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Understanding and Improving the Culture of Hackathons: Think Global Hack Local

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Abstract— Hackathons bring developers, artists and designers together around a shared challenge: ideate, plan and create an application in a highly constrained time frame. A way to socialize, solve problems, and strengthen soft and hard skills, hackathons have grown tremendously in popularity in the last half decade. Despite this growth, it has been noted that females do not participate in hackathons with the same frequency as males. Some theorize that the hackathon culture is intimidating, does not appeal to women, or that it acts to amplify pre-existing cultural biases in computing. In this paper we introduce an alternative format for hackathons to address these issues. Think Global Hack Local (TGHL) is a non-competitive, community-based hackathon that connects non-profit organizations with student developers. Students donate a weekend to solve problems that these organizations otherwise lack the resources to solve. To date, there have been two TGHL hackathons, and we have observed many interesting divergences within the culture of TGHL in comparison to other hackathons. Response has been positive, and nearly all of them indicate that they would do it again. By adopting some of these ideas, we believe that hackathons can become an environment that is more inclusive and fun for all.

Keywords—*hackathon gender issues; community engagement; community-based projects; service learning*

I. INTRODUCTION

For student participants, hackathons offer many promises: improving or acquiring programming skills, spending a brief but fun and immersive time with like-minded people, taking a non-trivial project from beginning to completion in a short time, competition and prizes (though many events are non-competitive), an agile prototyping environment and direct contact with potential employers. Despite what many may perceive as positive attributes, hackathons also elicit strong negative reactions from others: they can foster a competitive, male-oriented programming culture, they can encourage poor software development practices, and they can reinforce the

"nerd" stereotype. This paper explores both sides of the discussion and describes a hackathon format (Think Global Hack Local), which retains most of the positive attributes while attempting to minimize the negatives by focusing on community-based projects. From participant responses to post-event surveys, we have an understanding of what motivated these students to attend this event and what aspects they felt were positives about the event. Participants tell us that the community focus was important to them and that, as previously reported by others, the social aspects of the event have a big influence on their initial interest in participation and their willingness to come back.

II. BACKGROUND

Hackathons, hacking (or coding) marathons, have seen a surge in popularity in recent years. Now considered a staple of the technology community, such events grew primarily out of companies looking for ways to innovate within their business, but have since grown into the public domain and academia as a way to build things, advance new ideas, and improve skills. Some have become so large and garnered so much attention that many students participate as a way to help them with job search [1].

Like hackathons, game jams have grown in popularity evolving their own culture that is similar, yet slightly different than the hackathon model. Jams have been noted to focus on experimentation and innovation, rather than polished products [2]. One of the earliest jams was *Indie Game Jam 0* that took place in 2002 with 14 experimental games created over four days [3].

In [2], we see game jams characterized as ludic craft, a constructive form of play. The authors characterize them as focused on creativity, playfulness, and “gamefulness”, providing a focus on generating ideas and creating, not always on finished and polished products. This may not be a true picture of the difference between the two however, as many

hackathons do not produce finished or polished products either. However, it is important to note that many feel a jam has a different focus, or at least had a different impetus when they first began appearing on the technology scene.

We also see [2] focus time in discussion about the community that exists during a jam, emerging both from the structure of the event as well as the people participating. This is called out as an important factor in the jams. The authors conclude that the jams that tended towards playfulness facilitated more innovation.

Of the largest game jams, *Global Game Jam* (GGJ) [4] started in 2009 with concurrent game jams in 23 countries. Continuing yearly, the 2015 GGJ had 28,837 people registered for 518 jam sites in 78 countries. There were 5438 games produced [5].

A. For the Social Good

As jams and hackathons have grown in popularity, we have seen the emergence of such events around specific causes commonly associated with social good, sometimes referred to as civic hacking [6].

These events can be focused around themes. One such series of events, given the title “Game Jam 4: X”, centers around three primary themes for X: health, diversity, and research [7]. In a related effort, [8] describes a series of three hackathons in India to solve social problems sustainably; [9] describes a hackathon designed to create technologies for the homeless. The CDC *Games for Health* game jam provided a way for participants to jam on health-related issues [10]. During a recent *Global Game Jam*, Scott, Ghinea, and Hamilton [11] promoted designing games for inclusiveness (for sensory, motor, or cognitive impairments) at their jam site.

The products that come from civic hackathons can be viewed as secondary. As claimed in [12], the more interesting by-product is the versions of the civic imaginary and can transform the way people view themselves as citizens. The CDC *Games for Health* organizers saw that participant interest and awareness of health-related issues and careers increased [10]. After the focused GGJ that Scott, Ghinea, and Hamilton ran, a survey was administered showing participants were more likely to consider issues of inclusiveness in games in their future development [11].

Computing with the community in mind is not a new idea to the computer-science education community. There are many examples of projects and entire courses at all levels of the curriculum that have service learning components and/or community-based projects [13] [14] [15] [16] [17] [18] [19].

B. Academic Hacking

The popularity of hackathons and game jams has made its way into the broader academic community, with a particular rise of these events as part of conference programs. At SIGCHI 2013, a game jam was organized to allow members of the CHI community to participate and explore this model of creation as a way to focus on interacting with digital play [20]. At SIGCHI 2014, there were two hackathons, one dealing with big data and privacy issues [21], and the second using a game

jam to focus on a research question in HCI [22]. OData Hackathon @ CSCW 2014 was a hackathon that focused on online communities [23]. At Group 2014, a hackathon was organized centering on online co-production systems (systems where many people are contributing to the system) [24].

Another area of academic focus when it comes to hackathons and jams is as a resource for academic study. As Fowler, Khosmood, and Arya point out in [25], given the large number of participants across the world, the GGJ provides a learning opportunity and a research platform for many [26], and has spawned several workshops around this idea [27][28][29].

Of particular academic interest is the impact of the participation on those involved in these activities. Such research shows that participants can gain skills in prototyping and collaboration [30], can have a positive correlation with academic performance [31], and can improve confidence of participants [32]. Reng, Schoenau-Fog, and Kofoed [33], discuss the importance of the social aspect of the jam as highly important to the participants.

C. Criticism of Hackathons

Even with the surge in popularity and massive amounts of participation and success stories, there remain some points of concern around hackathons. Guzdial laments that these types of events help to propel the “geek” stereotype and promote poor software design practices [34]. Given the amount of literature devoted to techniques for software development and the countless methodologies that exist for creating good software, some question if a 24-, 36-, 48-hour development cycle helps to promote those practices. In [35], we are presented with a way hackathons were used by a software company focused on security software to help improve their business. They recognize one challenge in turning the prototypes created into products that are of real business value.

That aside, the “geek” stereotype as a turnoff to women has garnered more attention. For the 2013 Global Game Jam, a survey was administered to participants. Of those that filled out the survey, 85.97% identified as male while only 12.54% identified as female [36].

A post on Quora gives some perspective on why women may feel out of place at hackathons, including the way they are treated by male participants (calling to mind the ongoing #gamergate scandal [37]), false perceptions of the general format (e.g. having to stay up the entire time, no showers, eating junk food), and not having a community of friends that participates [38].

Johnson’s article [39] adds onto [38] by providing suggestions for how to make hackathons more female-friendly. These include a pre-registration period just for women (though we note a high risk of making matters worse by creating a reinforced sense of exclusion by adding another layer of separation), avoiding competition, ensuring a clean and welcoming environment, broadening recruiting (such as through women’s groups on campus), watching for use of non-welcoming language in advertising, working to make beginners feel welcome, and advertising events in a gender-neutral

manner, avoiding strictly male stereotypes and images of males participating, and publishing attendees list so that women can see ahead of time that women attend (though we add privacy concerns must be kept in mind).

In an effort to address these issues, several hackathons specifically targeted at women have emerged [40] [41], including the International Women’s Hackathon sponsored by Microsoft [42]. However, as with the women-only pre-registration period, such segregation arguably increases the sense of separation and distracts from the real issue of creating an inclusive, safe environment, regardless of gender.

To this end, others have taken a different approach. Instead of creating events specifically for women, they have instead focused on changing events to be more welcoming and by extension appeal to women. Spotify’s hackathon had an impressive 50% female participation rate. This was achieved by specifically calling out the culture as mostly male-oriented and working to increase diversity. They reached out in advertising to women, served healthier food and removed the prizes, creating an atmosphere that was more like a science fair [43]. Brown University changed the focus of their event towards beginners, paying special attention to use of language (create and build instead of hack) [44].

StitchFest [45] adds elements to a traditional hackathon to try to appeal to a more diverse audience, such as the use of LilyPad Arduinos to design wearables. This portion of a larger hackathon saw 33% female participation, as opposed to the entire event (PennApps [46]), which had only 14.8% female participation [47].

In response to Guzdial’s original post [34], Krishnamurthy brings up a correlation between hackathons/jams and the film industry’s 48-hour film competitions. He refers to [48], which makes a strong case for why these competitions are important to film, many of which can be equally applied to computing like “actually starting and finishing...”, “honing your craft”, “it’s fun”. The article also focuses on the human aspect of the competition, something we see echoed in the discussion of the computing equivalents.

Similarly, we acknowledge that while there are tradeoffs, it is important to note that jams and hackathons provide unprecedented opportunities to practice agility, iteration and scoping. Many companies use such events as a way of testing students’ capabilities to iterate quickly and scope effectively. Typically any such projects are thought of as proofs-of-concept, not finished products. The expectation is that development will continue after the event. Furthermore, unlike many traditional computer-science programs, jams and hackathons provide an opportunity for students to learn to work with artists and designers, an invaluable skillset that is often missing as our students graduate.

III. THINK GLOBAL HACK LOCAL

Think Global Hack Local (TGHL) [49] and its structure were inspired by industry practice and community need. Hackathons and jams are popular events for local industries in partnership with universities. At the University of British Columbia (UBC), this has been the case for some time.

Companies frequently request running hackathons on campus to allow them to put their product/service/software in the hands of students. It is both an opportunity to inspire innovation around their product and a chance to preview students for potential future hires.

A strong connection with community grew out of the UBC’s CPSC 319 course entitled, “Software Engineering Project”. In this course, students work throughout the term (13 weeks) on small teams (6 students) to create software for a real-world client. These projects have been solicited from the community (both the university community and beyond) for many years. Occasionally, one of the clients for the course would propose something that would be useful for them, but was not enough work to keep a team of 6 developers busy and engaged for 13 weeks, so the need went, unfortunately, unfulfilled.

Given the existing highly engaged student sub-community of hackers and jammers (Vancouver’s Global Game Jam site at the UBC had over 350 participants in 2014 [50]), and given the ever-present need for software-related help in the non-profit sector, it seemed a natural next step to plan a jam around such civic need.

When designing the TGHL hackathon, a conscious decision was made to be non-competitive, and to find ways to amplify collaboration even more. The assumption was not only that students were capable of filling the needs present in the community and open to the challenge, but that the students would be intrinsically motivated to help the community.

Clients were recruited through past clients for the CPSC 319 course as well as UBC’s Centre for Community Engaged Learning [51], which actively promotes efforts that put UBC students and faculty to work for the greater community good. The Centre was able to provide potential clients for this event. Students were recruited through advertisement within the Computer Science Department (posters in building, email, etc.) and asked to attend an information session, which provided food and drink along with information about the event.

A. Event Structure

TGHL follows the “typical” hackathon structure of a weekend (48-hour) time period starting on Friday evening and ending late Sunday afternoon.

On Friday evening, participants gathered for an overview of the event, any rules and regulations, and themes and goals for the weekend. Teams would be formed for each of the clients with no project overlap between teams. It was made clear that there was no competition involved—the “prize” was to create products to fulfill the needs of the clients. The introduction was followed by short pitches from the clients describing their problem and their ideas about what the solution might be.

After brief introductions, dinner was served and the participants were able to discuss the projects in greater depth with each of the clients. Students were then given an opportunity to choose a project. In order to ensure that each project had sufficient staff, organizers would ask students to move when participation was low. In almost all cases, students were willing to switch teams if needed after discussion.

After the teams were formed and requirements elicitation was completed in its initial phase, the clients left and teams were left to plan the rest of their weekend.

Saturday was a day of solid work, interrupted by meals, provided by TGHL. Most of the clients dropped by at some point during this day to chat with their teams, answer questions, and check on progress.

Sunday morning and early afternoon was working to finish up the projects. For the last two hours (starting around 4pm), the teams would demo what they had accomplished and the clients were given the floor once again to talk about their experience in the process and products.

Throughout the event mentors (typically graduate students from the Centre of Digital Media, other students, or local industry professionals) would drop by to help students design and plan their solutions, debug code, and address software and design architecture issues—a key element given concerns around fostering an educational environment and practical, best software practices.

IV. RESULTS AND OBSERVATIONS

To date, there have been two Think Global Hack Local hackathon events, one in March 2013 (TGHL 1) and one in October 2013 (TGHL 2), both with the same format. A third is planned for summer 2015. In this section, we present our observations about the participants, the events, and some of the responses from the surveys administered after the events took place.

Table I gives some demographic information about participation in these events. For TGHL 1, there were 5 projects from 5 distinct clients. The clients were: Burnaby School Board, BC Cancer Agency, SelfDesign/PCRS/PeerNetBC, PeerNetBC, and Delta Youth Orchestra. For TGHL 2, there were 8 projects from 7 distinct clients. There were no repeating clients from TGHL 1 to TGHL 2. The clients for TGHL 2 were: BC Centre for Employment Excellence, Neil Squire Society, BC Association of Family Resource Programs, Sunshine Coast Botanical Garden Society, UBC Department of Medicine, Writer's Exchange and Climb and Conquer Society Canada.

There were 35 participants in TGHL 1 (35% females) and 65 participants in TGHL 2 (30% females). Although demographic information was not collected on major systematically, the majority of the participants were observed to be computer science majors. At this time, the UBC Computer Science undergraduate program was made up of 25% women.

TABLE I. DEMOGRAPHICS OF PARTICIPATION

	TGHL 1	TGHL 2
Number of clients	5	7
Number of projects	5	8
Number of participants	35	65
Number of survey responses	32 (91%)	47 (72%)

A. Observations

Overall, the events were judged a success by the organizers and clients. The atmosphere was fun, excited and energized. A positive and collegial mood remained through the entire event.

Plenty of collaboration was observed during the events. Teams were actively encouraged to help each other and as such no competitive behaviors were observed during the events. As an example, the following was observed:

If a team had an issue with PHP, for example, they might yell out "is anyone here a PHP guru?" and someone from another team would leave their project for a bit and help with the other project.

The structure and expectations for the event led to an atmosphere that did not put an onus on the students to stay up and cram and build the entire time. Students were instead mentored around scope and realistic planning for the weekend. In fact, on the first night after project teams were created, many participants chose to go home and get a good night's sleep and return the next morning to start work.

B. Participant Feedback

Participants were asked to fill out a short survey about their experiences with TGHL at the end of the event. In this section, we will present the feedback collected from those surveys. Participation in the survey as a whole was voluntary and no questions on the survey required a response. Therefore, the number of responses varies from question to question.

Table II shows the responses to the question "Was this your first hackathon?" For both events, the number of first-time hackathon participants was greater than veteran hackathon attendees. Response rate and percentages of total are shown.

Table III summarizes some of the main reasons that were given to the free response question "What made you decide to attend?" This was a question on the survey that directly followed the first-timer question. The percentages given in the table are percentages based off of all responses to the survey (32 and 47). The categories that were tracked were responses that dealt with the following:

- Student desire to learn, gain experience, try new things
- Student desire to help non-profits, do something good for the community, work on "impactful" projects, solve real-world problems
- Student desire to be part of the social group either because friends encouraged them to attend, friends were attending, or to come to know their peers better

TABLE II. FIRST TIMERS

	Was this your first hackathon?		
	Yes	No	Did not answer
TGHL 1	23 (71%)	6 (18%)	3 (1%)
TGHL 2	40 (85%)	7 (15%)	0 (0%)

TABLE III. REASONS FOR ATTENDING

	<i>What made you decide to attend?</i>		
	<i>Learning</i>	<i>Civics</i>	<i>Social</i>
TGHL 1	6 (18%)	9 (28%)	6 (18%)
TGHL 2	19 (40%)	9 (19%)	12 (25%)

TABLE IV. LIKELIHOOD TO REPEAT

	<i>How likely are you to attend another community hackathon?</i>					
	<i>Def</i>	<i>Very Likely</i>	<i>Likely</i>	<i>Likely but not for a while</i>	<i>Not Likely</i>	<i>Did Not Ans</i>
TGHL 1 First Timer	7	1	10	1	2	2
TGHL 1 Veteran	3	3	0	0	0	0
TGHL 2 First Timer	21	1	15	0	1	2
TGHL 2 Veteran	4	0	3	0	0	0

The students could have indicated more than one of these items in their response and several did. The responses were then categorized in multiple categories. Also noted was the number of veteran and first-timer responses in each category across the two events. For veterans, learning came up in 2 responses, working with the non-profits in 4 responses, and social aspects in 3 responses.

Table IV gives the results of the question “How likely are you to attend another community hackathon?” broken down by response to the veteran question. This question was a Likert scale question with the responses being: *Definitely*, *Very Likely*, *Likely*, *Likely but not for a while*, and *Unlikely*. Placing these on a numerical scale with 5 being definitely will attend again and 1 being unlikely to attend again, first timers averaged 3.48, while veterans averaged 4 for the first event. In the second event, first timers averaged 4.08, while veterans averaged 4.14.

When looking at the response to the survey question, “What aspect of this hackathon do you like the most?” two categories of answers stood out. The first were responses that dealt with the personal and social aspect of the events, which included one’s team as well as the others at the events. The second were responses that dealt with the real world projects and community aspect of the events. Table V summarizes the number of responses in the two categories for both events.

TABLE V. MOST LIKED ASPECTS

	<i>Which aspect of this hackathon do you like most?</i>	
	<i>Social</i>	<i>Community</i>
TGHL 1	11 (34%)	12 (38%)
TGHL 2	20 (43%)	8 (17%)

Since this question was free response, participants could have mentioned both aspects in their response and would be counted in both groups in the table.

Some of the comments that stand out from this question (about most liked aspects) included:

- *Collaborating with and learning from each other*
- *Connect with the organization and put their idea to some real products*
- *Getting lots done, realizing I know more about web dev than I thought*
- *The non-competitive positive environment*
- *Meeting new people with similar interests and learning from one another*
- *Learned a lot. Also feel really fulfilled when finally done (especially it's for the community)*
- *Developing something for a client*
- *Working on a problem that has real world applications*
- *Coding with awesome people and learning new stuff*

C. Client Feedback

Clients were also asked to fill out a similar survey as the participants about their experiences with the events. Again, participation was voluntary, but the response rate from the clients was 100% for both events.

All of the clients at both events were first-time participants in a hackathon. Their reasons for participation varied, but centered on the idea of reaching out and working with the community as well as opportunities to work with the students. Many of the clients indicated that they had a specific need and this opportunity came along and it was a fit for them to attend.

For TGHL1, all of the clients indicated that they would definitely be likely to participate in a community hackathon again. For TGHL 2, 6 of the 8 clients indicated they would definitely be likely to participate again, while two indicated that they were simply likely to participate.

When asked why they were likely to participate again, 7 out of the 13 clients (54%) indicated in some form that they felt it was a good opportunity to support the students and to work with them. A few samples of those responses are:

- *Wonderful opportunity to support student learning and community partners*
- *The students are amazing to work with*
- *Really fun, great team building exercise, good cause connecting with young, smart people*
- *Great fun. Great students. Reminds me of my misspent youth*
- *How amazing all of these people were*

The clients also pointed out in 3 out of 13 responses (23%) the community partnerships that were built because of the event.

In terms of client satisfaction, the survey responses give us a snapshot of how they were feeling after the event.

- *The team really went above and beyond in taking my ideas and running with them. They were able*

to create and visualize something that has only existed in my head as a concept.

- *From our community, we will involve more. This is fantastic; we got more results than we expected! Well done.*
- *I am really happy with what my team accomplished.*

V. DISCUSSION

Many issues are brought out by the structure and nature of this hackathon. Some of the suggestions for improvement given in [38] and [39] are put into place with the TGHL structure. Further, TGHL provides another aspect to participants that has been noted by Dahlberg et al. [52] as valued by women and minority students, the social relevance of computing. In [52], the authors argue for more civic engagement and community service into outreach programs to appeal to these groups. An event of this type, while not outreach per se, provides these elements to students. This may have resulted in the higher percentage of participation of women in the events than in the general population of students enrolled in computer science as a whole.

Student reasons for attending the hackathon varied, but the number of responses in key categories was encouraging. Students (18% and 40%) viewed the opportunity as a learning experience and were attracted by the cause and helping the community (28% and 19%) as well as the social aspects (18% and 25%) of participation in the event.

The response to returning to a community hackathon can be viewed as positive by both veterans and first timers due both to the average response (in numerical form) being above 3 (neutral), as well as the actual responses being more positive than negative. In fact, only 3 total participants indicated that they were not likely to attend a future hackathon.

It is hard to tell from the data that was collected how many participants from the first event attended the second. The question was not asked specifically about the TGHL event, but rather hackathons in general. However, it is encouraging that the event is drawing so many new participants and from the free response question on motivation, it appears that the community involvement aspect is a draw for at least some of the participants. The social aspect and having friends participating was also called out by participants as a reason for attendance, all of which point back to the sense of community around these events that has been noted previously.

The participants' views on the most liked aspects of this hackathon don't differ much from the general view of this event as a social experience of value for the participants. Comments echo the value of working with the team and the great experience they had working with their team. They call out the learning experience that they had, both learning about each other and the team as well as new technologies and the exchange of ideas.

Participants also called out the community/real work aspect of these events as a positive. This was acknowledged in 38% and 19% of the comments about the positive aspect of these events. This mirrors the similar response to reasons the

students chose to come to the events (28% and 19% were because of the community aspect). There was an increase in recognition of that fact in the first event, but not the second. However, none of the students called out the community or real-world aspect as a negative at any point in the survey responses.

From the clients' perspective, they seem to indicate benefit from the experience. It is important to note that one of the most often cited things about the event was the students. The community partners were genuinely impressed with the students and their abilities and how much they were able to accomplish against the goals of the client. The growing recognition by the community of the products of the university is a valuable contribution of this type of event.

VI. CONCLUSION

Overall, we are very pleased with the success of these two events. The students arrived seemingly interested and excited to help the community, and they were seemingly very successful. In reverse, the community (clients) anecdotally "fell in love with the students". These outcomes will keep us investing in these events for the future.

Perhaps most interesting to reflect on while looking forward to our next event is what the participants and clients asked for in terms of improvements. There was a survey question that asked them for feedback for the next event.

While responses varied, several that stuck out that are on our radar for consideration are suggestions for some pre-planning from the participants. The participants mentioned wanting to put together teams beforehand to try to help balance expertise. They asked for some basic descriptions of the projects that will be worked on and also some information about the technologies that will be used.

While not possible in all cases, and requiring teams to be put together beforehand could be discouraging to newcomers, the ideas about publishing the projects could have the potential to bring people in that might not have otherwise participated. Given that some students also mentioned attending the information session in the surveys (n=5), this may be a good time to present some of the projects.

One comment from this section stands out for us:

Do not kill this program. This has to happen every year!! This is what students should be doing with their time. Solving real problems of the real world.

Two particular future challenges we are food and the "post-hackathon problem". Food is an interesting challenge—in order to keep people nourished for the weekend, food must ideally be provided. In fact, across the 79 responses to the post-hackathon survey, food was mentioned in 50 of them (63%). Some of the comments were favorable, but some complained about food choices and food quantity. Making sure that the participants are fed in an appropriate way is an expensive and interesting challenge.

The second challenge is one of follow-through. Engaging students through the event does not guarantee that students

will continue to be involved after the event ends. This can be a problem when further development remains, changes are needed, or simply clients require help with installation (many were not technically inclined). Students certainly seem passionate about the project for the weekend's event, but how can we maintain that level of passion to help students maintain a relationship with these same community partners after the event comes to a formal close?

We are committed to constantly re-assess our procedure and the event to make sure we are improving the experience and not falling into the traps criticized by others. We want to ensure that our events remain inclusive and friendly to all and that both parties (participants and clients) get out of the event what they hoped. We are facing these challenges head-on for our next event.

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