

# Game Jams: An Innovative Education Experience in Higher Education

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**Abstract:** Team based learning has been a significant component of games design/art and programming courses at the University of Huddersfield, but not without challenges. A solution that maintains the benefits of team based learning while solving some of the challenges was sought. Game Jams are a popular method for rapid game development. The Game Jam idea is refined for the higher education sector and details presented, with positive results mostly focused on student engagement but also includes more achievable scoping and improved communication.

## 1 INTRODUCTION

The two games courses at the University of Huddersfield, Computer Games Design and Computer Science with Games Programming, have included team based learning (TBL) modules on all 3 years of the full time degrees since their beginnings in 2006 and 2004 respectively. (Michaelsen and Sweet, 2008) highlights the three main concepts of TBL as:

- 1) group work being central to exposing students to, and improving their skills in, course content
- 2) the vast majority of time being focused on group work
- 3) that there are multiple group assignments designed to improve learning and promote self managed teams.

(Michaelsen and Sweet, 2008) expands the concepts with four essential elements of TBL as:

- Groups must be properly formed and managed
- Students must be accountable for the quality of their individual and group work
- Students must receive frequent and timely feedback
- Group assignments must promote both learning and team development

To meet the four essential elements, each of them can be linked with the TBL modules as follows. Groups are self determined in the first instance, usually around friendship groups, with the rest of the cohort distributed amongst those nascent teams. The groups are managed by the module team on a weekly basis, with local management implemented through the use of agile development methods, for example

SCRUM, and democratic decision making. Accountability is also derived from the agile development methods and through a peer assessment system implemented at the end of the module. Frequent and timely feedback is given weekly during tutorial sessions where each group presents their progress on the game development and the module team can feedback in real time. Finally, the assignment to build a game prototype promotes team development and skill learning and improvement, both skills being necessary to build a successful prototype.

Despite many years of operation, the TBL approach in the module does include several challenges. A solution that maintains the benefits and four essential elements of TBL whilst also attempting to solve some of the weaknesses is the focus of this paper. This paper presents the traditional approach used in these modules in detail, followed by the presentation of an alternative approach, its refinement for use in higher education and its implementation in the 2018/2019 academic year. Observed changes, both positive and challenges still to overcome, are presented followed by some interesting and somewhat unexpected outcomes finishing with conclusions.

## 2 TRADITIONAL APPROACH

When the games courses were being developed the idea of team based learning (TBL) was considered an essential part of the learning process. The software skills and approaches from other modules would be brought together with team based working skills to

allow the students to build a small game. The benefits of TBL are well documented (Michaelsen et al., 2002) and so are not the focus of this paper. In all three years of the full time degrees, the team modules follow the same basic approach.

1) Teams are formed in the first week. In the first year these tend to be a little more random as students have not yet had time to form friendship groups. In second year they tend toward friendship groups and in final year it is a little more mixed as there is a combination of students continuing directly from second year and some students returning from a placement year in industry. Students are also more aware of each others skills and capabilities and often form teams for success rather than just friendships.

2) Game concepts are developed and presented to the module tutors over the next few weeks. This includes some level of skills gap analysis on behalf of the team and an overview of scoping for the module team.

3) Prototypes and alpha versions are built during the first semester and presented before moving into semester 2. User testing, re-scoping, design tweaks and technical experimentation all form part of this phase.

4) The final phase which lasts all of semester 2 is to work through the rest of a software development cycle of beta, including further player testing, and release versions.

Throughout this process, the module team are there to monitor and feedback on progress and decisions being made. There is also an element of project management, although there is certainly a focus on the teams self managing their workloads.

## 2.1 Challenges

The teaching teams have many years experience leading TBL modules and have experienced myriad challenges.

The students take 6 modules in first year, 5 modules in second year and 4 modules in final year (different size modules but always a total of 120 credits). All modules run over the full 24 week academic year. One of the more intrusive disruptions to team based modules is the impact of workload and assessment in the other modules. Workload is relatively consistent over the year with the inevitable peaks around assessment time, but as those assessment dates approach, the team project module is most often the first module to be abandoned. Near assessment dates, output drops to almost nothing, always with the best intentions of catching up later, but very rarely actually recovering enough to be at the expected stage of development.

With such a long project and only a few hours per

week dedicated to the module content, idea fatigue and general boredom at the slow progress occur, particularly in teams where members are not all enthusiastic about the idea or it is being heavily led by one or two members. Another impact of longevity relates to ongoing health or mental health issues with students and the impact on the overall team.

Communication issues are one of the biggest challenges that develop. Different levels of enthusiasm, workload peaks at different times, external factors such as employment, family or social and even sleep patterns can impact on team communication. Missed attendance at weekly sessions means team members can be out of touch for 2-3 weeks and lose motivation to continue with the project. Poor communication of ideas, personality conflicts, task allocation and feedback within the team all lead to challenges.

These major issues and a myriad smaller challenges result in disengagement and inevitably poor achievement in the module. The module teams require a system that maintains the benefits of team based learning while trying to solve the challenges highlighted.

## 3 LITERATURE REVIEW

Since the first “Indie Game Jam” in 2002 (Kultime, 2015), the game jam has given game developers a method of rapidly prototyping game ideas, with some real-world successes (Wikipedia, 2019) evolving from those embryonic “compressed development processes” (Zook and Riedl, 2013).

Game jams have taken many forms over the years. Themes can be as simple as a single word, picture, sound or sentence, to more societal concerns or sensitive subjects to solving challenging problems. Time frames can be from 1 hour (Ohgame, 2018) to 2 weeks (Game Jolt, 2017) and take place in myriad locations, from Universities to castles, planes to trains (Lindvay and Wallick, 2019).

Game jams give students a better understanding of prototyping practices in software development (Fowler et al., 2013) and develop effective collaboration skills (Musil et al., 2010)

Others have used game jams as an educational tool, for example (Scott and Ghinea, 2013) using game jams to teach issues of accessibility in games.

It would be remiss not to mention the most successful game jam, the Global Game Jam, which in 2018 had 42,811 participants in 108 countries making 8,606 games (Global Game Jam, 2019), and about which many papers have been written (Shin et al., ; Hrehovcsik et al., 2016; Fowler and Arya, 2013).

The huge impact of the Global Game Jam inspired the module team to consider game jams as a potential solution to the team based learning challenges faced at Huddersfield.

## 4 THE NEW APPROACH

For the second year team project module, a novel and innovative approach that attempts to solve some of the concerns of the traditional module structure while maintaining all of the benefits of team based learning methods.

The main considerations for the new approach were:

1. Maintain the benefits of team based learning
2. Improve attendance and engagement
3. Maintain enthusiasm
4. Reduce the opportunity for conflicts to arise
5. Improve retention and attainment

(Kultime, 2015), after studying many papers, defines a Game Jam as "... an accelerated opportunistic game creation event where a game is created in a relatively short timeframe exploring given design constraint(s) and end results are shared publicly". This provided a potential solution to the problem, shortening the timeframe being a key factor, but also meeting the considerations above.

Guidance for the "rules" of a Game Jam were suggested by (Musil et al., 2010) as being:

1. Rapid prototyping
2. Thematic constraint
3. Anyone can participate (if one can contribute)
4. Time constraint of 24-48 hours
5. Ad-hoc teams and small team sizes
6. Software and hardware agnosticism
7. Public presentation and judging at the end of the event

These "rules" were further refined and to some extent softened later by (Fowler and Arya, 2013; Fowler et al., 2013) and presented as:

1. Goal of small and experimental games within a limited timeframe
2. Previously unknown theme
3. Anyone can participate (if one can contribute)
4. No team formation before the event and limited size of teams
5. Hardware and software agnosticism

6. Public presentation (sometimes) and judging at the end of the event

These two sets of "rules" for a Game Jam were developed within the constraints of the academic environment to create a proposed new set of "rules":

1. Game Jams would be one week long and take place outside of the normal teaching weeks to minimise disruption and maximise time on the project
2. Three Game Jams are undertaken to meet the minimum number of hours required for a module.
3. There are also 4 lectures for academic content delivery, such as an introduction to agile software development methodologies and tools and for reflection after each of the game jams
4. Each Game Jam would have a unique theme
5. Teams are alternated for each of the Game Jams to allow students to work with as many of their peers as possible
6. Hardware and software agnosticism within the constraints of University provision
7. Final game presentations to all peers and an "open house" demonstration for all students and staff

Because of the restrictions placed on university scheduling some structure had to be implemented to ensure the smooth running of the Game Jams. This has to be balanced with the minimum contact hours for university module tutors. The structure for each Game Jam evolved to give more emphasis to the teams working independently of the academic tutors, with more contact in the first jam, less in the second and least in the third. As an example, Game Jam 1 has 15 hours of tutor contact and 20 hours of directed study and the third game jam is 10 hours of tutor contact and 25 hours without.

To allow for some planning the teams and theme are announced the week before the game jam starts. The first two game jam team structures of 6 designer/artist roles and 2 programmers are decided by the module team. They are randomly allocated in the first game jam and then randomly sorted for the second ensuring no student works with another student they have worked with in the first game jam. For the third game jam, students are asked to form their own teams. Although it is inevitable that some teams will form around friendship groups, several teams have formed around strength of skillset or desire to undertake an enterprise placement year and form a company based on their game idea.

Each Game Jam week follows a similar structure over the 5 days:

Monday: Introduction, concepts, art bible development and early programming experimentation

Tuesday: The first early prototypes start to appear, with some level of game play possible, albeit with programmer art

Wednesday: Major leaps forward in development are made here with more of the art assets starting to appear

Thursday: Further leaps forward are made with playable demos for testing and refinement of design and art taking place

Friday: Last minute fixes for the programmers with the designers and artists moving to presentation building followed by presentations in afternoon after a short "open house" session for other students and staff to see the outcomes

Although the results of the Game Jams are presented to the whole cohort, including members of the academic staff and students from across the degree, there still a requirement for summative grading. The teams are awarded a higher percentage of their grades based on team performance rather than the product that they develop to ensure a team with weaker skilled members can still perform at a high standard. This is moderated through a peer-assessment exercise with individual grades awarded based on a peer driven shifting of the awarded team grade. There is also a reflective element to the assessment through a final individual assessment which considers a minimum of three aspects of their Game Jam experience from a list of nine points:

- Technical Knowledge
- Professional Conduct
- Motivation
- Communication
- Initiative
- Working with Others
- Self-organisation
- Judgement
- Adaptability

In order to evidence the process for quality assurance purposes, each team is given a notebook. This took a physical form in the first game jam, but was replaced with a cloud based collaborative document in the second. There is also a discord<sup>1</sup> server for team communication which is locked to each team. The programmers use Git to version control their code with also shows how the programming developed. Together, these form a "paper trail" for the module tutors to follow all discussions, minuted meetings, logs

<sup>1</sup><https://discordapp.com/>

and see how the ideas evolved over the week and how well the team worked together across all assessed elements. Final games are compiled and submitted and the presentations are filmed for review and external moderation.

A summary table of the changes between the traditional approach and new approach can be seen in 1.

Table 1: Summary of changes in approach.

|              | Old                                    | New                      |
|--------------|--|--------------------------|
| Timescale    | 2 hours per week for 24 weeks          | 3 one week blocks        |
| Teams        | Same team all year, chosen at random   | Change team each Jam     |
| Theme        | One theme                              | One theme per Jam        |
| Presentation | 3 presentations spread across the year | One presentation per Jam |

## 5 OBSERVATIONS

After completing two of the three game jams for this academic year, observations have been similar for both of them. In each game jam, 8 games were made (i.e. 1 per team) to various states of completion. Other than 2 students, the most rewarding outcome was total and uninterrupted engagement from all students across the full 5 days, with a significant number of students working outside of the official hours. There were no significant communication issues or conflicts to resolve and everyone was still very energised at the end of the week.

### 5.1 Positives

By far the most positive outcome of these first two game jams has been the level of engagement seen amongst the whole cohort. Students were excited and enthusiastic before the game jam, were present for all of each day, were engaged in the development without drifting onto other module work and were still excited when it came to the final presentations on the Friday. No other team based learning module has experienced close to that level of engagement over the last 15 years.

This increased engagement and excitement has meant that in every team, at least a prototype/alpha build was achieved. An unexpected but very wel-

come outcome in several instances was that the developed games far exceeded most games made in previous years, despite only 1 week of work versus a full academic year in the past.

The teams were generally very good at scoping within the time frame. Given a whole academic year, students consistently over scoped but with such a short time frame they focused better and created more realistic ideas.

Communication was excellent throughout the whole week, from in person during the day to online on the discord servers in the evenings. Being in the same place for 6-8 hours over 5 days forced the students into regular verbal discussion without the long quiet periods of whole year projects.

## 5.2 Challenges

One student did not engage in the second game jam and has now left the course. One student partially engaged in both game jams and despite repeated discussions offered no reason for only partial engagement. This impact on the 2 teams was mitigated through re scoping and careful task allocation.

For the first game jam, a paper based approach was used for recording and evidencing, i.e. minutes of meetings, game designs, art bibles, programming logs etc. This was quickly realised to be a problem. Only one team member could write in the log at once, one team left it at home for one day and it was challenging to print content only to be glued into the book. For the second game jam, a cloud based collaborative document was used. This could be edited by all team members simultaneously, couldn't be physically left anywhere and by using different colour fonts for each team member can be reliably used for evidencing team members contributions.

The discord server proved to be a double edged sword in the first game jam. Because students were expected to evidence their communications during the week, one team decided to speak very little and maintain a detailed discord log. On reflection they felt that this hindered their communication somewhat. Clarity was added for the second game jam and much more appropriate use of discord was used alongside verbal communication.

## 6 OBSERVED CHANGES IN LEARNERS

Other than the aforementioned significant improvements seen to engagement and attendance with the team project module, an increase in excitement for

the module and the possibilities was observed. This manifested in some teams meeting before the start of the game jam to discuss early concepts, a more sociable yet productive working environment and a general sense of giddiness throughout the week.

A reduction of 20 credits of the typical second year workload during the teaching weeks has seen an increased output in the other 100 credits across all modules. Skills developed during the game jams, having been honed in a short time frame, are being seen in other modules with an overall increase in performance across the board being observed, although this can not be proven until the end of the year once results are calculated.

One unexpected observation has been an improvement in a few students social engagement with the rest of the cohort. Being forced to work with new people and spending a large portion of time with them culminating in a presentation to the whole group has "brought them out of their shell" and led to much better integration in the peer group.

## 7 OBSERVED CHANGES IN ACADEMICS

There have been some unexpected changes in the module tutors. Spending a compressed time with the students, without the usual week long breaks, has made it much easier to learn and remember the students names. This makes for easier communication in other modules and an improved sense of belonging for the students.

A second benefit is a greater understanding of each students capabilities, including those not usually taught by the team, i.e. the programming students.

Seeing the teams at work and their ideas evolving is infectious and creates a lot of excitement for enterprise placement year and placements in general.

## 8 UNINTENDED BENEFITS TO OTHER MODULES

Some unintended, although somewhat expected, benefits have been observed in other modules by running the team project in this game jam approach.

Students have appeared to be more engaged in their other modules compared to previous year groups. The perceived benefits to student engagement is that other module leaders have anecdotally noticed the lack of using team project as a previously common excuse for not progressing on assignments. Stu-

dents have previously used the focus on team work and peer pressure as a reason for disengagement or lack of progress on other assignments.

The approach has been so successful that the final year team project is planning to adopt part of the approach for the next academic year. As a double size module there is work being undertaken to run half of the module traditionally and half following the game jam method. The game jams will be used to make significant leaps forward in progress and the weekly sessions between used for refinement, player testing and bug fixing alongside design/programmer experimentation.

Outside of the games programs, traditional computer science and information systems module tutors are now considering ways to implement the ideas into their modules, through similar game jams or blending the theories with “hackathons” and developments more appropriate to the disciplines.

## 9 CONCLUSIONS

The challenges faced by year long team based learning modules for games design/art and programming students have led to difficulties with engagement and ultimately achievement. A solution that maintains the benefits of team based learning while solving some or all of those challenges is presented here following the ideas of a game jam. Two of the three planned game jams have taken place with remarkable improvements in engagement and unexpected results in other areas. Minor changes were made between the first and second game jams as the module team adapt to student behaviours and refine the methodology. It has been so successful that other year groups and modules teams from other courses are looking at ways to integrate the ideas into their team based learning modules.

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