Encouraging Students to Document Software Development Projects using Blogs

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***Abstract*— This paper will present an ongoing project to encourage students to document Software Development Projects using Blogs. The use of blogs in the documentation of software development projects is gaining acceptance within the industry itself. As such the use of blogging within the industry will be examined to identify the potential areas of use. The pedagogical issues associated with such a project will be investigated and an attempt made to incorporate these into the student experience. The aim is to increase the student's engagement with the documentation process by using a medium that is familiar, media rich and gaining acceptance within the industry.**

Keywords- Blogs; Documentation; Software Development.

I. INTRODUCTION

Quality documentation is an integral part of any software development project. This is true for both students' software development assignments and industry projects. Within the author's institution a trend towards a steady decline in the volume and quality of documentation submitted as part of these assignments has been detected. One hypothesis for this is the modularization of subject areas within the curriculum paints a disjointed view of the syllabus as a whole, leading students to miss the connection between analysis, design and programming. In the author's institution teaching of these subject areas tends to be as separate modules. Students perception of programming modules is such that their focus is mainly on the programming leading to assignment submission with no or extremely sparse documentary evidence of the analysis, design and development of the software product.

Since the inception of blogging, circa 1994, the past two decades have seen an almost meteoric rise in their popularity leading to academics across many disciplines incorporating blogs into their teaching [1]. Blogging, in this context, can also be used to enhance the students' capacity for reflection, opening the door to active learning [3].

Thus, the concept of using a blog was employed to engage the students in the process of recording and reflecting on their progress during the production of a software product. The hope was that the informal nature of blogging would forge a relaxed environment, in which the student could convey their thought processes. Blogs also allow for the Lecturer to monitor the student's posts offering constructive feedback in a timely manner.

The remainder of this paper is organized as follows: Section II will give an overview of the author's use of blogs within teaching; indicating the nature of the cohort and the subject are studied. Section III gives information about pedagogical issues related to blogging, Section IV introduces the uses of blogging within the industry of software development. Section V presents the results from the use of blogging with the student cohort. Section V discusses the test results, while Section VI attempts to draw conclusions from the data and the ideas presented in Sections III and IV. Section VII discusses issues encountered during the use of blogs. Section VIII offers ideas for future work based on the synthesis of Sections III, IV and VI.

II. STUDENTS DEVELOPMENT BLOG

The author predominately teaches Games Programming using C++, DirectX and OpenGL to Year 2 and Year 4 Degree students. Thus, the participating students for this research are Year 2 and Year 4 students on the BSc Computer Games Software Development degree. The students were undertaking the modules Games Programming 1 and Games Programming 3 respectively. Since the initial test group, in academic year 2009-2010, the number of participants has reached 218.

The inherent nature of game software development is the production of a multi-media rich artifact. As such the multi-media rich environment of blogs is an ideal partner for students to express their analysis, design and software development progress in a vibrant and colourful manner. Thus, the belief was that the students would engage with the documentation process more avidly as the ability to produce a media rich online portfolio of their software artifact.

Both cohorts of students were issued with course work that involved the development of a game of their choosing. Such an open brief makes it crucial that the students embark on the proper analysis, design and planning before attempting to write any code.

The coursework was assessed in three main parts: coding (40 marks), documentation (40 marks) and extension work (20 marks). The study has been set-up to integrate into

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the documentation section of the course work. The documentation section is subdivided into the following components: traditional paper based Code Explanation (10 marks), Class Diagram (5 marks), Storyboards (10 marks), References & Documentation formatting (5 marks) and Development Blog (10 marks). The expectation on the student was to blog regularly building a development log. This development log would demonstrate the student's ability to analyse a problem, define a solution to the problem and implement the defined solution. Thus, blog entries would detail the processes the student undertook to develop their game. A typical set of blog entries would include: a user specification, a proposed solution, class diagrams, storyboards, code snippets, screen captures and the final post should include a video demonstrating their game being played.

III. PEDAGOGICAL ISSUES

A number of pedagogical issues have been identified as a justification for incorporating blogging into the curriculum, irrespective of the subject area.

Zinger and Sinclair identify the property of blogging tools to have the ability to be "enjoyable yet educational" [4]. In the setting outlined above this is a key factor in the attainment of engagement with the software development process.

Zinger and Sinclair observe that blogging engages the student in a cognitive process transforming education from its fact based approach [4].

An important observation (by Zinger and Sinclair) notes that students' use of blogs exhibited the students "abilities to apply the knowledge and skills learned in one setting to another" [4]. This helps address the hypothesis postulate in the introduction about the disjointed nature the student possess of the curriculum.

A vital soft skill for any student is the ability to communicate clearly and effectively. This is particularly important in the production of technical documents such as that produced in the software development process. Using blogs has been identified as means to enhance and improve the student's communication skills [4][8].

Griffith et al. observe the blogs potential to offer an environment for collaboration, participation, interaction and writing skills as such implementing blogging within their own institution to enhance student engagement [8]. Again a list of soft skills that is essential for any graduate. The outcome of their study has resulted in their idea of the "5C's: Conversations, Creativity, Community, Collaboration and Connections", which can be mapped by the use of blogs both educationally and by the software development industry [8].

Game programming in itself is a very creative process so the fact that blogs lend themselves well to this is a definite boon for the student. This can be utilized by the student to produce feature rich and multi-media rich documentation.

Collaboration and community are interlinked and blogging plays a major part in this cohesion become engaged within the software development community through collaboration [8].

Griffith et al. also implement the idea of blogs as an e-portfolio [8] confirming the author's identification of this possibility. Chong identifies the usefulness of blogs as a just in time diary with a peer and lecturer feedback mechanism [2][5][9][13].

Two issues identified by Chong as positives of using blogging software educationally are "RSS delivery" and the ability to archive posts [5] these are also key components in the use of blogs in the software development industry.

Feedback in the form of comments are seen by Chong as vital to the "interactive nature of blogs" [5]. Von Krogh reiterates the tenants of blogging as the ability to share efficiently and effectively knowledge [11].

Chu, Kwan and Warning agree that blogs can support and facilitate communication, self-reflection, idea sharing and information organization [15]. Hsu and Lin suggest "blogs can be considered as one of the major ways of knowledge sharing" [14].

IV. BLOG USE IN INDUSTRY

Storey et al. notes that software developers make use, in general, of social media and in particular blogs and as such "the use of these mechanisms influences software development practices" [7]. This reinforces the author's decision to implement blogging as part of the student's documentation process.

Storey et al. identifies collaboration as a key component of software development; the synergistic nature of software development and the crucial role communication plays "when designing large scale modern software systems" [7]. Pagano and Maalej also indicate that the software development community has seen the potential of blogging and social media to improve collaboration and communications within software development projects [12].

Developers appear to use blogs for a number of different documentary processes: new release features, "how to's" and requirements engineering [7].

Begel, DeLine, and Zimmermann identify the fact that "social media has changed the way that people collaborate and share information" stressing how this can aid software development teams to find new ways to work together [9].

The idea that social media can play its part in the conception, design, development and successful deployment of software products is stressed by Begel, DeLine, and Zimmermann [9].

Noted by Begel, DeLine, and Zimmermann is the use of blogs by Microsoft to share "technical information and opinions with their employees" providing a synchronous communication channel and the ability to react to new information quickly [9].

Parnin and Treude indicate that software development blogs "are changing the way software is documented" allowing developers the ability to create and communicate their knowledge and experiences [10].

A crucial observation made by Parnin and Treude is "all too often documentation is absent or incomplete" this is borne out by the student population too [10].

Pagano and Maalej analysis of the content of developers' blog posts identified "functional requirements and domain

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concepts" as the most favoured posts [12]. From their study, they have drawn the conclusion that the blog posts made by developers tend to be based around high level concepts [12].

Black, Harrison and Baldwin study singles out communication as the prime benefactor in the software development process of blogging and social media [15].

Reinicke and Cummings show that blue chip companies such as "IBM, Cisco and Sap" are leading the way with the use of blogs and social media as a communication and collaboration tool in software development projects [2]. An interesting observation they make is the connection between software development projects using agile methodologies and the importance of blogs and social media to the success of such projects [2].

V. RESULTS OF STUDENT BLOGGING

The results were determined by recording the data in a two stage process. Firstly the frequency of each student's blog posts is recorded in a spreadsheet on a weekly basis. The content of the student's weekly blog entries is reviewed and feedback is provided to the student based on the following subjective criteria: length of entry, quality of English, relevance, and ability to use technical terms in the correct context.

Secondly to determine an individual student's final mark, the previously collected data on frequency and content is reviewed and combined to arrive at a subjective mark.

The first cohort to undertake the integration of blogging within the Year 2 module Game Programming 1 was in academic year 2009-2010. The results from this initial test showed promise and a decision was made to integrate the blog concept into the Year 4 module Game Programming 3. It has since been used in other modules that the author teaches thus, covering 218 students since its initial inception.

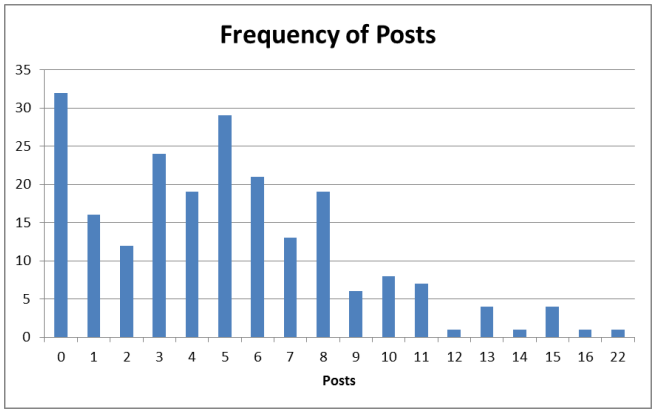

Figure 1. Frequency of Posts.

Figure 1 gives an indication of the frequency of posts made. Unfortunately 32 students from the 218 failed to engage with the process and made no post. Anecdotally, this translated to a very lightweight submission of the remaining documentation required and a low overall mark for the documentation section of the assignment.

The majority of the posts were in the range 3 to 8 with around 125 students in this range. Only around 33 students engaged to a level that could be deemed enthusiastic.

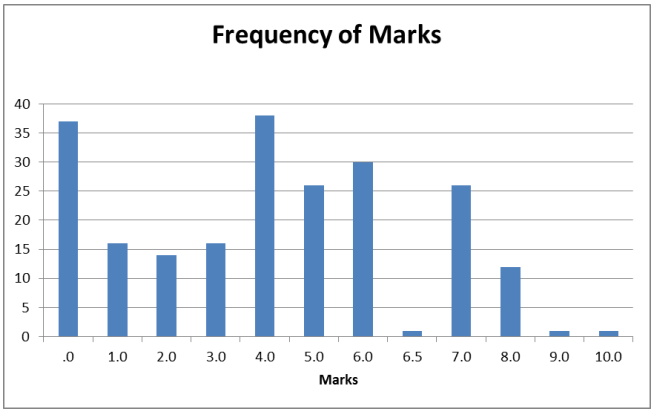

Figure 2. Frequency of Marks.

Figure 2 shows the frequency of marks gained by the students. Marks were awarded based on the number of posts and the level content of the posts. It was not sufficient to make a number of single sentence posts therefore it is conceivable that the number of posts does not match the amount of marks awarded.

Drilling down into the data, reveals the ability to compare a cohort's performance in Year 2 against their performance in Year 4. This in itself can be revealing. The first cohort to undertake the blogging assessment can be compared again in academic year 2011-2012.

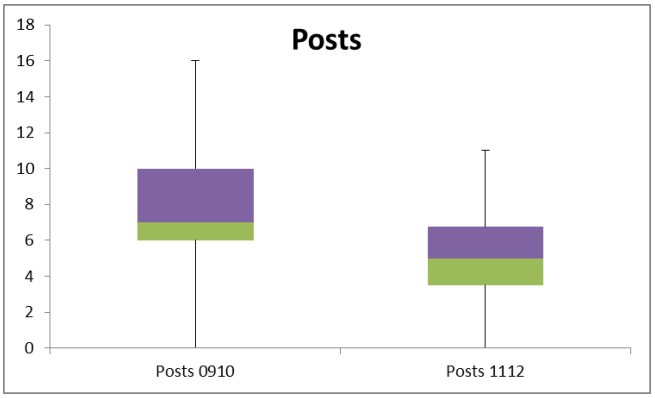

Figure 3. Comparison of posts for same cohort in Years 2 & 4.

Figure 3 indicates a comparison of posts for the same cohort in Year 2 and Year 4. Year 4 is the final year of their Degree. It is quite evident the stark drop in the number of posts being made.

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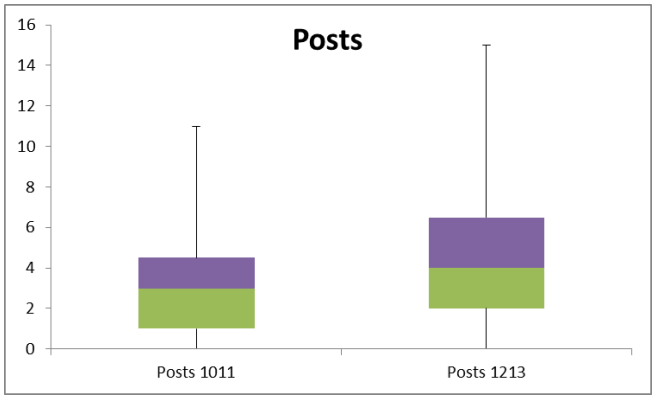

Figure 4. Comparison of posts for same cohort in Years 2 & 4.

Figure 4 indicates how the cohort for academic years 2010-2011 faired when compared again in academic year 2012-2013. On this occasion, it can be seen that there has been a positive increase in the number of posts.

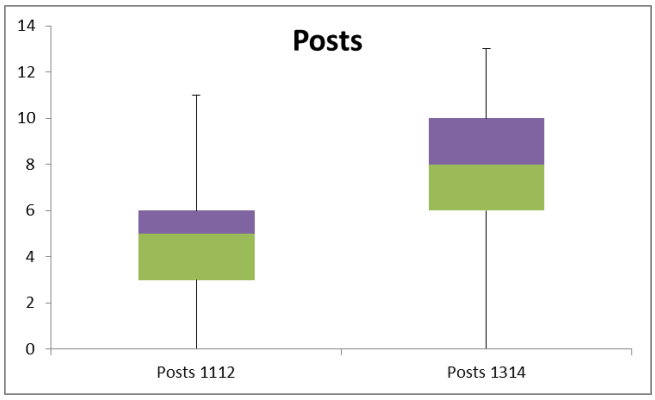

Figure 5. Comparison of posts for same cohort in Years 2 & 4.

Figure 5 indicates how the cohort for academic years 2011-2012 faired when compared again in academic year 2013-2014. On this occasion it can be seen that there has been a positive increase in the number of posts.

Comparing the marks for each cohort in the same fashion as the posts should yield a similar pattern.

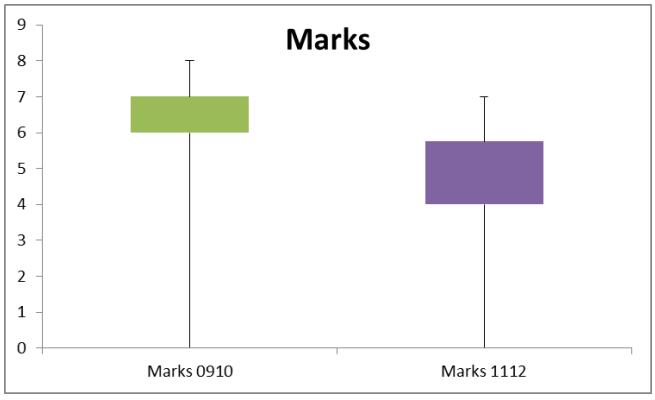

Figure 6. Comparison of marks for same cohort in Years 2 & 4.

Figure 6 indicates how the cohort for academic years 2009-2010 faired when compared again in academic year 2011-2012. On this occasion it can be seen that the marks have decrease in line with the decrease in posts shown in figure 3.

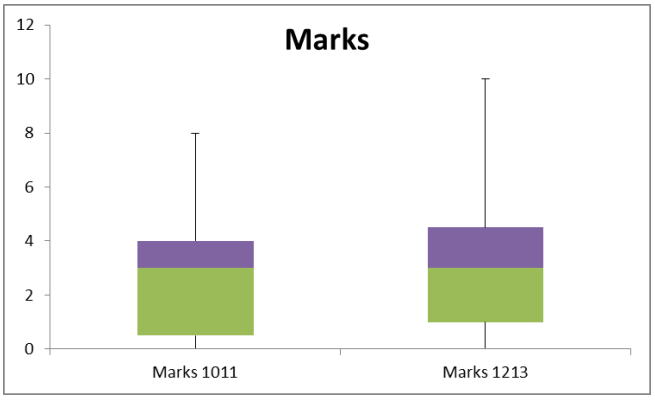

Figure 7. Comparison of marks for same cohort in Years 2 & 4.

Figure 7 indicates how the cohort for academic years 2010-2011 faired when compared again in academic year 2012-2013. On this occasion it can be seen that the marks have increased marginally following the increase in posts shown in figure 4.

Figure 8 indicates how the cohort for academic years 2011-2012 faired when compared again in academic year 2013-2014. On this occasion it can be seen that the marks have increased marginally following the increase in posts shown in figure 5.

Table 1 shows the correlation of marks and posts for each of the pairs of years. All pairs show a positive correlation between the number of posts made and the marks gained.

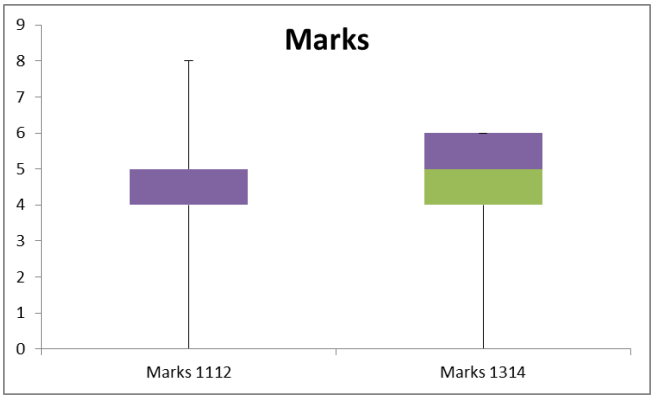

Figure 8. Comparison of marks for same cohort in Years 2 & 4.

TABLE I CORRELATION BETWEEN MARKS AND POSTS

Module		Module	
GP1 09/10	0.790539	GP3 11/12	0.927967
GP1 10/11	0.954243	GP3 12/13	0.967233
GP1 11/12	0.88226	GP3 13/14	0.745314

In the following section, an attempt will be made to draw conclusion between the results obtained and the literature review in Sections III and IV.

VI. CONCLUSIONS

The pedagogical issues revealed in Section III would indicate that the use of blogs should engage the student. However, in the data sample present around 15% of students did not engage at all, registering no posts. This was higher than expected and very disappointing.

Although the quality of the posts could be deemed to be subjective, it was surprising at the number of students that conspired to do the minimum content that they could. This complements the evidence suggested by Chu, Kwan and Warning [13].

From the data presented, it was difficult to quantify if there had been any improvement from Year 2 to Year 4 in the quality of written English. The blog posts in Year 4 did indicate a wider range of content than the previous posts in Year 2.

The drop in posts within the same cohort shown in figure 3 is interesting and unexpected. Our expectation was for the posts to increase in Year 4, as the maturity level of the students has increased and they have experienced the benefits of previous exposure to blogging.

Figures 4 and 5 offer the expected result of an increase in posts from Year 2 to Year 4.

By the end of the module, the blog that the student had created should have been in a fit state to be considered a reasonable example of an ePortfolio of their work. Unfortunately, only a small percentage of the blogs created by the student sample discussed here could conceivably be regarded as in a fit state to be a presentable ePortfolio. This was disappointing, as game programming is a very creative area awash with rich multi-media artifacts that could have been used to create rich content blog posts.

Figure 9 gives an example of the content from one of the better blog posts.

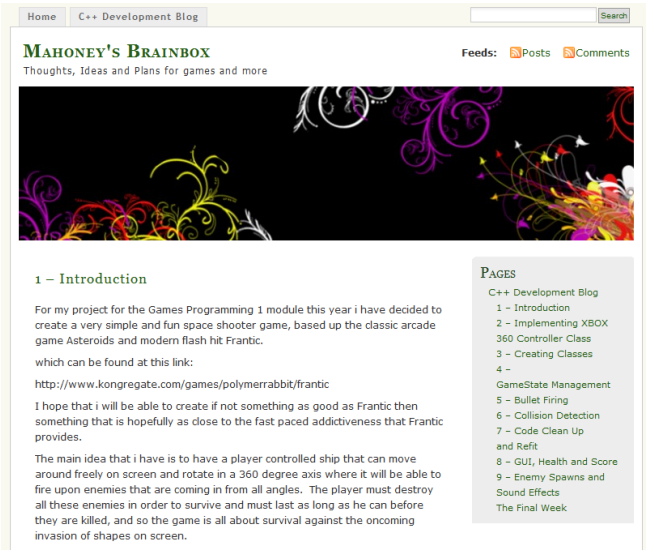

Figure 9 Example Blog Post

Table 1 shows the correlation between the mark awarded and the number of posts. All are highly positive. Thus, indicating that the students that put in the effort to post regularly and their posts contain a level of content that can be deemed acceptable they will in turn receive a mark commensurate with the number of post they have made.

The one aspect of the blog that worked very well was the chronological aspect as the author was able to monitor and note the periods of effort applied to the assignment. The typical student tended to have top heavy posts clustered around the final few weeks of the assignment. A good student tended to have an even spread of posts illustrating good time management.

For us, the data is an indicator that there are positives in continuing to ask students to blog during software development projects. This is evidence in Section IV which highlights that Blue chip companies and independent developers are turning to the use of blogs and other social media for collaboration, communication and sharing of technical knowledge.

VII. ISSUES

Incorporating blogging within the curriculum leads to a number of issues including feeding back to students in a timely manner [8]. The author set aside approximately two hours a week to read and feed back to the students posting comments on each blog post. This creates an additional load [8] for the member of staff involved but the feeling of the author was that it was worth the extra effort.

Picking the correct environment for the blog is crucial as there is some indication that this has a bearing on how often the student posts. If the environment is perceived to be too difficult to use then the student will procrastinate on its use.

At our institution, the Virtual Learning Environment created by Blackboard tm is used. For future presentations of the module, a change of blogging environment will be sought.

Our expectation was for students to engage with the multi-media rich environment making use of the ability to post images, code fragments and video clips instead most students produced rather bland vanilla heavily text based posts.

VIII. FUTURE WORK

We will investigate expanding from blogs to include other forms of social media to encourage a range of skills. From the literature reviewed the software developers in industry use a number of diverse social media including wiki's, micro-blogging and social networking sites for creating, maintaining, communicating and collaborating.

This will lead to the student creating and maintaining the documentation required for a software development project in a purely electronic format.

The literature reviewed indicated the rise of tools that can be integrated or plugged in to popular Integrated Development Environments (IDE) to enable developers to use social media direct from their IDE.

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