game creation ecosystem [Kultima 2021, Turner et al. 2013]. These events provide accessible, low-risk environments to experiment with roles, develop competencies, and access professional practices and networks [Cook 2015, Silva et al. 2022, Ferraz and Gama 2019]. Entry can be strengthened through newcomer support (*onboarding*), the activation of women's networks and role models, and organizational support for team formation (*matchmaking*), alongside mediation and effective enforcement of codes of conduct [Ferraz and Gama 2019, Paganini et al. 2021, Silva et al. 2022] Moreover, when more experienced women act as mentors, game jams also function as bridges between entry and continued participation [Pirker et al. 2016]. However, retention and continuity in the game ecosystem are shaped by structural challenges that extend beyond initial access [Almeida et al. 2025, Harvey 2021]. Study 3 shows that mechanisms hindering retention already emerge within game jams, including the normalization of *crunch*, microaggressions, "special treatment", and gaps in team formation support. These dynamics produce overload, emotional strain, and erosion of self-confidence, aligning with the *pipeline problem* [Monroe and Chiu 2010] and the literature on exclusionary cultures [Ochsner 2019, Styhre et al. 2018]. Thus, increasing women's participation is insufficient without ensuring concrete conditions for retention, progression, and well-being [Almeida et al. 2025, Paganini et al. 2021, Bailey et al. 2021].

These findings point to a broader and more dynamic relationship between game jams and the game industry, configured as a complex feedback loop in which both contexts mutually influence one another. Positive experiences in game jams can expand professional networks, foster skills, promote female role models, and stimu-

late diversity, contributing to a *virtuous cycle* of female influence [Paganini et al. 2021, Silva et al. 2022]. Conversely, the reproduction of problematic practices in these events tends to normalize them—especially for young and novice participants—producing a *reverse effect* that pushes women away from the game development ecosystem. Together, these dynamics highlight that game jams are not neutral spaces: they can either reinforce exclusion or operate as strategic sites for structural change toward more inclusive and sustainable career pathways. As we will discuss in the next section, this thesis presents recommendations for better positive outcomes from game jams.

6. Contributions

This thesis offers contributions at both practical and scientific levels.**Practical contributions, recommendations, and applied impact.** This thesis offers evidence-based recommendations to promote gender inclusion in game jams, addressing both event organizers and women participants. The recommendations translate empirical findings into actionable strategies that support safer, more inclusive events and help women better navigate and benefit from game jam participation. In addition, the research generated applied impact through direct community engagement, as the author applied these recommendations while organizing the local site of the Global Game Jam in 2023. The resulting materials were made publicly available for reuse in future editions.

Scientific outputs. This doctoral research resulted in multiple peer-reviewed publications across national and international venues. Early outputs include studies presented at SBSC [Almeida and de Souza 2022a] and GE@ICSE [Almeida and de Souza 2022b] focusing on women's socio-cognitive experiences in hackathons and game jams, as well as a paper at ICGJ'24 addressing difficulties in online game jams and mitigation strategies [A. do Vale et al. 2024] (Study 2). Among the main contributions, two articles appear in the Proceedings of the ACM on Human-Computer Interaction (CSCW): one published in 2025 examining women's difficulties in collaborative gaming environments [Almeida et al. 2025] (Study 3), and another accepted for 2026 proposing a taxonomy of difficulties in game jams [Almeida et al. 2026] (Study 2). A final article on the influence of game jams on women's career trajectories is currently under review at the ACM CSCW conference with expected notification in March 2026 (Study 4).

7. Final Considerations

In this thesis, we investigate women's experiences in game jams and how these events shape their professional trajectories through four mixed-methods studies. The findings characterize participants' profiles, systematize recurrent difficulties into a taxonomy, and reveal gendered challenges that generate overload and demand coping strategies. They also show how game jams influence career choices, professional validation, and continuity over time. Taken together, the results indicate that, despite ongoing diversity efforts, women's participation in game jams remains an "uphill journey". Finally, the thesis offers practice-oriented recommendations to foster more inclusive environments and to help women strategically leverage game jam opportunities for career development.

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