Game Jams: How can they influence Software Development Curricula?

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ABSTRACT

This paper will present an ongoing project which is attempting to capture the ethos of game jam participation and its inherent educational benefits applying these outcomes to rejuvenate and influence the delivery of Software Engineering curricula.

Categories and Subject Descriptors

K.3.2 [**Computer and Information Science Education**]: Computer Science Education:

General Terms

Human Factors.

Keywords

Game Jam; Educational benefits; Software Development; Curriculum

1. INTRODUCTION

Game jams attract a diverse range of participants from students to professional developers. Team sizes can range from two participants to nine participants [2].

Glasgow Caledonian University has been running game jam events, as part of the Global Game Jam, since 2009. These events have continued to grow year on year with the most recent Game Jam in January 2015 recording its largest number of participants, 117 [12].

During this period of time Glasgow Caledonian University's hosting of the Scottish Game Jam has grown in stature and reputation leading to a high demand from participants for places at the event [12].

Since its inception in 2009 the Game Jam has proved very popular with Glasgow Caledonian University undergraduate students with regular participation from Game Design, Game Software Development and 3D Art students [11].

This participation is not restricted to current undergraduate students. There is a healthy level of participation from former students who are now employed in either the games industry in Scotland or as Software Engineers in the private sector [8].

This level of participation would suggest that the participants feel that they gain from the experience in a number of ways: socially, educationally and personally [8].

The key question is: how can the game jam participation ethos and undoubted educational benefits be captured and applied to the teaching of Software Development in the curriculum?

It should be noted that game jams are not seen as a panacea but as model that can help transform and influence teaching and learning for Software Engineering students.

2. CONCEPTS AND PRACTICES

A typical game jam is a pressurized cauldron of activity compressed into a 48 hour time scale. Participants are supplied with a theme, sentence or quote as a premise for a game.

The coupling of a short time scale and such little information can be seen as a hindrance or a realm of possibility to stretch the boundaries of creativity.

Ultimately the idea for each team is to have at least a prototype game by the end of the jam. The processes and practices put into place to achieve this are very much rooted in both industrial and sound pedagogical practice.

Observation of this process would suggest that participants exhibit both natural and learnt behaviour when engaging in the process of producing the final product.

To successfully produce a product within the timescale of the game jam requires teamwork [7]. Collaboration between team members and across disciplines [4] is essential with clear channels of communication [10].

These skills are essential graduate attributes that will stand the student in good stead for future studies and are highly desirable by employers.

2.1 SOFTWARE DEVELOPMENT PRACTICES

The successful deployment of software development practices is essential to the development of a well-designed and working prototype.

Many of the software development processes and practices taught at undergraduate are applicable to game development and their use should be encouraged within the game jam.

It is important for students to apply the theory they have been taught to real life scenarios and the game jam environment offers an excellent opportunity to put these skills into practice.

Musil et al have developed a diagram, shown in figure 1, that summarizes the "known techniques" [6] of the Gam Jam process. The notable elements in this diagram are: multidisciplinary, concurrent development, participatory design and rapid experience prototyping.
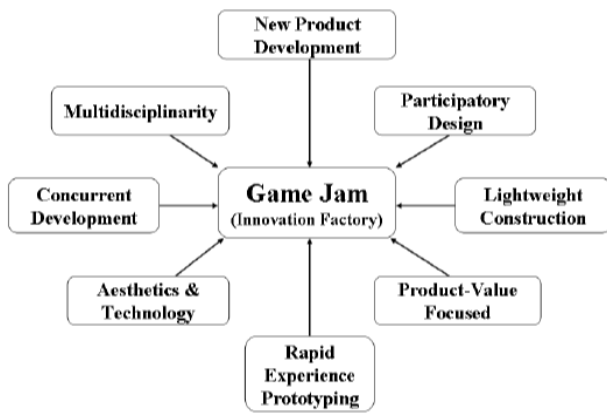
Figure 1 Musil et al. mix of design and development strategies.

Before any product is produced it is essential to elicit its requirements. There must be a defined set of requirements in order to build a successful working prototype. It is crucial, therefore, that the team defines a succinct set of requirements for the game before undertaking the development process [7].

A succinct set of requirements should provide clarity to the team with regard to what will be needed to produce a working prototype of their game.

As noted by Preston, getting the requirements wrong can have a devastating effect on the outcome of the project as it can be difficult to change tack within the limited time scale afforded by the game jam [7].

Traditional approaches to software development provide an obvious solid basis for development that should deliver a well-crafted product. However, game jam products are time limited and as such traditional software development approaches may prove too inflexible for their production.

Kannode and Haddad point towards the use of Agile methods, as used by a number of game development companies, as a suitable approach [5]. The flexibility offered by agile approaches allows the team the ability to adapt as development progresses.

One of the most popular approaches used by both Indy developers and industry developers is scrum [3]. This allows for an iterative approach to development based on short sprints which allow a particular function to be implemented within the software.

This iterative approach allows for a layered approach to testing. Testing is a very important part of insuring that the software is fit for purpose.

The software can be tested for compliance against the requirements produced at the start of the gam jam and independently after each sprint to ensure that iteration is free from bugs.

Prior to the game being deemed fit for purpose it should be stress tested under playable conditions in order to experience the game as the user will play it [5].

The choice of the correct development tool is crucial to successful completion of a polished and working prototype therefore it is important that the team choose wisely.

Goddard et al. suggests that a number of different tools will be used throughout the development of the prototype and that these tools will be appropriate for the stage in the process they are required forming a "toolchain" [3].

This "toolchain" can include simple project management software such as Trello, asset creation software such as Maya, 3DS Max and Blender, and software development tools such as Unity3D and GameSalad.

An increasingly important tool that is becoming more prevalent in its use is versioning software such as Git. Projects can be uploaded to the cloud via services such as GitHub and BitBucket that allow for programmers to collaborate on code and to work on separate tasks before merging the final code base.

Game jams provide an excellent environment for students, and other participants, to hone their abilities with regard to the aforementioned skills.

Students that participate in game jams generally, although anecdotal, enjoy and feel they have learned from the experience. It is this very feeling of having learned from, and having enjoyed, the game jam that would be good to capture and use to transform the software development curriculum.

2.2 PEDAGOGICAL THEORIES

Game Jams offer students a learning environment that is transparent to them. As the student takes part in the Game Jam the sense that they are utilizing skills they have been taught in their undergraduate programme, honing existing skills and learning new skills will not be instantly apparent to them.

Game jams exhibit a number of pedagogical theories that make them ideal venues for student learning.

A constructivist approach to learning adopts activities that will build on the learner's current knowledge base through individual and group work centred on problem solving [16].

Using this definition it can be seen that game jams offer a substantial match with this approach. Working in teams to solve a problem, in this instance, develop a theme based game, based on the students undergraduate knowledge.

An interesting theory first postulated by Vygotsky is the Zone of proximal development (ZDP) [13]. Vygotsky asserts the social and active nature of learning. ZDP is the separation between what is deemed as the actual development level and the potential development level when collaboration is undertaken.

This idea would be borne out through anecdotal evidence from student participants who perceive that they have learned more interesting and more useful skills from their participation and collaboration with their team in the game jam.

Active Learning involves a number of different strategies but two which seem appropriate in the context of game jam is group work and shared brainstorming [1].

Drawing parallels with the game jam it can be seen that game jam is inherently team based and that there is an initial shared brainstorming session when the teams are discussing the style, type and design of their game.

In a sense, game jam links undergraduate learning with real situations allowing the student to apply previously learned knowledge to the task of making a themed game. This approach has parallels with the aspects of deep learning [9].

Warburton [14] notes the need for students to have a more rounded understanding of how other disciplines interact with their own discipline and this is exemplified by the game jam approach.

Communities of practice [15] is a learning theory which has three characteristics: a domain, a community and practice.

The domain can be thought of as a place of shared interest, the community is the place that relationships can be built and the practice is where shared resources are developed.

The game jam is a near perfect fit for this pedagogical theory as the shared interest or domain is game development, the Jam itself is a worldwide community of developers, designers and artists for whom relationships can be built and the practice represents the pulling of these resources to produce a game.

Game jams by their nature foster the idea of social presence. This is the concept that being with others and being willing to discuss and exchange ideas builds a suitable environment for learning.

An interesting academic observation is the voluntary nature of participation in game jams and the juxtaposition of student participation with optional or extended tutorial and lab assignments [3].

It could be that students perceive a benefit from participation in a game jam due to the social interactions and the perception that the product being built has much more appeal than the extension material.

3. CONCLUSION

Without doubt game jams are a thriving hub of learning and productivity. The question still remains: how can the game jam participation ethos and undoubted educational benefits be captured and applied to the teaching of Software Development in the curriculum?

One attempt being made at Glasgow Caledonian University is the development of an integrated project module that brings together a team of students from three areas: Game Software Development, Game Design and 3D Art and Animation.

These teams are brought together for a semester in years 1, 2 and 3 and charged with the development of a themed game. Although, not an intense 48 hour type idea it does mimic in many ways the ethos of the Game Jam.

The project relies on the teams working together for the duration of the 12 week semester. To help and encourage the students milestones are set for the completion of certain tasks.

The idea of community for the group is normally helped by the use of social media tools for disseminating information and progress updates.

Version control software tools such as GitHub are used for a collaborative approach to coding and for keeping track of changes to the code base.

By year 3 of study a number of students are game jam veterans and as such are very familiar with game jam ethos and how to mimic it.

From the perspective of the integrated project module the attempt to mimic the Game Jam processes has been a relative success with most students having enjoyed the process and being happy with the software product produced.

Students undoubtedly learn from their Game Jam experience and in particular programmers are learning a number of techniques, some quite advanced, for solving various programming problems.

Revitalizing the Software Development curriculum relies on reinvigorating the student's enthusiasm for the subject area by applying the Game Jam model to software development classes by using social media for creating a community for sharing ideas, code snippets and problem solutions.

Encouraging the use of Agile methods to prototype the students game code strengthening the concept of iterative development.

Assessment in Software Development modules has normally tended to be based on a course work which is issued approximately a quarter of the way through the term. The coursework is normally open, in the sense that, the student can create a game of their choosing.

One suggestion that has been mooted is to arrange two days at the end of term which could be used as a mock Game Jam where the students would be given a theme and various art assets and asked to create a game.

This type of jam event would not be run as a straight 48 hour jam but rather two eight hour sessions on consecutive days. At the end of the two days the students mark would not be derived solely from the aesthetic appearance of the product but the quality of the code and the use of the "toolchain".

4. FUTURE WORK

It is intended to survey the current student cohort to ascertain the pros and cons of the game jam model and if the students would like to see this model applied to the Software Development curriculum.

Individual face to face interviews will be undertaken with both students that regularly take part in game jams to find out why they enjoy and return to subsequent jams and also with students who have either not attend or only attend one jam to understand why they have not engaged with or enjoyed the game jam experience.

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