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RESEARCH-ARTICLE

Articulating Social Issues with Open Data: Exploring a Game Jam Approach

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Articulating Social Issues with Open Data: Exploring a Game Jam Approach

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Abstract

Open data holds the potential for public understanding of social issues. In recent years, open data hackathons have emerged as an approach to address social issues with open data. However, hackathons focus on technical solutions and are only suitable for involving an expert audience. There is a need for an approach enabling non-experts to participate to collectively explore social issues with open data. In this research, we developed a game jam approach for beginners. The participants collectively design a video game, and in doing so they articulate social issues. To evaluate the approach, we conducted a series of three game jams, and tested them through non-participant observation, pre and posttest surveys, and analysis of the games produced by participants. We found that the use of available open datasets was limited. Participants were able to produce minimal but functional game prototypes in which the social issues were present. Participants found it difficult to set up collaborative work around the game engine, which limited social learning.

CCS Concepts

• **Applied computing** → **Computer games**; *Collaborative learning*; • **Human-centered computing** → *Information visualization*.

Keywords

Issue articulation, Game jam, Open data

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1 Introduction

In recent years, open data hackathons have emerged as an approach to incentivise the reuse of open datasets. Open data hackathons are relatively short events - usually one to two days long - where participants collaborate to produce solutions that rely on open data. This is an intensive, pressure cooker setting [15, 17], in which participants need to quickly pick a problem and *hack* together a solution, which is then evaluated by a jury and sometimes awarded with a monetary prize [4]. As found in previous literature [4, 19], the value of (open data) hackathons is in the networks created among a participants, rather than in the effectiveness or sustainability of the solutions they produce. However, previous literature also criticised hackathons for being techno-solutionist events, where societal issues are flattened in order to justify easy technological interventions, which fail to address the underlying root causes of the issues. In order to take meaningful action about a social issue, such issue needs to be articulated [19], so that the connection of actors, factors, and consequences becomes clear. The invitation to develop and produce apps and make a pitch creates a tendency towards solutionism. Although this has resulted in short term gains, the underlying social issues have often remained unaddressed. To reorient hackathons towards issue articulation, we tried changing their invitation from *making apps* to *making games*. We were motivated by Bogost's [3] argument that video game development is rhetorical practice, and by Schouten et al.'s [31, p. 28] claim that game-making "about complex systems (e.g., urban environments) requires exploration and reflection", and their call for further research into game jams. To test whether game-making as a process is better suited to articulate social issues in a short event, we organised a series of three different game jams. We collected data through pre and posttest surveys, non-participant observations, and through an analysis of the artefacts produced by participants. Through each of the game jams, we discovered insights into successful and unsuccessful features of the event format. In this study, we will test the following hypotheses about the game jam:

- (1) The game jam resulted in greater knowledge about the social issue for participants
- (2) The game prototypes connect different actors, factors, and consequences of a social issue (issue articulation)

- (3) The game jam motivated participants to collectively explore a social issue

After presenting our research background, we explain the research methodology used in our study and the format of the game jam we conducted. We then present our results, and, finally, we draw conclusions and give recommendations for further research.

2 Research Background

Our research background starts with an introduction to open data hackathons. We then present their critique as a solutionist approach, and motivate why game jams could potentially be better suited for issue articulation with open data. Finally, we present previous research on data-inspired games.

2.1 Open data hackathons

Open data is any data that can be freely accessed, shared, and reused [25]. In recent years, governments have made an effort to increase the amount of available datasets. Commonly available open datasets include public transport routes and timetables, maps (e.g. OpenStreetMaps), Wikipedia articles and images, air quality measurements, and election results, among others. However, releasing open data does not automatically yield benefits [16]. Reusing an open dataset requires technical knowledge - to clean the dataset and process it - as well as domain knowledge - to know which questions to ask and to extract valuable information. To realise the benefits of open data, someone needs to reuse the dataset in a meaningful way. In recent years, governments and other organisations have organised hackathons to incentivise the reuse of open data [28]. The term hackathon stands for *hacking marathon* [4], because participants hack (i.e. assemble) together a prototype in one to two days. The events usually end with a presentation of the prototypes, and selection of the winners. Open data hackathons have been identified as an approach to introduce available datasets to the public, and to find new ways of reusing them. The prototypes made at hackathons range from business model ideas, to app mockups, and product concepts. Hackathons usually end with a presentation of the results from each team, and a jury selecting the winners. Open data hackathons have started to shift from being tech-focused events designed around software development, to more open get-togethers welcoming the contributions of non-expert users [9]. Previous research found that the main value of hackathons is in creating communities, rather than in the technical solutions produced [4, 19]. Hackathon participants not only build and test new solutions, but also test new ways of collaborating together around shared ideas, providing a “unique networking opportunity” [4, p. 11]. Jaskiewicz et al. [17] similarly found that open data hackathons can contribute to community capacity building, with participants developing shared mental models around common issues. Hackathon participants interviewed by Jaskiewicz et al. [17, p. 23] stated that the most valuable outcome were “learning about other participants’ views, improving their ability to work in a diverse team, and gaining new perspectives on the city’s problems”. However, hackathons have also been criticised for being a solutionist approach, as we explain in the subsection that follows.

2.2 Solutionism in hackathons

Solutionism is the oversimplification of an issue in order to justify a technological intervention [22]. Clary [6] argues that university hackathons are inevitably subjugated to neoliberal forces, with participants spending most of their efforts on creating captivating demos to impress the judges, in order to sell a product or a business idea. As observed by Lodato and DiSalvo [19, pp. 552-553], “the underlying controversies that comprise issues are, more often than not, simply not made present in hackathons”. This problem is convergent with the wider critique of solutionism in the design thinking approach. Design thinking often privileges social issues that “can at least be presented as ‘fixable’ on the surface” [29, p. 10], and avoids confronting wicked problems which cannot be solved with technology alone [29]. Another critique is that hackathons end up exploiting the free labour of participants [33]. Hackathons often have corporate sponsors, which offer participants using their software the possibility to win a monetary prize. With this type of sponsorship, businesses can benefit from the free labour of dozens of developers [33], who create an ecosystem around the sponsored product, learn how to use it, and showcase its potential. In summary, hackathons have a tendency to presume that problems are technological, which flattens the complexity of those problems, and prevents people from engaging in a deeper exploration. We acknowledge that open data hackathons have a variety of formats, objectives, and participants, and that not all of them can be considered solutionist. At the same time, the value of a hackathon also depends on the outcome being measured. The same hackathon could be considered solutionist if judged by the prototypes produced by participants, or not if judged by the networking and peer learning outcomes. As argued by Lodato and DiSalvo [19], in order to understand hackathons, we need to judge the opportunities they offer for “collective issue articulation” [19, p. 553], and look at processes such as “how groups are structured to accomplish tasks” or “who and what is present to enable work to be accomplished” [19, p. 555]. Still, asking participants to produce a solution seems to limit the space for issue articulation, and rather favours tinkering with technology. In developing our new approach, we looked for a different kind of objective, which can open up a wider space for issue articulation.

2.3 Game jams

In looking for processes that can favour issue articulation in the context of hackathons, we found game-making (the process of making a game) as a possible way forward. As argued by Bogost [3, p. 119], video games can express *procedural rhetoric*, meaning they can “make claims about the world, which players can understand, evaluate, and deliberate”. Because of this, “when kids program, just as when they write, they can learn to make their own claims about the world in the form of processes” [3, p. 137], thus making video game development a *rhetorical* rather than *technical* practice [3]. Changing the main activity of open data events from app-making to game-making could open up more possibilities for issue articulation throughout an event. In the context of urban-scale issues, Schouten et al. [31, p. 28] argue that “making games about complex systems (e.g., urban environments) requires exploration and reflection, which in turn allows for a better understanding of the problem

space” and call for further research into game jams. Game jams are in many ways similar to hackathons [7], with the key difference that participants make game prototypes together. In fact, they are sometimes referred to as “hackathons for video game development” [4, p. 3]. Falk [10, p. 12] similarly considers both hackathons and game jams as “accelerated design processes” which can be studied together, rather than separately. Other scholars, however, argue that game jams and hackathons are fundamentally different. Grace [12] argues that, while game jams emphasize “a state and process”, hackathons focus on “a measurable result standardized by a shared sense of competition” [12, p. 45]. To understand whether game jams can be an effective approach to articulate societal issues with open data, we developed and conducted three open data game jams. At the jams, we invited participants to brainstorm a social issue, find available data about the issue, and make a video game about it. The objective of the jams was to articulate these social problems, in the sense of connecting the actors, factors, and consequences implicated in the issue [19]. Using open data about the social issues was one of the main themes of the jams, and we invited participants to take inspiration from available datasets about the issue they intended to address. In the subsection that follows, we give an overview of data-inspired games described in previous literature.

2.4 Data-inspired games

Several open data games have been studied in the literature; Friberger and Togelius [11] created a way to generate bespoke monopoly boards based on open data. The tool automatically generates street prices based on available open data on indicators like “Participation in regular volunteering”, or “Perceptions of drunk and rowdy behaviour as a problem”. Friberger and Togelius [11] propose a categorisation of data-inspired games based on three different criteria: genre (board game, arcade, first person 3D game, etc.), type of data used, and way in which data is translated into game content (game maps, items, etc.). Barros et al. [2, p. 5] argue that games can act “as a form of highly interactive data visualization” and stimulate lateral thinking. Barros et al. [2] propose a categorisation of data games on two axes: data fidelity - how much a game sticks to the original data it is based on - and data functionality - the extent to which gameplay is based on data, rather than data playing a purely decorative role. For example in *WikiRace* [24], players are dropped onto a random Wikipedia page, and need to get to another random Wikipedia page using hyperlinks. The game has high data fidelity, because the Wikipedia pages are left untouched, and high data functionality, because the player has to read the articles to find the right hyperlinks to click.

3 Research Methodology

Our aim is to understand the contribution of game jams to issue articulation. Our methodology - summarized in Table 1 - primarily relies on data collected through pre and posttest surveys [8]. Pretest surveys were distributed at the very beginning of the event, prior to the introductory presentation. To gain deeper insights, we also utilize non-participant observation and a debriefing interview with one of the game jam teams. Non-participant observation was conducted by one of the authors of this study at game jams A and B.

	Hypothesis	Methodology
H1	The game jam results in greater knowledge about the social issue for participants	Pre and posttest surveys, non-participant observation
H2	The game jam motivated participants to collectively explore a social issue	Posttest surveys, non-participant observation
H3	The game prototypes connect different actors, factors, and consequences of a social issue (issue articulation)	Posttest surveys, analysis of the final game prototypes

Table 1: Methodology used to test each of the hypotheses

Jam	Date	N	Participants	Country
A	February 2024	45	Master’s students	Netherlands
B	April 2024	50	Civil servants	Netherlands
C	June 2024	6	Master’s students	Netherlands

Table 2: Game jams included in the study

Additionally, we analyzed the final video game prototypes created by the teams [8].

3.1 Participants

We conducted three game jams over the course of seven months, with each jam having a duration of 7 to 8 hr. One of the game jams involved civil servants, and the other two involved Master’s students. Table 2 shows a summary of the events we conducted to collect data for this study. Game jam participants were not pre-selected. For the game jam involving civil servants, we shared an open invitation on professional channels such as mailing lists. The remaining events were organised as part of a Master’s course. Participants could earn credits by participating to a number of different workshops. The game jam was one of the workshops available for Master’s students to freely attend. In total, about 101 people attended one of the events. Of these, 73 filled at least the pretest survey. Of those who filled the pretest survey, 62% described themselves as male, 36% as female, and 1% chose not to say, and 1% described themselves as non-binary. The most common nationalities among participants were Dutch (83%), and Chinese (3%). Regarding participants’ background, 69% agreed that they like video games, 49% agreed that know how to analyse datasets, and 19% agreed that they know how to make video games.

3.2 Game jam format

The game jams followed a similar format, with some slight variations, as summarized in Table 3. A few days before each game jam, we distributed via email basic information about the event together with three example games to play: *Spent* [20], *The McDonald’s Videogame* [21], and *Coming Out Simulator* [5]. The game jam format takes 1 day to complete (9:00 a.m. to 5:00 p.m. with a

Element	Description
Accommodation	No, game jams started at around 9:00 a.m. and ended at around 5:00 p.m. ¹
Awards	1-3 winning teams selected by participants, no prize
Catering	Meal break included in the agenda
Codes of Conduct	No additional code of conduct other than the university or workplace ones
Types of Games	Digital only
Games Presentations	Play each other's games at the end of the jam
Group Forming	Idea pitches to create teams (similar to the <i>capitalist group forming process</i>)
Hardware & Software	Participants' laptops and <i>Construct 3</i> game engine (suggested) ²
Ice Breakers	Human Bingo
Internet	Yes
Keynote Speakers	No
Location	Physical
Security	Workplace/university security
Sponsorships	No
Standup meetings	No
Tutorials & Workshops	Online tutorial materials for making a prototype in <i>Construct 3</i> ³
Theme	Social issue and open data

Table 3: Game jam elements from Lai and Khosmood [18] applied to our approach (right column)

lunch break). Game jam B was split in two days, with 7 hr of total work time. The morning section was dedicated to brainstorming the game ideas, and the afternoon to actually coding the games.

We started the event with an introductory presentation, and showed different ways and purposes of making games about social issues. We opened a discussion about the differences between *The McDonald's Videogame* and *Zamzee* [13], and highlighted that games can be made to depict the complexities of an issue, or to incentivise positive behaviour change, sometimes blurring the line with gamification. This discussion was inspired by Morozov's [22] comparison of *Fatworld* [26] and *Zamzee*. After an ice breaker, we distributed *issue pitch sheets* with a guided reflection on the issue to be addressed through the game. Participants could either pitch as a group, or pitch individually and invite others to form a team. This is similar to the *capitalist group formation process* [1]. Once the teams were formed, we distributed the following guided brainstorming sheets: (1) *inspiration sheet*, (2) *game doc sheets*, (3) *screenshot sheets*. The inspiration sheet was intended to think through existing games that the team is familiar with, and get inspiration for a new game. The game doc sheets were intended to produce a game design document, containing details such as the the story-line, environment,

¹Game jam B was split in two days, two weeks apart (9:30 a.m. to 12:30 a.m.)

²Advertisement materials for game jam C also included a link to the *GDevelop* [30] game engine

³Written tutorial materials only distributed at game jams B and C

and art style, as well three data insights about the issue, and corresponding game mechanics. Examples on how to fill the sheets included: "Data insight 1: McDonald's spends \$650m per year on marketing (The Guardian); Game mechanic 1: Purchase marketing campaigns. The more money you spend on marketing, the more customers you get". The screenshot sheet simply contained empty spaces where participants could freely sketch how the final game should look like. Most groups spent almost the entire morning brainstorming, and were ready to move to coding after the lunch break. Participants were introduced to *Construct 3* [32], a game engine based on visual coding, and were given starter tutorials with instructions on how to code basic game mechanics, and make game art.

4 Results

The surveys we used contained Likert items on a 7 point scale, from *Strongly disagree* to *Strongly agree*. In reporting our results, we aggregated responses into three categories: agree (*Strongly agree*, *Agree*, *Somewhat agree*), undecided (*Neither agree nor disagree*), and disagree (*Strongly disagree*, *Disagree* and *Somewhat disagree*). For each Likert item relevant to our hypotheses, we report the percentage of respondents in each response category (agree, undecided, disagree), as well as the absolute numbers. The stacked bar charts showing the distribution of responses to Likert items, shown in Figure 1, were produced using Matplotlib [14] and the plot-likert library [23].

4.1 Hypothesis 1

The first hypothesis is that the game jam results in greater knowledge about the social issue for participants. From the observations, it became apparent that most users possess a lot of information about the issues they decided to work on, and that game-making did not necessarily increase their knowledge. This is convergent with the findings from our surveys. Only 47% (24/51) of respondents agreed that "Because I had to make a game, I learned something new about the issue", 62% (34/54) agreed they learned more about a social issue, and 53% (29/54) agreed that "I discovered this issue is more complex than I initially thought". Finally, only 22% (12/54) agreed that "I realised I had faulty assumptions about the issue". We conducted a debriefing interview with a game jam team who made a game about the housing crisis in The Netherlands. The group was surprised about how quickly you can prototype a game. While brainstorming, they all agreed that student housing is "miserable", that it is often covered in the news, and that it was an issue they were familiar with. They found statistics on the issue, but did not manage to incorporate them in their game. They were surprised by the difference in cost of housing between different municipalities, and one team member was not aware of the high cost of housing in their municipality. The game was a *cookie-clicker*, where the player needs to tap the screen as quickly as possible to earn money. With this basic mechanic in place, they were able to reflect on real world scenarios and transfer them into the game. The team initially wanted to describe the issue from the perspective of the affected people. They then pivoted to a concept where the player is responsible for the issue and rewarded for causing it, as the game would be more fun and they could show that "money can make

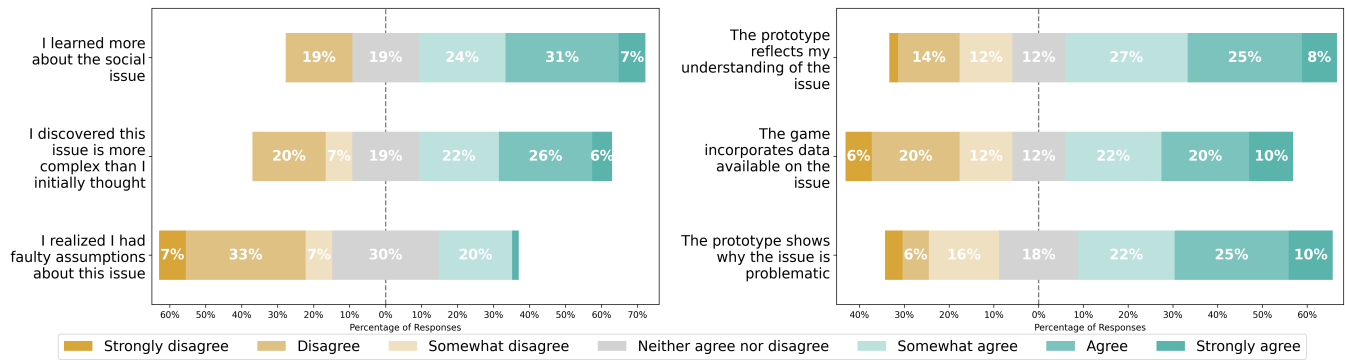


Figure 1: Distribution of responses to Likert items on learning outcomes (left), and on game prototypes (right)

more money”. The team divided into two pairs: coders and artists. One person who was knowledgeable about the issue took the lead. Overall the group was happy with the workshop and their game idea, which shows how difficult it has become to buy a house. They stated they would like to finish the game and continue learning game development.

4.2 Hypothesis 2

The second hypothesis is that the game jam motivated participants to collectively explore a social issue. Participants seemed highly satisfied with the workshop, 96% (52/54) agreed that they had fun during the workshop (the rest were undecided), 98% (53/54) agreed that they felt included in their group, 72% (37/51) agreed that “I could express my ideas through game-making”, and 66% (34/51) agreed that “The format of the workshop allowed me to express my thoughts on the issue”. We observed very high levels of motivation and engagement during the brainstorming section of the workshop, prior to coding the game prototypes. The *capitalist group forming process* was well received, and in all game jams, more than enough participants stood up to present an idea and look for others to join their team. While each pitch was brief (around 2 min), this was a moment of social learning, as participants in the room could learn about other participants’ issues and priorities. However, groups became visibly quieter during the coding section of the workshop, after being introduced to the game engine. From the observations, there appear to be multiple reasons for this: (1) the switch to digital work on a laptop inevitably leads to distraction (such as work emails and other work related tasks), (2) the steep learning curve of approaching a game engine for the first time, and (3) the difficulty of structuring simultaneous collaborative work.

4.3 Hypothesis 3

The third hypothesis is that the game prototypes connect the causes (actors, factors), and consequences of a social issue (issue articulation). While participants had very limited time, they still managed to produce playable game prototypes. We counted 27 different game prototypes across the three game jams. The prototypes produced had the aesthetic of early Flash games playable in the browser. Almost all games had 2D graphics, and often contained a mix of original and third-party game art. We distinguished two themes in

the games made by participants: (1) *managerial* games, where the player is in charge of managing a system and making choices that affect other people, and (2) *protagonist* games, where the player is acting as an individual affected by the issue, and makes decisions mostly affecting themselves. At the same time, three further categories could be identified: (1) games rewarding *unethical* behaviour, (2) games rewarding *ethical* behaviour, and (3) *ethically neutral* games. It was clear from the observations that Master’s students coped better than civil servants with the steep learning curve of learning how to use a game engine, and managed to produce more complex game prototypes. In the surveys, 60% (31/51) of respondents agreed that “The prototype reflects my understanding of the issue”, 56% (29/51) agreed that “The prototype shows why the issue is problematic”, and 70% (38/54) agreed that “I am satisfied with the game produced by my team”.

5 Discussion

For this study, we organised three game jams involving either Master’s students or civil servants, and tested three hypotheses: (H1) the game jam resulted in greater knowledge about the social issue for participants, (H2) the game jam motivated participants to collectively explore a social issue, and (H3) the game prototypes connect different actors, factors, and consequences of a social issue (issue articulation). We collected data through pre and posttest surveys, non-participant observations, and analysis of the game prototypes made by participants. Concerning H1, only about 1 in 2 survey respondents reported having learned more about the issue after the game jam. The game jam team we interviewed reported researching data about the social issue they wanted to describe, and learning new insights in the process. From the non-participant observation, it was apparent that group discussions and learning about the social issue mostly happened during the brainstorming phase. While coding the game prototypes, participants learned digital skills, but this activity was mostly individual, and did not seem to require reflection about the social issue being addressed. At the same time, we found that the game jam was a good motivator for participants to collectively explore a social issue (H2). Satisfaction with the workshop was high with 9 in 10 respondents reporting they had fun during the workshop. While coding the game prototype is largely about learning digital skills, rather than articulating

social issues, it provided a significant motivation to participate and to collaborate with other attendees. Concerning H3 (game prototypes articulating social issues), only 1 in 2 respondents agreed that their game prototype reflects why the issue is problematic. Not all teams were able to quickly learn how to use the game engine and make a playable prototype. In addition to our three hypothesis, we discuss successful and unsuccessful features of the game jams.

5.1 Successful features

We found four main successful features of the game jams: (1) the group forming process, (2) the broad theme and freedom to pick any social issue, (3) the examples shared before the event, and (4) the limited duration.

Capitalist group forming process - At the beginning of the event, in order to form a team, participants had to pitch the social issue they chose in front of others. We found this to be successful as, during the pitches, participants could learn about social issues they were not familiar with.

Broad theme - The theme of the game jams was to simply use open data to make a game about a social issue, leaving participants free to pick a specific issue of their liking. This meant participants could pick social issues they were already familiar with and share their knowledge with other team members, leading to deeper discussions.

Sharing example games before the event - We shared with participants links to *The McDonald's Videogame*, *Spent*, and *Coming Out Simulator*. This provided a common ground for participants to discuss how games can be used to depict and reflect on social issues.

Limited duration - Conducting the jam in 7 hr meant it could be easily integrated into coursework or conducted as a team building event for civil servants, who might be unable to dedicate more time. A reduced duration makes the event accessible to a wider audience, which extends beyond passionate game developers. While not all teams were able to produce working game prototypes, we were surprised by the results achieved in just a few hours of game-making with novice participants, who for the most part had never written computer code before.

Beginner-friendly game engine - We introduced participants to *Construct 3*, which does not require installation, and allows games to be exported almost instantly and played in the browser. While being somewhat easy to use, *Construct 3* is commercial software, and offers a free trial with limited functionality, which might limit participants from continuing their development efforts. The only game prototype that was finished and published a few weeks after the jam had use all of *Construct 3*'s events included in the free trial and cannot be extended further unless a licensing fee is paid. Some participants did not find the game engine intuitive and struggled to work with it.

5.2 Unsuccessful features

The three unsuccessful features we found caused some level of frustration to participants, and were: (1) wrong expectation of what could be achieved at the jam, (2) lack of references for game mechanics, and (3) lack of teamwork during actual coding of the games.

Wrong expectations - We observed many novice participants expecting to make fairly polished prototypes over the game jam, which proved very difficult in reality. In order to reduce frustrations, game jam organisers should provide clear guidance about what is achievable through the jam. This issue is convergent with the difficulties and frustration observed by Pontual Falcão et al. [27].

Lack of references - Some of the participants had never played a video game before, lacked any references to make their new game, and were unfamiliar with the concept of game mechanic. This issue could be addressed by providing a set of game mechanics (e.g. in the form of cards) that participants can pick from during the brainstorming phase.

Insufficient teamwork during game development - Only some of the teams were able to divide tasks across the group, and work in parallel on coding the game and producing art assets (drawings, music, etc.). This led to many games using third party art, which limited participants capacity to express the social issues through their games. Effectively, game development revolves around a single person owning the laptop used to code the game. This issue is hard to solve, as setting up collaborative software development is technically challenging.

6 Conclusion

Game jams (and hackathons) are a double-edged sword. The opportunity to learn how to code a game motivates people to participate, and gets them engaged about articulating social issues. Social issues were present and visible in the video game prototypes made by participants. Making a video game needs the contribution of participants with diverse skills (art, coding, sounds, narrative, and others). Supposedly, a game jam should be all about *jamming* - a state of flow where participants intuitively understand their roles and what is needed by the team. Most participants reported feeling included in their teams and having fun. However, from the observations it became apparent that this jamming state was not constant; it varied across different phases of the event, with some experiencing it more during brainstorming, and others during coding. In particular, we observed participants switching to individual work as the actual coding began, as they faced a rather steep learning curve with the game engine. This is convergent with existing literature, which found that low-fidelity prototypes lead to group discussions and social learning, while high-fidelity prototypes lead to individual learning [17]. The game engine we introduced to participants offered a beginner friendly, no-code interface. However it lacked real time collaboration functionality, which significantly hindered group work.

6.1 Limitations

The validity of our results is limited as it relies on participants self reporting their learning outcomes, motivations, and satisfaction. One of the authors of this study was both facilitated the game jam and also administered the surveys, which can lead to acquiescence bias in the surveys, as well as courtesy bias during the observations. One of the three game jams was somewhat different. Game jam B was split in two days, two weeks apart (the pretest survey was administered on the first day, and posttest survey was administered

two weeks later). This difference limits the comparability of the events and validity of our results.

6.2 Future research

This study is not sufficient to establish whether the outcomes related to issue articulation were due to game-making, or due to the different objective presented to participants, when compared to a traditional hackathon. Further research could compare hackathons and game jams in an experimental setting, to validate whether game jamming, with all other conditions being equal, is more conducive to issue articulation. During the jams, which lasted less than 8 hr, participants had to both learn technical skills and articulate the issues. Future research should test whether more experienced jammers spend less time on learning technical skills, and therefore gain a better understanding of the issues. In future research, the game prototypes made by game jam participants could be further analysed. It is still unclear what pushed certain teams to make games that reward ethical behaviour as opposed to unethical behaviour.

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