

The Global Game Jam for Teaching and Learning

Allan Fowler

Waiariki Institute of
Technology

Rotorua, New Zealand
6473468955

allan.fowler@waiariki.ac.nz

Foaad Khosmood

California Polytechnic State
University, USA

8057562911
foaad@calpoly.edu

Ali Arya

Carleton University
Ottawa, Canada

6135202600
arya@carleton.ca

Gorm Lai

Kotori Studios
London, United Kingdom

07449115342
gorm@kotoristudios.com

ABSTRACT

The Global Game Jam (GGJ) is the world's largest game development activity. Every year since 2009, thousands of computer game enthusiasts participate in this forty-eight hour challenge to make games around the same theme. While game jams, 'hackathons', and game festivals existed before the GGJ, and continue to proliferate, the GGJ 2009 was perhaps the first time such events were held in multiple physical spaces (23 countries) at the same time. In this paper, we track the growth of GGJ using multiple dimensions, and discuss the potential for research and teaching through this popular activity.

Categories and Subject Descriptors

K.8.0 [Personal Computing]: General – *Games*; K.3.2 [Computer and Information Science Education]: *Computer science education*

General Terms

Design, Experimentation, Human Factors, Languages.

Keywords

Global Game Jam, Game Design, Programming.

1. INTRODUCTION

The GGJ involves gatherings (game jams) of participants in more than 60 countries and over 300 locations (jam sites) [9]. The event brings together thousands of game enthusiasts with different skills to make games with a common theme and some optional diversifiers [11]. The global event is organised and managed by the Global Game Jam Committee, and the local events are organized by volunteers [1].

Game jams have the potential to provide an effective and focused experience and participants gain valuable skills in prototyping and collaboration [20]. The collaborative and community-based environment that the GGJ provides supports creativity and learning and establish spaces that support the independent game development ecosystem [8].

Initially the participants were from International Game Development Association (IGDA) chapters, Universities and small game development studios [27] but now also include participants from companies, computer clubs, training centres, Colleges, Polytechnics, and High Schools [15]. Some common elements can be observed in many game jams. These are [20]:

1. The goal is to develop small experimental games within a limited timeframe (for example 24 or 48 hours).

2. All games developed during the game jam must share a common theme, previously unknown to the participants.

3. These events are generally open to anyone who can contribute to the development of the game. However, some game jams include an age restriction or have school affiliation requirements.

4. Team formation prior to the event is discouraged, and the team size is usually constrained to less than five people.

5. The events encourage the development of games for any device and the teams can generally choose their own development platforms.

6. In some locations, there is a final presentation where the best games will be selected by other participants, an audience or a panel. However, the GGJ is not a competition, the intention is for this event to be a free flowing collaborative development process, in a similar way that musicians jam [27].

Although some jam sites include a competitive element for their local participants, the GGJ does not offer any rewards for the games developed during the game jam. Moreover, the games are not judged by a central expert panel, although no restrictions are made on local game jams that provide audience choice awards. When the jam is concluded the development teams are asked to upload their game to the GGJ website. This site enables other game jam participants and the general public to play these games, be inspired by them and support them. A rating system has been provided in the past. As the ratings are from other game jam participants and the general public, the rating system provides a very public feedback mechanism for the participants and can provide considerable motivation to make a product that is enjoyed by the end-user. This, according to Shin et al. [27] can serve as a reflective learning experience for the developers of the game.

2. THE EVOLUTION OF THE GGJ

Game jams have existed for years. Of the earliest notable ones achieving significant publicity, are the: Indie Game Jam (IGJ) which was held in March 2002 [13], Ludum Dare (LD0) in April 2002 [19], the inaugural Nordic Game Jam (NGJ) in January 2006 [21; 22; 27], and the Toronto Game Jam #1 (TOJam) in May 2006 [28].

At the NGJ 2006, eight games were made by the forty participants who consisted of representatives from the local video game development industry and the students and faculty at the IT University, Copenhagen (ITU) [21].

Using primarily the Nordic Game Jam as a template, the GGJ was created by Susan Gold, Gorm Lai and Ian Schreiber in 2008 [1]. As with Ludum Dare, the participants are international. Unlike other jams, GGJ has a physical presence requirement and has been held in dozens of locations each year. The first GGJ was held in January 2009 and attracted 1650 participants in 23 countries. The next year (2010) the participation had grown to over 4300

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jammers in 39 countries [3; 7].

In 2011, the GGJ attracted over 6,500 participants from 44 countries at 169 sites who created over 1500 games in total [3; 16]. GGJ organizers and participants are asked to complete a survey, usually after the game jam. From the 6,500 participants of GGJ 2011, 953 started the survey and 851 completed it (13%). The survey was performed online using SurveyMonkey. The survey sought demographic information, the level of experience the participant had the tools used, team formation, the experience the participant had, and their perceptions of the 2011 GGJ.

In 2012, the GGJ attracted over 10,684 participants in 242 locations (47 countries). 2209 games were created. The GGJ set the Guinness record for the largest game jam in the world [11].

In 2013, the GGJ saw 16,705 participants from 319 jam sites in 63 countries produce 3248 games [6; 16], eclipsing the previous world record.

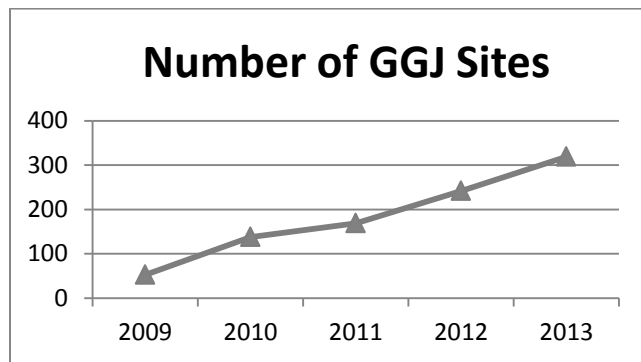


Figure 1. The growth of the Global Game Jam sites

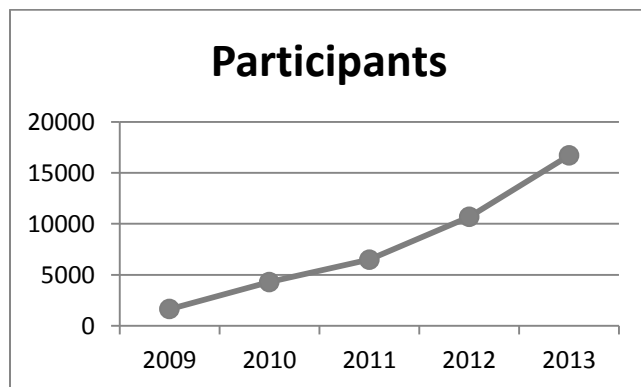


Figure 2. The growth of the Global Game Jam participants

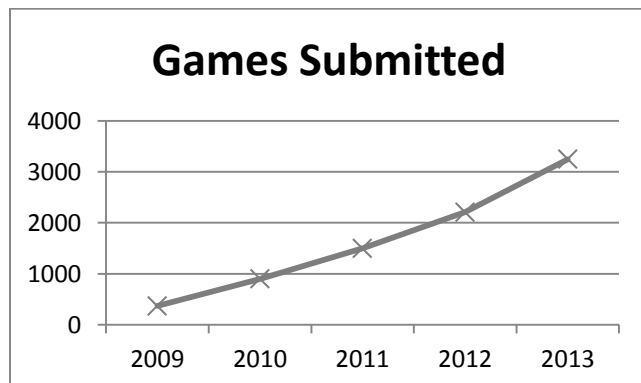


Figure 3. The growth of the submitted games

By the end of the GGJ 2013, game jams were taking place sixty-three countries. The number of countries for the inaugural GGJ in 2009 was 23 [1].

Initially the GGJ was dominated by US and European participants. However, in recent years, other regions have increased their participation significantly. Brazil and Japan, for example, had only one jam site each in 2009 [8]. In 2013, there were 23 and 17 sites from Brazil and Japan respectively [10]. Similarly, the number of African countries participating went from one in 2011 and 2012 to four in 2013. The proportions of world regions represented for the past four GGJ events are shown in Table 1.

Table 1. Proportional representation (in %) of GGJ participants over four years [5].

Region	2010	2011	2012	2013
N. Africa	0	0	0	1.4
So. Africa	0.96	0.6	0.45	0.27
W. Africa	0	0	0	0.3
Africa-All	0.96	0.6	0.45	1.97
Central America	0	3.19	0.30	2.37
N. America	36.54	42.91	37.44	31.45
S. America	10.81	7.98	12.48	10.85
E. Asia	0.68	2.79	3.07	6.84
S.E. Asia	2.51	4.39	3.57	5.07
S. Asia	1.46	1.1	0.25	1.58
W. Asia	3.06	1.9	3.82	1.76
Asia-All	7.71	10.18	10.72	15.25
Australasia	4.15	3.39	5.89	2.8
E. Europe	0.41	2.2	1.06	1.09
N. Europe	24.0	15.77	13.49	11.39
S. Europe	2.92	5.59	1.86	4.07
W. Europe	12.5	8.18	14.70	17.81
Europe-All	39.83	31.74	31.10	34.36

In general, it can be observed that the number of North American sites is becoming relatively fewer while the number of Western European and Asian sites is growing in relative numbers.

2.1 Learning

Piaget [23] asserts that we learn best when we learn through practical and applied learning experience. The GGJ enables the participant to create their own meaning and context (through interpreting and adaptation of the theme), learn new skills that are needed, and encourage social interaction through collaborating with the people in their team and other developers participating in the game jam.

From a micro viewpoint the game jam can be broken down into eight known techniques [20]. These eight elements according to Musil et al. [20] are new product development, participatory design, lightweight construction, product value-focused, rapid experience prototyping, aesthetics and technology, concurrent development and multidisciplinary.

From our research, we have found that one of the key motivations for attending the GGJ is to learn. This is further supported by the responses to our questions on learning in the GGJ (figure 4). Although, the results are close to being evenly split between yes and no, the data does demonstrate that almost half of those respondents (820 in 2011 and 920 in 2012) that answered this question indicated that they had learnt a new tool. Figure 5 suggests that the video game authoring tools or engines were the main tool learnt at the GGJ. Moreover, when asked about an overall improvement in skills the majority (96% in 2011 and 2012) of the respondents (848 in 2011 and 872 in 2012) that answered this question indicated that there had been an improvement of skills (figure 6).

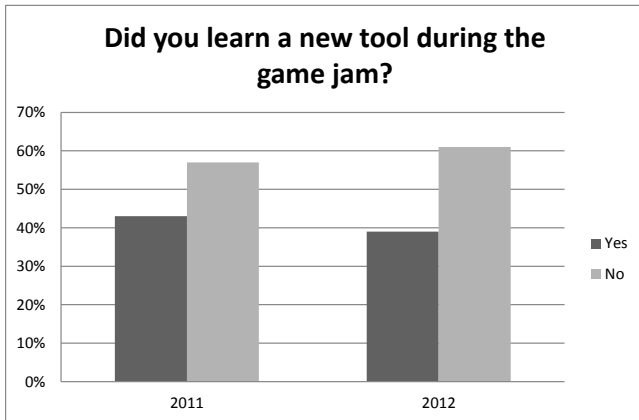


Figure 4. Did participants learn a new tool?

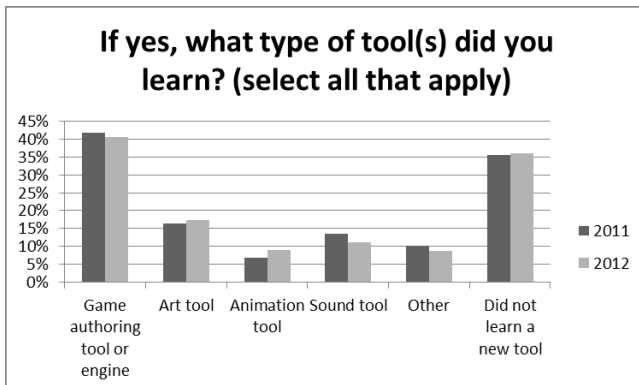


Figure 5. The tools learnt

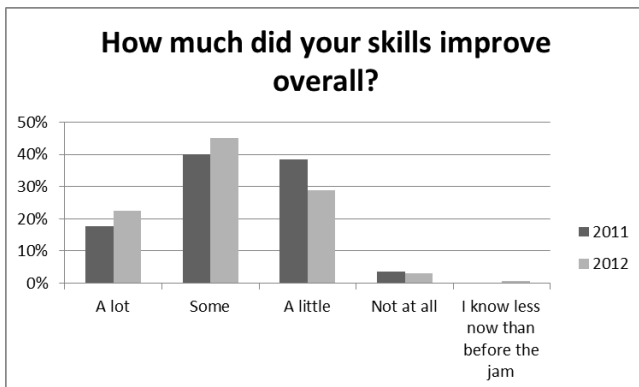


Figure 6. Skill improvement

Preston et al. [24] further support this view that participants attend the GGJ to increase skills and try something new.

The benefits of real-world practical experience are well documented (see for example Piaget [23]) and the GGJ provides both students and practitioners a very tangible and practical learning environment [24]. The GGJ provides a venue where participants need to develop an end product under immense time constraints [24]. The GGJ is inclusive; anyone can participate, regardless of their skill level [24]. The GGJ encourages team formation at the game jam (although our research indicates that this may not always be practiced).

Another learning opportunity within the GGJ is the chance to work in or with developers from other disciplines [24]. This co-development opportunity provides the participants the opportunity to learn how to cooperate with and learn from people from other disciplines [24].

3. THE SIGNIFICANCE OF THE GGJ

As spectators, participants, and organizers, we have considered the potential learning opportunity that the GGJ represents a great opportunity to provide an applied and practical learning experience. Academics and the organizers of the GGJ identified the research potential of the game jam and established the GGJ Research Committee to promote, facilitate, organize, and conduct scientific and technical research activities related to innovation, experimentation and collaboration [12]. Further, the practical and applied nature of the GGJ makes it a potentially excellent venue to use for capstone projects for some institutions.

3.1 A New Kind of Research Platform

Due to its global nature, wide range of participants, and the active involvement of industrial and academic partners, the GGJ provides a unique opportunity for studying different professional, educational and cultural aspects of computer games [12]. Among potential areas of research that can be done within the context of the GGJ are [12]:

- Culture, motivation, and the skills sets of the young game enthusiasts who will be the future game developers.
- Communication, collaboration, development and management methods and tools for game projects.
- Effective experiential learning for skills required in game development projects including but not limited to programming, art, writing, management, testing, and communication.
- Regional and/or sub-culture variations in the game development industry with comparative or focused studies.
- Organizational studies for youth and/or volunteer-based activities and events.

Considering such a significant potential, and the limited studies done focusing and using the GGJ as research context, the GGJ Research Committee (GGJ-RC) has been established to promote, facilitate, organize and conduct scientific and technical research activities related to innovation, experimentation and collaboration, on behalf of the GGJ Executive Committee, in order to [12]:

- Promote the value of the GGJ as a global effort that can increase our knowledge of game-related topics and can lead to the development of new ideas and methods.
- Better understand the three P's of game development (People, Process, Products) within the context of the GGJ

- Use the GGJ as an example/experiment to study game development and education, and other related topics in the video game industry
- Use the GGJ as a global effort to study more general topics such as community building, group dynamics, and identity.
- Disseminate and promote the research findings to a wide audience through publications, workshops, conferences, etc.
- Work to create a better forum or conference for the above activities

The GGJ-RC helps researchers conduct their studies and publish the results by providing global surveys that include questions by approved research projects, inviting all GGJ participants to respond, collecting and passing the data to researchers, and finally organizing means of disseminating the research findings [12].

Researchers find access to thousands of jammers valuable. By consolidating the various electronic data collection efforts, and disseminating them in a uniform manner, the GGJ-RC hopes to support multiple on-going academic research investigations efficiently.

In 2012, the GGJ-RC sent out its first public Call for Proposals and approved three research studies [12]:

- Key success factors for developing a videogames industry in South America
- Learning Aspects of the Global Game Jam
- Music in Video Games

In 2013, this grew to eight approved proposals:

- Gender and Global Game Jam Participant Motivation
- Experiential Learning in a Game Jam
- The Latin American Independent Communities of Creators of Electronic Games compared to the Large-scale Industry
- Team Dynamics and Development Processes of the Global Game Jam
- Level Up
- Investigating the Lack of Accessibility in Game Design
- Game Design Processes in Rapid Game Development
- Enhancing Experience with Digital Design and Production Tools in High-pressure Rapid Prototyping Environments.

In 2013, the GGJ-RC organised the inaugural workshop on the Global Game Jam at the 8th International Conference on the Foundations of Digital Games in Chania, Crete, Greece [10]. This workshop resulted in the publication of five papers on the Global Game Jam [10]. These include:

- The Evolution and Significance of the Global Game
- The Motivational Power of Game Communities - Engaged through Game Jamming
- Promoting Game Accessibility: Experiencing an Induction on Inclusive Design Practice at the Global Games Jam
- Game Conceptualization and Development Processes in the Global Game Jam
- Adaptability of the Global Game Jam: A Case Study in Japan

This workshop resulted in the first formal gathering of researchers to discuss the potential of the GGJ. Due to the success of this inaugural event, it was agreed by organisers to make this an annual event.

3.2 Survey of the Literature

While game jams have been around for some time and are growing in worldwide acceptance, the idea of using game jams to systematically improve community and learning is fairly new.

Shin et al. [27] review the potential of a collaborative learning process and suggest some design ideas for Jam organizers to set up events. The suggestions cover topics such as process, observation, testing, team development and localization, and aim at promoting collaborative development. Their work is within the context of a local game jam site in Fukushima, Japan. Musil et al. [20] suggest that game jams provide an effective and focused experience and that participants gain valuable skills in prototyping and collaboration. They study game jams as “composition of design and development strategies: new product development, participatory design, lightweight construction, rapid experience prototyping, product-value focusing, aesthetics and technology, concurrent development and multidisciplinary.” They propose that “although game jams are normally used for rapid prototyping of small computer games, the constellation of the mentioned elements provides a powerful technique for rapidly prototyping new product ideas and disruptive innovations” [20].

It is possible to utilize games and game jam events to foster creative thinking and innovation and expand computational thinking among participants. Not only do participants brainstorm many game designs during the initial hours of a game jam, there has been research done that shows creativity can be enhanced through idea generation games such as GameSpace [18]. In fact, this technique of idea generation has been used specifically at the Finnish GGJ venues in 2010 and 2011 [17].

Preston et al. [24] demonstrated that there was a positive correlation between game jam participation and formal academic performance in courses within the first two years of students’ studies. Students who do not attend game jams have a lower GPA than the average GPA of their peers [24]. Arya et al. [4] used the results of the GGJ 2012 participants’ survey to show a strong learning aspect in the game jam experience particularly with respect to the process familiarity and confidence improvement. They also link certain process decisions such as brainstorming and forming teams with new people to the levels of satisfaction with results and satisfaction with the overall experience.

Reng et al. [26] focused their study on what motivates participants to engage in the GGJ. Through their study of the 2013 Nordic Game Jam (NGJ) they found that the main motivators were to make games and to meet people who share common interests. They concluded that the social aspect of the game jam helps fulfil the desire to learn more about making games or specific game development disciplines (for example, programming).

Zook and Riedl [30] investigated how participants conceptualised the game and the development process that went into making the final product. The limited time available (48 hours) in the GGJ provides a challenging constraint for most beginners. Therefore, the conceptualisation and development process is more important. Zook and Riedl [30] found that the participants typically over scoped the project and as a result over 49% (n=278) cut some of the features initially planned.

Yamane [29] reported on the impact of the Global Game Jam on a specific region. According to Yamane [29], the core elements of

game jams; participatory design and prototyping are not widespread in Japan. However, through GGJ, Japanese game developers ‘discovered’ the benefits of participatory design and the game development community have adopted this practice [29].

3.3 2013 Research Survey

The GGJ 2013 participant’s survey was conducted after extensive communication with researchers with approved proposals who submitted their required survey questions. The survey was organized in three parts: Pre-event (including the questions that needed to be answered before the event), Post-event (including the questions that had to be answered after the event and were requested by more than one research group) and Extended (the rest of the post-event questions). The total number of participants who responded to the survey was:

Post 1,257
 Extended 418
 Pre 878

Table 2 shows some of the questions asked in the survey. While various research projects have been approved and are aimed at studying the 2013 participant’s survey, some initial results are shown in Table 3.

Table 2. Sample Survey Questions

Pre-event (total 20 questions)
- Email address for linking to post-event survey
- Age, Education and Employment status
- Gender (Male, Female, Male (transgender), Female (transgender), Genderqueer/Neither, Do not want to answer)
- Skill Levels and years of experience at various positions (2D or 3D Artist, Sound Designer, Programmer, Game Designer, Writer, UI Designer, QA/Play Tester, IT Support, Project Manager, Producer, Business/Legal, Executive)
- Frequency of playing games and platforms
- History and motivation for attending the Global Game Jam
Post-event (total 36 questions)
- Email address for linking to pre-event survey
- GGJ attendance information (site and project, motivations for attending again if any)
- GGJ experience (satisfaction with various aspects including final result)
- Skill levels on various positions AFTER the Jam
- What was learnt during the Jam, if anything
- Process elements used (brainstorming, iterative models, frequent reviews, etc.)
- Team formation (Who, when, how)
- Collaboration and communication methods and tools used
- Development tools used
Extended (total 57 questions)
- Email address for linking to pre-event survey
- Initial goals and ideas
- Problems encountered
- Decision-making and inter-team behaviours
- Team size, tasks, positions, and tools
- Details on team issues such as trust, dependency, conflict, etc

Table 3. Initial Results

Question	Answer	
Age	Answer Choices	Responses
	18-20	23.97% (210)
	21-29	56.51% (495)
	30-39	15.64% (137)
	40-49	2.40% (21)
	50-59	1.14% (10)
	60 or older	0.34% (3)
	Total	876
Gender	Answer Choices	Responses
	Male	85.97% 754
	Female	12.54% 110
	Male (transgender)	0% 0
	Female (transgender)	0.23% 2
	Genderqueer/Neither	0.68% 6
	Do not want to answer	0.57% 5
	Total	877
	Education	Answer Choices
Less than high school degree		2.41% 21
High school qualification		19.93% 174
Some college but no degree		29.21% 255
Associate degree		6.64% 58
Bachelor degree		30.93% 270
Master’s degree		10.08% 88
Doctorate degree		0.80% 7
Total		873

3.3 Capstone Projects

To facilitate an applied and practical learning experience, several educational institutions include a final year project in a degree program (a capstone project). In our experience, these capstone projects require students to create a product and solve (or research) a particular technical or business problem.

This can provide students with a meaningful learning opportunity and in some cases a potential employment opportunity, as well as an opportunity to consolidate the learning from their formal education. Capstone projects also allow students to learn skills that are often not included in traditional course-work [5]. We have found that students learn soft-skills (team-work, communication skills, customer awareness), a lot easier when delivered through a practical and applied program [14].

However, we have found it difficult to find capstone projects for students undertaking a degree with a major in game design. The process of making a video game usually extends well beyond a single academic term and development is typically undertaken by a team (or in many cases several teams) of developers. Therefore, this makes it very difficult to provide the student with a tangible and meaningful project where it is possible to identify or demonstrate to faculty what has been produced and what the student has learned. In addition, many engineering oriented programs put great emphasis on customer interaction and requirements engineering, things that are typically underemphasized in the practical, rapid-prototyping environment of the GGJ.

The GGJ provides an opportunity for students to join an existing team or form their own team. These teams are frequently multi-disciplinary, and this enables students from a variety of backgrounds and skills to make a valuable contribution [5]. Further, the time constraint ensures rapid development and project completion [5]. More importantly, because this is a non-commercial enterprise, there is no commercial risk if the project is not completed or does not meet a commercially acceptable standard.

There are a few risks associated with allowing students to undertake team based projects [2]. One concern is the problem with team members not contributing to the project equally (free-riders) [2]. In the video game industry if a team member does not contribute to a project as needed, these team members typically are asked to find another team or another employer. However, our experience has shown that with student projects, this is not always practical as exclusion from a team can mean that the student may not graduate in that given year. Because the GGJ is limited to just one weekend, if a student is not able to contribute to or participate in a team, there is usually adequate time to find a meaningful project for them to complete before the end of the academic year.

3.4 Independent study and class projects

Independent study credits are a natural fit for GGJ activity. In one case at the California Polytechnic State University, one unit of independent study credit was offered to students who both participated in GGJ, and later agreed to improve their game the rest of the term according to the instructor's feedback [25]. Interestingly, even though the GGJ is a single weekend, more hours could be spent on that project than would otherwise be spent on a 10-13-week long course and provide the opportunity to assess the learning outcomes.

Similarly, GGJ-based class projects in appropriate game courses are an option for educators. The challenge here is the timing and

the theme of the event. Both the timing and the theme must be compatible with the course for this to work. Attempts to pre-constrain the GGJ experience by conforming the activity to course requirements are not likely to succeed.

In New Zealand the Global Game Jam has been held in Auckland, Hamilton, Rotorua, Wellington, Christchurch, and Dunedin which has provided students throughout the country to participate in this global event. Furthermore, the Global Game Jam organisers in New Zealand and throughout the world welcome applications from additional sites as required.

4. CONCLUSIONS

In its fifth year, the Global Game Jam is a relatively young activity, but one with tremendous community support and enthusiasm. It is clear this community is growing and becoming more diverse and less US-centric.

We explore the benefits the GGJ can provide for research and teaching activities. With a unified data-gathering mechanism the GGJ-RC hopes to accommodate more projects and more jammer interaction for the benefit of the research projects. We also discuss some methods where this predominantly extracurricular activity, can augment the classroom experience in various forms.

In conclusion, the continued growth and popularity of the GGJ makes it an ideal vehicle for game-based research and education, combining the classroom theory with the practical experience and constraints of the GGJ.

5. ACKNOWLEDGEMENTS

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