

Opportunities and constraints of women-focused online hackathons

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Abstract—Hackathons are often viewed as not being inclusive to women, who have low participation in these events. Reasons for this include low self-esteem in STEM fields, toxic environments, bad sleeping habits during the event, and a competitive atmosphere. Hackathons also can be a valuable opportunity for undergraduate students to improve their skills, but a lack of gender diversity can prevent women from taking advantage of these opportunities. Recently, initiatives have been implemented to increase the number of women participating in hackathons, such as women-only events, balancing participants by gender during the selection process, and using feminist and social themes for the hackathon. Our qualitative study investigated how event design choices (Focus on Women; Event support activities such as mentoring and pre-pitch; and Event warm-up activities) can influence the participant’s experience in a women-focused hackathon. Data was collected through surveys and semi-structured interviews with participants.

Index Terms—time-bounded collaborative events, women-focused events, hackathons, collaboration

I. INTRODUCTION

Hackathons are time-bounded events, normally lasting from 24 to 48 hours [1]. These events can have different objectives from the organizers, from promoting a technology, learn new skills, apply concepts seen in the classroom and as informal way of learning [2]. Participants usually form multidisciplinary teams (programmers, designers, etc) to develop a proof of concept until the end of the event. These events often have few women [3], and are usually viewed as not gender-inclusive [4], [5]. Some of the reasons for this include the low self-esteem of women in STEM, toxic environment (e.g., mansplaining, maninterrupting), bad sleeping habits during the event, the hackathon ethos, and competitive environment [6]–[8].

Hackathons are also a source of informal learning and can be a opportunity for undergraduate students to improve their background in their early years of college. These experiences as decisive for the persistence of women in STEM field [9], [10]. Furthermore, hackathons are also used as recruitment for companies [9], so the lack of gender diversity makes women lose employment opportunities and fostering the feeling of non-belonging in the tech industry. Throughout the years, some initiatives have tried bringing more women to these events: women-only events, balancing participants by gender during the selection process, feminist and social themes for the hackathon [9], [11]. The design choices for organizing hackathons can turn them more inclusive, such as having

women as mentors creating a safe space for women. The term safe-space is historically used by women’s, and LGBTQIA+ groups for a place where people can meet and share their experience without being judged [12]. Safe spaces are designed to protect historically marginalized groups.

Through a qualitative study in a women-focused online hackathon, in which the first author was the co-organizer, we aimed to answer the following research question:

RQ. How did the event design choices influence the participant’s experience in a women-focused hackathon?

The design choices refer to Focus on Women (Women-focused participation, Women-only mentors, Hackathon theme/challenge addressing women), Event support activities (mentoring and pre-pitch), and Event Warm-up (Workshops, Team-formation dynamic). To answer this question, we analyzed data that was collected with participants through a survey and semi-structured interviews.

II. BACKGROUND AND RELATED WORK

Historically, women’s participation in hackathons has been low. A survey made in 2014 with 150 hackathons participants from the United States showed that women were only 11% of the attendees [1]. In the 2018 season, one of the main organizers of these types of events in North America and Europe, the Major League Hacking (MLH), with more than 90,000 attendees in 215 hackathons, reported that 24% of the participants were women [13].

One of the possible reasons that can prevent women participation is the *hackathon culture*. There is literature pointing out a perspective of risks when participating in hackathons, where women consider their health at risk — including poor quality food, sleeping arrangements, and sleep night [14]. The common hackathon format has a dedicated weekend where logistic challenges are common for women, especially with associated tasks by their gender, e.g. family care [14], [15].

Throughout the years, strategies has been used to increase the number of women, such as making hackathons around social themes (*hack for good*), including *healthcare* and *breastfeeding* [9], [16], encouraging the participants to submit their motivation to join the hackathon [17], having different types of participation during the event [4], and making women-only hackathons. Some considerations with the online events are that they could increase the participation of women since

they don't have the feeling of being "the only women in the room", provide the option to control the sleep spaces and healthier options of food [14]. MLH reported an increase in the percentage of women participation during the pandemic, from 21% in 2019 to 39% in 2020 [18]. However, it is not clear how the online experience was for their participants and if other issues related to gender have appeared.

III. METHODOLOGY

We needed a method that could help answering the *RQ*. *How did the event design choices influence the participant's experience in a women-focused hackathon?*. This method needs to be empirical, have a participatory design, and support the *critical* epistemological perspective. Following [19], where the methodology can be identified by two dimensions (obtrusiveness and generalizability), where we have a pre-existing setting (hackathons) with some level of manipulation (design choices). One of the recommended methods in is Action Research [20], summarized in Figure 1, which allows the participants to be involved and gives voice to historically underrepresented groups, being appropriate to localized problems [21], [22]. The choice of the methodology is appropriate in the *critical* epistemological perspective, with the purpose of changes in the hackathon's environment for women [21].

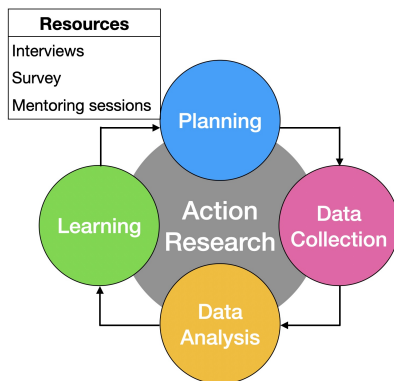


Fig. 1. Steps involved in one iteration of Action Research

A. Setting

The hackathon was held online, during the social distancing phase of the COVID-19 pandemic. It was organized to last 48 hours from the opening to the closing ceremony and was held on Discord, where participants could use the open channels to communicate with each other, mentors, and the organization. An online hackathon platform (Shawee) was used to register teams created during the hackathon, submit projects, and for feedback from the jury after the pitch.

B. Event design choices

1) *Focus on Women*: This event had **women-focused participation** in which men could participate at a minor rate. The hackathon had a **theme/challenge addressing women**: "Ethics on Marketing for Women". Teams had to propose solutions around this topic. This was disclosed during the

opening to avoid solutions being created before the event. The organizers shared supporting documents related to the theme in one of the Discord channels. The support team was **women-only mentors** - one motivation for that is according to Cheyran *et al.*, interacting with women in non-stereotypical roles has a positive impact on the vision of other women for success in STEM area [23]. Mentors were recruited by invitation (9 mentors) and through an open call (12 mentors) on the website, based on expertise in one or more of the following areas: *development, design, marketing, and business*.

2) *Event support activities*: The participants could have **mentoring** in 3 ways: check-in, on-demand, and pre-pitch. The check-in is a moment where a pair of mentors (ideally from different expertise) are randomly assigned to a group during the event and during one of the four assigned moments, would ask about the progress of the project, understand the group needs, and answer possible questions during the event. The on-demand interaction was to request a time slot (30 minutes) of the mentors' schedule, using a Discord bot to assist in the process. The bot shows the time slot, the area of the mentor, and a short description of the participants. After the mentoring session was scheduled, the mentor would receive an email and could use any platform for this interaction with the team.

The **pre-pitch** moment occurred with two mentors, that were different from those assigned during the check-in process, where the teams needed it to present their idea and progress until that point - each channel for the check-in had 2 teams to stimulate the teams to interact with each other.

3) *Event Warm-up*: For the **workshops**, opening, and prizes ceremony - where people that did not participate in the hackathon could watch and have the recordings, we opted for live streams on Youtube. We offered two technical workshops before the event - one on *React.js* and *GraphQL*, and another one on creating chatbots using *Twilio* - and one in the day of the event, focused on expectations and how to participate in a hackathon. The workshops were available for the general public through Youtube live streams and were recorded.

For the **team-formation dynamic** we suggested creating a team on the first day, meeting new people, and having no option in the enrollment form to join as a team. We held a session after the opening ceremony to help people know each other. The dynamic was carried out in the official Discord of the event, where we had two mentors in 7 of 14 available channels for participants, with them setting up a general knowledge quiz and games (e.g., Gartic, Stopots) as ice-breakers. After one game round, we left the participants in the room, so they could freely chat and know each other.

C. Data Collection

The data collection with participants was performed with a survey and interviews. These two moments offer a different level of detail about participants' experience in the hackathon, in which the survey explains the general feeling of the event, while we explore the topics in the interviews. The correlation of interventions in the two moments is shown in Figure 2.

	Focus on Women	Event Warm-up	Event Support Activities
Survey	Why you didn't join hackathons before? (Closed) About the general (mixed) hackathon community, to what extent do you identify with these statements? (Closed) On what scale do the following statements represent why you chose to participate in the hackathon? (Closed) How can the event be improved? (Open)	Which of these events did you attend or watch the recording of? (Closed) How well did you know your team members at the hackathon? (Closed) How would you describe your team's work at the hackathon? (Closed) Was there a leader on the team? (Closed) Was there a project manager on the team? (Closed) Was there a social-emotional leader on the team? (Closed) How can the event be improved? (Open)	How can the event be improved? (Open) In your opinion, what was good about the event? (Open)
Interview	What are the positive aspects of these events from your point of view? Do you have experience in hackathons? What is your goal in attending these events? What attracted you to attend a female-focused event? What prevented you from joining hackathons before event? How was the process of understanding the theme of the hackathon and creating the hackathon goals?	Did you attend the lives and workshops? They were useful during the event? Did you know your peers? How did you meet them? How were the roles assigned to the team? Did someone from your team give up during the hackathon? Would you work again with your peers? And why?	What do you think about the check-in process and the pre-pitch? What would you change about the event? And what would you not change about the event?

Fig. 2. Questions related to interventions in the Survey and Interview

TABLE I
NUMBER OF PARTICIPANTS, BY AREA AND GENDER OF THE HACKATHON

Participants of the hackathon			
Desired role in the event	Total	Women	Men
Developer	18	17	1
Designer (UI/UX)	16	15	1
Marketing	12	12	0
Business	9	8	1
Total	55	52	3

1) *Survey*: We conducted a survey with event participants. The survey was available from the end of the event until the winner's ceremony (5 days), sent in the Discord channel and as an email to the participants. To help understand the impact of design choices, we asked the closed question for people without experience in hackathons "Why didn't you join hackathons before?", with the options based on previous research on women's participation in hackathons [24].

To understand the perception of the hackathon community and why people would join a women-focused hackathon, we had two general questions, the first one being "About the general (mixed) hackathon community, to what extent do you identify with these statements?". This was assessed on a 5-point scale anchored between *Strongly disagree* and *Strongly agree*. The statements were: I identify with other members of this community, I am like other members of this community, This community is an important reflection of who I am, I would like to continue working with this community, I dislike being a member of this community, I would rather belong to another community. The second general question was "Why did you choose to participate in the hackathon?", being assessed on a 4-point scale going from *Not at all* to *Completely* in regards to the following statements: Having fun, Making something cool/Working on an interesting project idea, Dedicated time to get work done, Learning new tools or skills, Meeting new people, Seeing what others are working

on, Sharing your experience and expertise, Advancing my career, Becoming part of a community, Getting immediate feedback, Joining friends that participate, Getting through personal problems, Feeling needed, and Having a safe space to work [25].

From the Event-Warmup, we asked "Which of these did you attend or watch the record?", including the options Workshop: React and GraphQL, Workshop: chatbots, Workshop: hackathon participation, Team formation dynamics, Fun night!, Coffee breaks, and None of them.

2) *Interview*: The interviews were semi-structured, where a script is available, but new topics can appear and be handled in the middle of the interview [21]. They were performed in the participants' native language. The script started with demographic questions: name, age, the location where the person lived in Brazil, current job, and if the person graduated. Then, we had questions about their experience in hackathons ("What are the positive aspects of these events from your point of view?", "Do you have experience in hackathons?", "What is your goal in attending these events?", "What attracted you to attend a female-focused event?", and "What prevented you from joining hackathons before Hack Grrr!") — to understand their motivations to attend a hackathon and if the fact of being women-focused influenced their choice. We also had a specific question about the Hackathon theme ("How was the process of understanding the theme of the hackathon and creating the hackathon goals?"). Regarding the Event Warm-up, we asked a direct question about the workshops: "Did you attend the lives and workshops? They were useful during the event?". For the Team-formation, besides asking, "Did you know your peers? How did you meet them?", we also wanted to understand more deeply the team dynamics with other questions ("How were the roles assigned to the team?", "Did someone from your team give up during the hackathon?", and "Would you work again with your peers? And why?"). For the mentoring and pre-pitch sessions, we had the question, "What do you think

TABLE II
NUMBER OF SURVEY PARTICIPANTS BY ROLE AND GENDER

Participants of the survey			
Role in the event	Total	Women	Men
Developer	10	10	0
Designer	10	9	1
Marketing	4	3	1
Business	6	6	0
Total	30	28	2

TABLE III
INTERVIEWEE'S PROFILE, BY ROLE, AGE AND GROUP

Interviewee's profile			
Code	Role	Age	Group
P1	Designer (UI/UX)	24	G1
P2	Marketing	31	G2
P3	Developer	30	G3
P4	Designer (UI/UX)	22	G4
P5	Designer (UI/UX)	28	G5
P6	Designer (UI/UX)	25	G5
P7	Business	19	G6
P8	Designer (UI/UX)	41	G6
P9	Developer	20	G6

about the check-in process and the pre-pitch?”. The interviews took place after the event with both participants. The survey was voluntary and participants were asked for their email at the end, if they were willing to participate in an interview. 12 of them shared their contact, 10 answered the follow-up email, and 9 of those showed up for the interviews conducted via *Zoom*, which were recorded and the participants were encouraged to keep their camera on.

All interview recordings were transcribed with the help of Microsoft Word transcription tool, and then manually verified by the authors.

D. Data Analysis

Survey. We converted the closed questions to their correspondent scale, then a visualization of the answers were made using stacked bars to see the answer distribution [26].

Interviews. *Open coding* was made in the transcriptions, adding labels for relevant parts of the interviews, aiming to answer the research questions [21]. Then, we proceeded to create groups for the labels created in the *open coding* phase, called *axial coding* [27]. During the process, it's necessary to merge different labels with same meaning and create newer ones if their meaning it's unclear [21]. Codes and quotes were translated from Portuguese into English.

IV. RESULTS

A. Focus on Women

1) Survey: *On what scale do the following statements represent why you chose to participate in the hackathon?* The answer that represents better the motivations according to the participants is "Making something cool/Working on an interesting project". Another relevant statement in the same question is "Becoming part of a community". The full distribution is available in Figure 3 (a).

Why did not you join hackathons before? This question (shown in Figure 3 (b)) was prompted for those with no previous experience in hackathons, 13 of 30 participants in the survey. The answer with more agreement is "Didn't feel that I have the technical skills to collaborate with the team". On the other end, the answer with less agreement is "Didn't feel comfortable to work with people that I don't know".

2) Interview: *Motivations to participate:* From the open coding process, the reasons to join the hackathon that appeared in the interview are Networking, Curiosity, Gaining experience, Apprenticeship, Career Transition, Personal challenge, Award, Social themes, Applying concepts learned in the project, Curiosity, Making friendship, and Creativity. Most of them reflect the options in the survey (Figure 3). The career transition code gives more insights into how participants may use hackathons to advance their careers and join the technology area even if they are not developers, as shown in the quote below.

"I'm in a moment of career transition and I'm looking to migrate to a more technology area. I think the hackathon is a good place to get experience for that." (P2)

The personal challenge code gave more details on how some participants can tackle personal problems during the hackathon, such as trying to code again after leaving the area: *"(it) challenged me because it was the first time in 10 years that I coded something on my own."* (P3).

During the interview, there were comments about the hackathon's social theme as a motivation to join the event. The P9 also had previous experience with hackathons with social themes.

The idea that I can help other people with my knowledge, and people in vulnerable situations, things like that, like minorities in general. In general, with technology, we can help by doing all of this - so I can acquire knowledge, share my knowledge, and still help other people with this, so I think it's very cool. (P9)

Hackathon format benefits: The hackathon format codes reflected on benefits that may happen in hackathons and are found in the previously mentioned literature. The codes are Product development, Soft-Skills Development, Networking, New concepts during the event, Knowledge Exchange, Meeting people from other areas, Collaboration beyond borders, and Collaboration between groups after the event.

Benefits of Hackathon focused on Women: Being more specific on the benefits of the hackathon is focused on women, the following codes emerged: Apprenticeship, Reception, Representation, Comfort to talk about themes considered "taboo", Learning Environment, Cooperation, Friendship bonds, Safe Space, and Identification. For those who did not participate in previous hackathons, the fear of not having the technical skills to collaborate with the team was the most agreed answer (Fig 3). In the code **Safe Space**, participants explained the environment and the impact it had on sharing their technical skills with their team and on collaboration during the event.

"an environment that only had women made me feel more comfortable in giving ideas. So I can talk about the skills

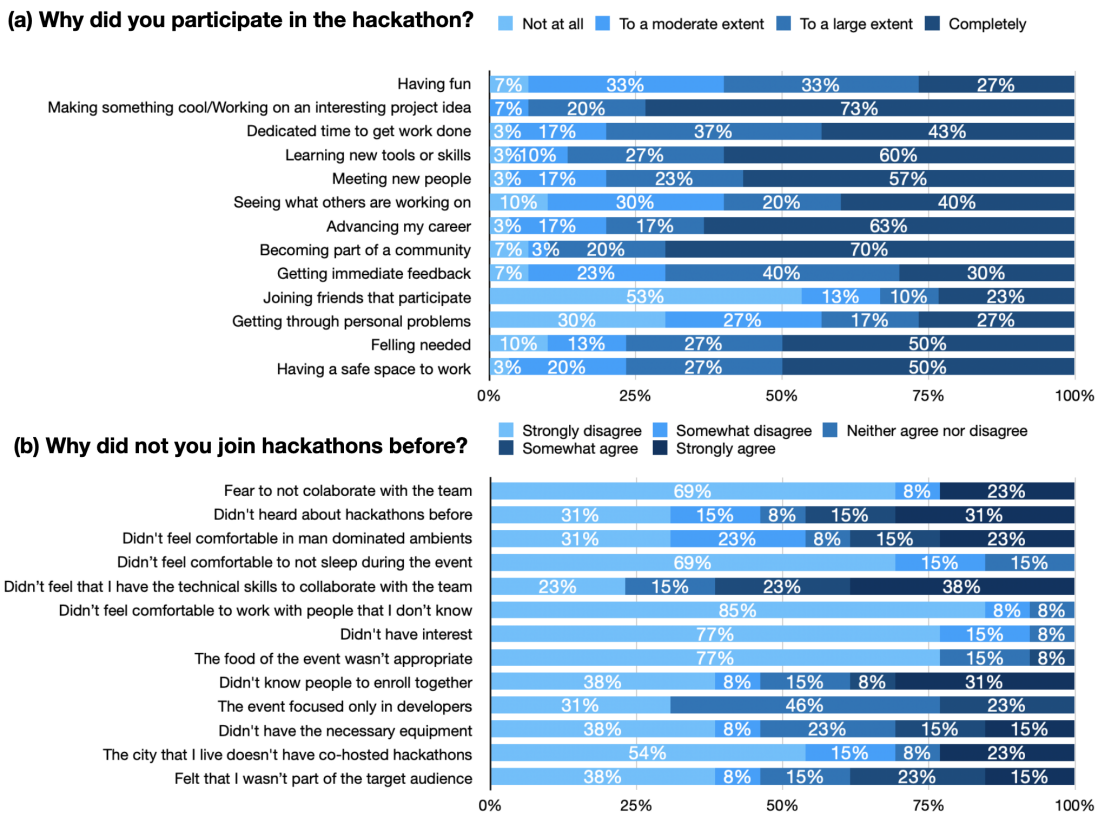


Fig. 3. Answer distribution for the questions for joining this hackathon (a) and not participating in hackathons before (b)

I have, and the skills I don't have and be able to talk too and learn. I felt more comfortable, I felt more is... As if I didn't feel judged for the lack of skill I had.” (P7)

Another related code is **Learning environment**. This also aligns with the objectives found in the survey (Figure 3 and Hackathon Format Benefits). However, the participants reinforced this even if a team had conflicts during the hackathon.

“We were there with the idea of learning so much that we reinforced it several times when we got to those moments of conflict [...] It's when we got to those moments, we still reinforced look at this here is a learning environment, we're here learning, we're more learning than aiming for the podium then. Yes, the girls and I, practically the whole team had this learning perspective, even though they had more experience.” (P7)

Reception refers to the participants' perception of the organizing team and mentors being women, how they reacted when facing challenges during the project, and being able to submit a project.

“I felt a warm reception, I liked it a lot, especially seeing all the female mentors as mentors. I love seeing women in positions of power like this” (P6)

“When I entered Discord I saw that the mentors were there, you stayed there until dawn and I was like, 'okay, if they're here it's all right, let's go there' and I continued.” (P9)

Although the goal of meeting new people appears in the sur-

vey (Figure 3), some teams went beyond and made **Friendship bounds** that went beyond the event in some cases.

“I think these days I sent them a message in the group, kind of asking how they were doing, what they felt about the end of the hackathon, the solutions and I don't know what... We talked for a while little, it wasn't just professional” (P1)

The code **Cooperation** also appeared in the interview, also associating a person wanting leadership as a negative sign. This code also shows the opposite of fear from people that never joined a hackathon before (Figure 3).

“We encouraged each other (...) there was a relief, we were always talking about amenities and relieving the pressure, so I think it was much more cooperative than a team that has that person wanting leadership, you know?” (P6)

While talking with each other, an interviewee mentioned the **Comfort to talk about themes considered “taboo”**, such as menstrual periods: *“So sometimes they made jokes about menstruation or something like that” (P1).*

The point of having a women-focused theme also impacted in the proposed solutions, where the code **Identification** emerged in the interviews.

“I always try to participate in events aimed at women because I identify with the group. When I think of a solution, I already think of something that as a woman, as a minority, would be good for me, what would be good to help this group of people.” (P9)

B. Event Warm-up

1) Survey: *Which of these events did you attend or watch the recording of?* Every survey participant attended at least one of the events (Workshops, Team-formation Dynamic, Fun night!, and Coffee breaks), as shown in Figure 4. The event with the most engagement was the Team-formation dynamic, and the event with less engagement was the Fun night.

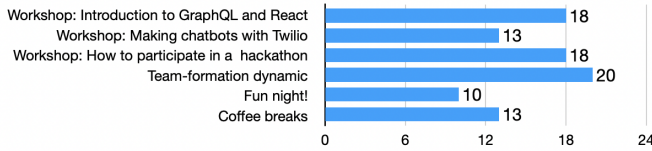


Fig. 4. Answer distribution for the question "Which of these events did you attend or watch the recording of?"

How well did you know your team members at the hackathon? To understand previous relations, we asked how well the participants knew the other members of their team. As detailed in Figure 5, the less agreed option was "I have collaborated with some of my group members before". Most of the participants did not know their peers, befitting the motivation for Networking.

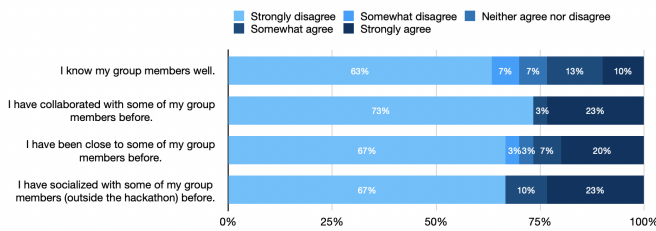


Fig. 5. Answer distribution for the question "How well did you know your team members at the hackathon?"

How would you describe your team's work at the hackathon? The survey participants were asked about the team's work in different measures, such as efficiency, coordination, fairness, and comprehension. Although most responses have been on the positive side (Figure 6), some participants mentioned the unfairness during the team's work.

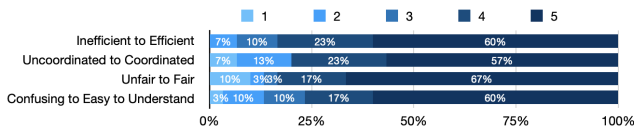


Fig. 6. Answer distribution for the question "How would you describe your team's work at the hackathon?"

Roles during the hackathon The participants were asked about the presence of roles (Leader, Project Manager, and Social-emotional leader) during the event. Although some participants acknowledged the presence of these roles in their teams, the majority answered that was no clear person in the roles. The entire distribution is shown in Figure 7.

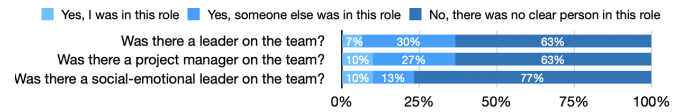


Fig. 7. Answer distribution for the questions "Was there a leader on the team?", "Was there a project manager on the team?" and "Was there a social-emotional leader on the team?"

2) Interview: *Obstacles during the event* From the open coding, we had the following codes emerging related to obstacles during the hackathon: Absence of communication within the group, No voice in the team, Erasure of work made during the hackathon, Competitiveness, Judgment within the team, Isolation of developers, and Environment is not so safe.

Absence of communication within the group shows communication problems such as the creation of other communication forms besides the official Discord and the lack of contact with the team: "I felt a little isolated at one point, as we created a group for the four of us on WhatsApp just to talk about the hackathon. I saw that there were times when they solved things that I wasn't aware of, so it seemed that they had another group and I wasn't participating." (P1).

The code **No voice in the team** was created according to mentions of participants' opinions not being heard. Some even mention less influence in their work, even with the hackathon theme being shared on the same day of team formation: "Sometimes, like, I wrote there in the group, it wasn't heard very well, the mentors would come and say something very similar to what I had written down at that time" (P4).

With G6, the code **Erasure of work made during the hackathon** emerged to refer to a change in the final presentation close to the end of the hackathon, leaving behind the work of some participants: "All the stuff I've been a part of, it doesn't show up in Pitch. It doesn't show up, it's like I didn't even exist at work you know?" (P8).

The code **Competitiveness** also explained the different motivations of some participants who do not always correspond with their peers, leading to frustration: "I just want to learn, I want to compete, I want to create a product that I say 'Look, I'm proud of what I've done', you know, but so far I haven't been lucky enough to join a group where everyone has the same vision." (P8).

The code **Judgment within the team** explored the judgment of some peers in the hackathon, also leading to frustration of the participants and interruptions of the workflow: "Our work could be much better presented if they had let me work" (P4).

However, not all teams had the same problem of judgment, with some teams being more open to teamwork: "They never judged me or that I would be inferior in some way for never having participated or for being such a newbie in the business." (P5)

Isolation of developers represent participants who were non-developers in the hackathon, noticing the absence of developers in important moments of ideation and check-ins.

"When we did the visual identity part, the brainstorming,

they didn't participate in this process. (...) I don't understand programming but nobody codifies anything from scratch, what will she code? What did she decide she was going to do?" (P8)

"Developers sometimes leave the call to do their part" (P4)

The code **Environment is not so safe** represents the expectations of a less competitive environment because of the majority of women in the hackathon.

"I always hope that if there are more women, we'll have a more empathetic team. That's my hope but I've already realized that it's not exactly how it works." (P8)

Event Format Feedbacks: In this code group, the code **Team formation** emerged concerning peers and their previous relationships. Some participants mentioned the Team formation event and have never met anyone in their team, while others knew previously at least one person (Figure 5).

"It was a group that didn't know each other, we had never, never met before, we formed the group at the hackathon and I thought it was a very cool group formation" (P2)

A suggestion was made by one participant to have the organization decide on the teams before the event.

"I understood the idea of why you let us choose our team, which has to do with autonomy, with interaction and everything - but I would find it much more interesting if the team was already pre-made." (P3)

Notably, two groups (G4 and G6) with trouble about people voicing their opinions or showing their work had members who previously worked together: "Yes, they knew each other and I discovered that after I joined (the group)" (P8)

C. Event Support Activities

1) Survey: We had two open questions for the participants to give feedback on the event format. In question *How can the event be improved?*, the suggestions included a clear disposition of information, where the check-in would be made in the Discord platform, and less interruption for the check-in. In question *In your opinion, what was good about the event?*, the participants mention the preparation of mentors, the check-in moment, and the reception from the mentors.

"Interaction dynamics, parallel challenges, attention to teams, attention to projects, tone of voice, the experience of mentors, event theme and quick responses from the organization."

2) Interview: From the open coding, the *Event Format Feedbacks* also included some feedback for the Event Support Activities. These codes are Feedback during pre-pitch, Fear of having the idea stolen during pre-pitch, Progress of other groups during pre-pitch, and Mentors.

When asked about **Feedback during pre-pitch** from other teams, as we created this intervention for teams to interact with other teams in the online environment, most interviewees mentioned the other team being silent and not interacting.

"We didn't have much contact. We only saw the other group. And each one congratulated each group, you know, we

congratulated the group, and the group congratulated us, but nobody said anything at all." (P5)

Only one person mentioned in the interview that their team received feedback from other participants.

"Their feedback was just that we had put a lot of ideas and there was really a lot of stuff, so we made it leaner. So the feedback they gave was good." (P9)

A possible explanation that emerged in the interviews was the **Fear of having the idea stolen during pre-pitch**. Mentors annotated group progress, so organizers could know if someone attempted to steal the idea. However, this did not avoid the tension of having another team watching the presentations.

"The only thing I was kind of like, although we have this idea of women collaborating, I confess that I was a little afraid of another group watching the pre-pitch" (P2)

Progress of other groups during pre-pitch concerns how some participants managed their hackathon time and used the moment of seeing other projects to compare their progress. It contrasts with the results of team coordination (Figure 6).

"We didn't think it was bad, it's nice to see other ideas... I thought it was cool because we thought we were too late, we found out that it wasn't just us, everyone was in the same boat, in the same situation, right? Then we thought wow, it's not just us who are so lost, everyone is lost." (P8)

The code **Mentors** gave the positive aspects of having support during the event, not only with technical advice but their presence during the night. The code also aligns with the opinion in the survey's open question.

"They (check-in moments) were very important for us to be able to get the idea from the mentors, we needed their help to be able to orient ourselves within the theme, (...) to realize that we were getting very open, when in fact we had to narrow our search a lot for a challenge." (P2)

"When I entered Discord I saw that the mentors were there, you stayed there until dawn and I was like 'ok, if they're here it's all right, let's go'" (P9)

Obstacles during the event Besides the motivation of Learning and Being Part of a Community (Figure 3), **Hackathons viewed as competition** resonated in some of them:

"Because after all, it's a competition, right?" (P2)

"So it really is time to put this test in a competition that demands the maximum" (P6)

V. DISCUSSION

Competence-confidence gap. The competence-confidence gap [28] – a fear of being unable to complete a task although you have the competence to do it – is more common in women. While in Figure 3 (b), the most agreed prompt was "Did not feel that I have the technical skills to collaborate with the team", the hackathon offered a Learning Environment, having mentors to support the participants and giving previous workshops, and cooperation necessary for them to finish.

Teamwork in hackathons. While most people join the hackathon with the motivation to learn and become part of a community, some groups had trouble creating a healthy

environment. From not having a voice to judgment within the team, the competitiveness of some participants made the hackathon experience not so great and broke some expectations from participants to have a less competitive environment because of the women majority. The previous relations between participants played a role in the groups with conflicts, where they can make decisions as being a majority of a team. The isolation from developers can be normal since they are making other tasks, however, is important their presence in the ideation process, so they can understand the idea of the project. Besides the bad experience in their teams, the participants mentioned that wanted to continue joining those events, with one of them already enrolled by the time of the interview. The teams that had the cooperation and reception had better interpersonal relations between the members, not necessarily being less competitive, as the vision of hackathon being a competition is present in different groups.

Limitations. As any qualitative research, this work has a subjective nature, possibly the divergence of codes between the person doing the analysis. The work also has cultural biases, as the participants came from the same country and were influenced by the events organized there.

VI. CONCLUSION AND FUTURE WORK

In this qualitative research, we explored the influence of event design choices in a women-focused online hackathon in the participants, using a survey and interviews as data sources. The motivations to join Hackathons, besides Networking and Learning, included career transition, and having a social theme. Having a majority of women in the event is not sufficient to have a healthy environment, with a high level of competitiveness in the event, although they want to be part of a community. For the next edition of the event, we want to revisit the check-in process, making it more interactive with the teams not being protective with their projects. Another design choice that will receive a new interaction is the team-formation dynamics since we want to match the same motivations of hackathons while giving freedom to the participants. We also want to run another iteration with a hybrid-event to investigate the influence of the design choices in a different environment.

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