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# **Maintaining an ethical balance in the curriculum design of games-based degrees**

by M. P. Jacob Habgood

## **Abstract:**

In February 2011, games-based degrees were subjected to the scrutiny of the Livingstone-Hope report into the future of education in the fields of video games and visual effects. The report delivers a damning appraisal of the education system's ability to fulfil skills shortages in these creative industries, and makes a range of proposals for changing education in both schools and universities to meet the needs of these sectors. This paper discusses the findings of this report from the perspective of higher education, with particular emphasis on the complex ethical considerations of designing a curriculum for games-based degrees. The argument for taking a broader perspective on this issue is illustrated through discussion of Games Software Development degrees at Sheffield Hallam University.

## **Context**

Mainstream video game studios in the UK generate global sales of around £1.7 billion a year from an industry which employs around 9,000 people in skilled game development roles [Kilpatrick, 2010]. It is primarily the commercial success and popularity of this industry which has driven the rise of games-based degrees in higher education. However, such degrees have been regularly criticised by members of the games industry as not being fit for purpose [e.g. French, 2008]. Most recently game-based degrees have come under detailed scrutiny from a NESTA-backed education review headed up by Ian Livingstone, the President of Eidos [Livingstone & Hope, 2011]. The review is based on the premise that skill shortages in the UK's video game and visual effects industries are restricting growth within an expanding global market, where the video game sector alone is predicted to be worth \$86.7 billion by 2014 [p.12]. Tax breaks and subsidies offered by other countries have contributed to a drop from third to sixth place in the UK's world ranking for the size of its game development sector since 2008 [p.5, p12]. Furthermore, a number of publications by The Independent Games Developers Association [e.g. TIGA, 2010] indicate that difficulties in filling vacancies have had a real impact on the growth prospects of video game and visual effect companies [p.14]. Ultimately the assertion is made that "the education system is failing to produce talent of the calibre that these industries now need" [p.14].

To address this, the Livingstone-Hope report makes wide ranging recommendations at every level of the education system from primary schools to higher education. The focus of this paper is on those recommendations directed at higher education and related to games-based degrees. It seeks to provide enough background to understand the arguments without reading the original document, but significantly more detail is available from the original 88-page report which is available to download from the NESTA website: <http://www.nesta.org.uk>.

## **Higher Education**

The central (and most concerning) argument made by the report for the failure of higher education, relates to students' prospects for employment within the games industry after graduating with a game-based degree. Statistics are presented from HESA (The Higher Education Statistics Agency) showing that 1585 students graduated with game-based degrees

in 2009 [HESA, 2010], while the report estimates that only 130-230 new graduates were required by the games industry in that year (a poor year for the industry) and only 450 were required in 2010 [p.50]. Yet despite this oversupply of graduates, employers surveyed by the report said that they have difficulties finding recruits straight from education with the required skills, stressing “important shortcomings in university applicants” [p.50]. The report goes on to use statistics derived from HESA’s Destinations of Leavers from Higher Education Institutions Survey to illustrate the bleak industry employment prospects of graduates from game-based degrees. This shows that only 10.8% of graduates from undergraduate degrees, and 32.3% of graduates from postgraduate degrees, obtain employment within the games industry within 6 months of graduating.

The report then provides a skills audit based on course information published in university prospectuses, which highlights the lack of hands-on technology training on games-based degrees. They suggest that less than one-third of these courses include C++ (the main programming language used for games consoles), less than 5% include training in Flash (the dominant platform for browser games) and only 20% of courses include hands on training with games consoles. Finally, only 27% of game-based degree courses were identified as offering modules in maths (critical to all aspects of 3D game programming). This data is supported by feedback from their videogame talent survey where only half of graduates from specialist games courses said they gained any expertise in gaming hardware, and only 68% of graduates from video games programming courses said they had gained strong skills in the use of software and programming languages used in the industry.

## **Recognising, supporting and improving good practice**

Despite the generally disparaging appraisal of games-based degrees, the report acknowledges that pockets of good practice do exist. In fact most of the recommendations made by the report relating to higher education, aim to recognise, support and improve examples of good practice within games degrees. The first and most central of these recommendations, relates to Skillset, the Sector Skills Council for Creative Media, which has been providing an industry accreditation scheme for games-based degrees since 2006:

***Recommendation: Develop kite-marking schemes, building on Skillset accreditation, which allow the best specialist HE courses to differentiate themselves from less industry relevant courses [Livingstone and Hope, 2011, p.63].***

To gain Skillset accreditation, courses are assessed by members of the games industry and must “strictly comply with industry standards” [p.61]. The report reveals that only nine out of 22 applications have gained Skillset accreditation for their game-based degrees since 2006 [p.61]. A compelling argument is made for the value of accreditation, based on the fact that graduates of these courses are nearly 3 times more likely to gain employment within the games industry than those from an average game-based degree. Nonetheless, an opportunity seems to have been missed to collect data on employer’s awareness of the current Skillset accreditation, and whether it has a conscious influence on candidate selection.

***Recommendation: HEFCE should include industry-accredited specialist courses in their list of ‘Strategically Important and Vulnerable’ subjects that merit targeted funding. Industry must in turn demonstrate its commitment to these courses through industrial scholarships and support for CPD for lecturers [Livingstone and Hope, 2011, p.64].***

HEFCE (The Higher Education Funding Council for England) has traditionally provided higher education institutions with block funding based on the number of students studying on a course [Browne, 2010]. However, in line with the recommendations of the Browne report, this funding will be removed from 2012 and each student will be offered a loan to cover these costs instead—leading to the much reported hike in tuition fees. For some years HEFCE have identified certain subjects as being “Strategically Important and Vulnerable”, receiving additional levels of subsidy because these subjects have higher associated costs, and potentially have a lower demand—despite being considered important to the national interest. In 2007 HEFCE identified chemistry, physics, chemical engineering and mineral, metallurgy and materials engineering as subjects which would receive targeted funding to “help maintain capacity in these subjects in universities and colleges while demand from students grows” [HEFCE, 2007, p.26]. These “laboratory based subjects” received additional funding through a banding system which prioritised them as Price Group B within the old system receiving 1.7 times the ‘standard’ funding level. Technology-related subjects such as game development also benefitted through this scheme by being included under Price Group C (“Subjects with a studio, laboratory or fieldwork element”) which received 1.3 times the standard funding level.

It has yet to be announced what support will be available from 2012 and which subject areas will or won’t be included as priorities. The Browne Report proposed that “Priority Programmes [...] will contain the programmes currently known as Price Group B and potentially some proportion of Price Group C” [Browne, 2010, p.47]. Given the significant pressures on public finance, and the historically high student demand for game-based degrees, it seems difficult to imagine them being included on this list. Nonetheless, the Livingstone-Hope report argues that the excess of games courses, combined with the lack of awareness amongst applicants, makes even accredited courses vulnerable, and we should “expect the market in university course funding, at least in the short term, to fail” [p.65]. As such they argue that Skillset accredited courses should receive additional support to ensure that courses demonstrating good practice survive the upheaval in the funding system.

***Recommendation: Skillset should work with the UK Centre for Excellence in Computer Games Education at Abertay University to develop a template for introducing credit bearing workplace simulation into other specialist video games and visual effects courses in the UK, based on the successful Dare to be Digital competition. [Livingstone and Hope, 2011, p.66].***

The concept of ‘Workplace Simulation’ is identified by the report as something that has particular significance to game-based degrees. These are defined as situations where “students deploy the skills that they have learned in the classroom in real-life campus-based projects where they collaborate with practitioners from different disciplines to deliver a finished product” [p.67]. In particular, the University of Abertay’s ‘Dare to be Digital’ competition is identified as an exemplary model for this, where interdisciplinary teams from around the world spend nine weeks prototyping games under mentorship from the games industry. The value of interdisciplinary working is something which is emphasised elsewhere in the report with respect to the need to overcome the difficulties preventing cross-faculty collaborations [p.64].

## **Re-emphasising traditional degree subjects**

Alongside the recommendations which seek to improve game-based degrees, a number of others are made which are unconnected to Skillset and have a focus outside of specialist games courses. The report argues that “Skillset’s current sole focus in its work on specialist courses risks distorting the HE market insofar as it under-emphasises to students the importance of high-quality general courses like computer science and fine art for many employers” [Livingstone and Hope, 2011, p.66]. It is this observation that seems to have driven the thinking behind the remaining two recommendations relating to higher education.

***Recommendation: Raise awareness of the video games and visual effects industries in the eyes of STEM and arts graduates.***

This recommendation advises the games industry to work more closely with established institutions, such as the British Computing Society, Royal Academy of Engineering and the Institute of Physics to increase their visibility to STEM graduates. The report suggests that highlighting the relevance of STEM degree subjects to games could be used to promote their uptake at university and address declining numbers in subjects such as Computer Science. It also suggests that creative competitions could be used to raise awareness of opportunities in the games industry for STEM graduates.

***Recommendation: Give prospective university applicants access to meaningful information about employment prospects for different courses.***

Since 2007 institutional data collected by HEFCE has been available through the Unistats website, which is a service “aimed at potential students and their advisers, to help them make choices about what and where to study” [HEFCE, 2011]. From 2011, enhancements to this service give more detail and prominence to employability statistics in line with the recommendations of the Browne report [Browne, 2010, p.30]. Nonetheless, the data provided through Unistats (or even HESA’s public data sets) doesn’t really provide enough detail to determine if graduates from game-based degrees are gaining employment within the industry. The report therefore proposes that Skillset works with the various other bodies to produce yearly league tables of courses based on their employment prospects within the video games industry. Furthermore the report states that “these league tables should include general STEM and art courses as well as specialist courses” [p.66] to address the ‘distortions’ in the HE market described above. In order to promote these league tables it suggests that games companies themselves should link back to them from their own websites and include education sections based on the exemplary Blitz Academy model developed by Blitz Games.

## **Games Software Development at Sheffield Hallam**

Sheffield Hallam University runs both undergraduate and postgraduate degree courses in Games Software Development, including a 3-year BSc, 4-year MComp and a one-year MSc degree. The entry requirements are 240 points (CCC) for the BSc route, which is slightly above the average of 226 points for game-based degrees, but below the 260 points average of Skillset accredited courses [p.62]. The requirements for the MComp route are slightly higher at 300 points (BBB), and both routes require a GCSE maths grade B or above. The MSc in Game Software Development gained Skillset accreditation last year, and the BSc/MComp route will be assessed for the first time this year. Sheffield Hallam University has been offering software-engineering degrees oriented towards games since 2003, but the Game Software Development degrees have only been offered in their current form since 2006. This means that 2010 was the first year that a complete cohort of students entered the employment

market (a prerequisite for gaining accreditation). As part of the application process we have collated our own employment statistics for these courses based on the 2010 qualifying year (at around nine months after graduation rather than the standard six months figures traditionally collected by HESA). For this cohort, 24% of our BSc graduates and 63% of our MComp graduates had obtained employment in the games industry within nine months of graduation. This compares favourably to the Skillset average of 27% although it should be noted that the MComp cohort consisted of only 8 students, therefore producing a combined mean for BSc and MComps of 34%.

Both the BSc and MComp Game Software Development routes include core modules dedicated to C++ programming, and throughout the course they are expected to apply their knowledge of C++ to other core modules such as DirectX programming and real-time 3D techniques. Similarly, there are core mathematics modules in the first and second year which cover the foundations of 3D mathematics required for real-time rendering. Students are also exposed to a range of console gaming hardware, from GameCube development kits in architecture modules, to PlayStation Portable and PlayStation 3 development kits in group project modules. The group projects involve teams of artists, programmers and designers working together in interdisciplinary teams in order to develop prototype games. This kind of interdisciplinary teaching is made easier at Sheffield Hallam because the faculty of ACES incorporates Arts, Computing Engineering and Sciences under one administration.

### **The Steel Minions game studio**

The Steel Minions game studio was set up at the start of 2011 to provide the precise benefits of “Workplace Simulation” extolled by the Livingstone-Hope report. The studio is based in Sheffield Hallam’s science park and provides high specification PCs with commercially licensed versions of software like Visual Studio, Photoshop and 3DS Max. It has PlayStation Portable and PlayStation 3 development kits and its status as a registered PlayStation Minis developer gives it access to the same tool chains and support available to commercial developers. As such it provides the space and facilities for one or two teams of students to work on small-scale commercial development projects at any one time. Current projects focus on the PlayStation Minis platform (small, digitally-distributed games for the PSP and PS3) as having an achievable scope, and a direct route to market without the need for backing or investment by a publisher. The studio’s first title, “Bounceback” was originally developed by a team of 3<sup>rd</sup> year MComp students as part of their group project module, but it went on to win a Sony competition, and will receive their support and backing to help turn it into the studio’s first PSP minis title over the summer.

The studio also has a longer-term development project based around the “Zool” I.P. which was originally created by Sheffield-based Gremlin Graphics in the 90’s and is now owned by Urbanscan, a company set up by Gremlin’s founder Ian Stewart. Urbanscan have given the Studio permission to reinvent the franchise and design and develop a new title for the PlayStation Minis platform. As such, a separate Steel Minions Design Group have been able to work on creating and pitching concepts to Ian to determine the direction of the new title. Next year the concept of ‘workplace simulation’ will be incorporated into the curriculum as a ‘credit bearing’ aspect of the MComp students’ final year, as they work on different aspects of this project as part of various final year modules.

The activities and influence of the studio already extend beyond the physical space it offers, as it has provided a focus for Hallam’s links with the local games industry. Sheffield-based Sumo-Digital (one of the largest game developers in Yorkshire) have provided advisors to the

studio in a range of disciplines from programming, art, project management and design, including their Creative Director, Sean Millard. Through these links, an opportunity arose for a dozen internships at Sumo working on a commercial development project. The Steel Minions studio was able to act as a recruitment agent, putting Sumo in touch with both current and ex-students to fulfil these roles. In addition, Sumo took on one of the lead programmers working in the Steel Minions studio in a separate role at their studio. Also through the studio's links, advisors from both Sumo and other local games companies have helped to mentor student teams through the pitching process for the Dare to be Digital competition, helping to get two teams from Sheffield Hallam through to the nine-week final of Dare for the second year running.

## **Broadening the perspective**

The Livingstone-Hope report clearly highlights some very real issues with game-based degrees, which potentially threaten to undermine good practice within this sector during the turbulent times ahead for higher education. The report sets high expectations for the content and opportunities offered by game-based degrees, but they *are* achievable and we believe that Hallam's Game Software Development degrees already meet most of the industry's aspirations for a specialist course of this kind. Nonetheless, despite consulting some individuals involved in the provision of game-based degrees, the report maintains a very external, industry-based perspective on higher education. Importantly, it doesn't attempt to explore the reasons *why* game-based degrees are as they are. Perhaps this was considered beyond the scope of the report, but without understanding the practical, economic and ethical constraints of running game-based degrees it seems unlikely that the recommendations of the report will succeed in achieving their goals.

In fact, the report's own recommendations come very close to identifying one of the reasons *why* there has been such a rapid increase in the number of game-based degree courses over the last decade. Between 2001 and 2007 the number of applicants to undergraduate degrees in computing subjects dropped by nearly a half [CPHC, 2008] and computing departments have been searching for ways to increase the appeal of their courses. There are plenty of academic papers detailing the use of games to provide additional interest and motivation in the study of computing [e.g. Jones, 2000; Leutenegger & Edgington, 2007] and it is a relatively small leap to the realisation that including the word "games" within the title of a computing degree will aid in recruitment. So the report's recommendation that games could be used as a way of improving recruitment to STEM subjects such as Computer Science is actually how some of the degrees criticised by the report were created in the first place. Combining a few specialist game-based modules with a Software Engineering or Computer Science degree is an easy way to create an engaging sounding course which will help to maintain student levels. However, it is far harder to teach a difficult programming language like C++ to any depth if it is not already part of other degree courses offered within the department.

The games industry considers the C++ programming language to be an essential backbone of any relevant game-based degree programme, but since the late 90's the popularity of teaching C++ as a 'first language' has declined in favour of Java. There are a range of arguments both for and against this move (beyond the scope of this discussion), but the winning argument is ultimately that Java is an easier language to apply to teaching [e.g. King, 1997]. Students on some game programming courses can therefore find themselves learning Java simply because it's the predominant language used in their department. C# and XNA development also appears as an alternative on many game development courses, but the prevailing view within the industry is that while a good C++ programmer's skills are transferrable to C# the same is

not necessarily true the other way around [e.g. Winder, 2008]. At Sheffield Hallam all of our Software Engineering and Games Software Development students study C++ as their primary programming language from year one. As a result, C++ is used as the basis of all the other modules studied by those students, giving them far more exposure to the language than they would otherwise receive. However, this immediately raises ethical considerations for the curriculum, as it could be argued that the Software Engineering students might be better off studying Java, as it is an easier language to learn. However, the counter argument is that once you understand a hard language like C++ it makes many other programming languages easier to learn. Yet while the status quo of teaching C++ at Hallam helps the cause of the Game Software Development students, other universities may have limited scope for changing a department's primary teaching language to C++ for the sake of games students.

Curriculum decisions within game-based degrees are intrinsically tied to the economic realities of running a specialist course, which in turn bring a whole range of other ethical considerations as well. The majority of game-based degrees will always be reliant on sharing modules with other courses for their continued viability, but the quantity and quality of specialist gaming modules a course can offer ultimately depends on the number of students registered on it. The low average point requirements for game-based degrees (226 points for non-Skillset) are a recognition that decreasing the entry requirements and reducing the difficulty of a course will increase student numbers and viability of that course. In theory, more students enrolling should make it possible to offer more specialist modules and the potential to offer excellent facilities and opportunities in line with the Livingstone-Hope report. However in reality it doesn't attract the kind of students who can make the most of these opportunities and the course content is likely to be 'dumbed-down' to appeal to the lowest common denominator. Students may enjoy their easy course, but most will find it difficult to gain employment in the games industry afterwards.

The unwritten message of the report seems to be that the industry would like to see these courses die out completely, and the best students to attend a limited number of Skillset-accredited "centres of excellence" instead. Nonetheless, an average entry requirement of just 34 points higher for Skillset accredited courses suggests that accreditation has yet to make a significant impact in the business models of these degrees. They may attract slightly more of the cream (8% with an UCAS tariff of 400+ points as opposed to 1.7% [p.62]), but they are ultimately still reliant on students with lower grades to ensure the viability of the courses. Moreover, the increase in student fees has the potential to encourage more students to save money by studying from home rather than relocating to a centre of excellence. So in the short to medium term a significant proportion of students—even on Skillset courses—are likely to be below the calibre required to meet the challenges of working in the games industry and it is only going to be the best graduates who have the potential to work in their chosen field.

### **Should game-based degrees exist at all?**

Although the report never directly asks this question, there is an apparent duality in the way the report's recommendations support game-based degrees on one hand, while emphasising recruitment from outside of them on the other. There are certainly those within the games industry that have previously argued that game-based degrees are simply unnecessary, as all the talent they need can be found from non-specialist degrees—but the very premise of the Livingstone-Hope report underlines that this is not the case. Game developers put enormous value on the use of C++ and game based degrees are gradually becoming some of the last bastions for teaching this within universities. Furthermore, while talented mathematicians, physicists and computer scientists all have valuable skills they can contribute to game



development, you can't simply place them in a room with artists and expect them to create a game. Game developers typically treat new graduates from any discipline as being relatively unproductive on a project until they have been through the processes of developing and releasing one published title [Habgood, 2010]. This is why most job advertisements for the games industry ask for this as a prerequisite (and thus creating a paradox for graduates). The value of group-based "workplace simulation" is highlighted by the report, and is a key part of the unique offering of game-based degrees. An industry-ready graduate is one who has respect for the contribution those individuals from the opposite side of the technical/creative spectrum offer to the game development process, as well as an appreciation of the importance of clear inter-disciplinary communication in order to successfully realise a product.

However, another perspective that is offered within academia is one that questions whether game-based degrees are (or should be) about training for the games industry at all. The stark employability statistics presented by the report succeed in highlighting a very real problem, but it should be understood within the context of comparable figures for other popular degree subjects. Unfortunately, at the time of writing, NESTA have not made the appendices available that detail their approach to calculating the employability data for the report. Nonetheless taking the latest publically available HESA Destinations of Leavers data for 2003/2004 it is possible to derive an employability rate of 64% for all graduates of undergraduate Biology degrees (2095 of 3285 graduates in full or part time employment) where around 21% of those were in an Industrial Classification broadly related to their field (475 of 2240 graduates obtaining employment in Agriculture and Forestry, Health and Social Work, and Manufacture of Chemicals and Chemical Products). Combining these percentages for 2004 produces an overall figure of 14% of Biology graduates that were employed within industries related to their discipline within 6 months of graduation.

This is not intended as a criticism of Biology degrees and far from seeing this as a weakness, many Biology departments promote the variety of options available to their graduates as a strength, which only adds to the offering of what is a popular and engaging subject to study at university. In fact the Livingstone-Hope report also acknowledges that graduates of game-based degrees gain employment in all sectors of the economy [p.59], so perhaps this is something to be celebrated and encouraged rather than derided. For many students game development makes the study of technology relevant and motivating for them, and many would perhaps not otherwise have studied a technology-based subject to this level. Furthermore, technology skills are arguably far more relevant to any modern workplace than those gained from the study of the Biological sciences.

## **Ethical Balance**

It is too early to say what effect the funding changes will have on further education but in the short to medium term it seems likely that even Skillset accredited game development degrees will continue to attract a spectrum of abilities. Game-based degrees have an intrinsic appeal which naturally attracts students with a wide range of motivations for studying the degree. Many students enrolling on Hallam's games courses do so because they aspire to work in the mainstream video games industry and this provides much of the appeal of the course. However, students often arrive with significant misconceptions about the different roles and skill sets required to work in this industry. It is inevitable that not all of them will excel at the wide range of technical abilities demanded of them on the course and only the cream of each cohort will stand a realistic chance of being employed in the mainstream games industry. The remainder will need to apply the skills they have learned on their course to other industries

and it would be unethical to ignore the career paths of these students as part of the curriculum decisions made for the course.

The Games Software Development degrees at Sheffield Hallam are run with the very open acknowledgement that game programming is a hard subject, and we emphasise to students at open days, and throughout the course that only the best students will succeed in gaining employment in the games industry. We consider this part of our ethical responsibility, but it doesn't actually appear to deter weaker students from entering the course (perhaps suggesting that they may have other motivations for doing so). We aim to provide students with a motivating and challenging set of core modules which teaches them industry-relevant content and gives them access to the same software and hardware used by programmers in the industry. However, at the same time we have to recognise that some students will not rise to all the technical challenges presented by the course, and provide them with the means to continue to succeed in, and be motivated by, other areas of game development. This means providing optional modules which allow students to either choose to deepen their technical abilities further, or replace some of the technical content of the course with learning how to use creative tools instead. Similarly, while we provide our best students with access to console hardware, we make sure that less challenging routes for creating games are also available (UDK etc). Unfortunately this can mean that some of our less technical graduates can emerge with a confused set of skills, encompassing programming, art and even game design. We know very well that this is not what the industry wants, but the alternative is to force these students to continue to prove their unsuitability for games programming roles and fail their degrees. This would be unethical and so we do what we can to provide as many escape routes as possible for struggling students (which can include changing to an entirely different course if necessary). Nonetheless, some of these "confused" students have actually had notable success in gaining employment in the games industry, which proves that the combination of talent and enthusiasm can take you a long way whatever you have studied on your degree.

By the start of the final year GSD students have generally come to terms with their own capabilities and have a more realistic view of their employment prospects within the games industry. Many students leave resolute in finding a job outside of the games industry, secure in the realisation that they have gained a qualification in an extremely difficult subject area, which equips them with the programming skills to engage in any kind of technical IT job. This should not be seen as a failure, but just part of the natural process of self-discovery which is a key part of the experience of higher education. Even the most competent students may find their interests evolve or change over the course of their studies. In particular the realisation that working in the games industry requires a higher level of technical competence, demands more unsocial working hours and pays less than other software industries is enough to make even the most talented students carefully consider their career aspirations.

## **Conclusions**

The Livingstone-Hope report highlights a real problem in the provision of game-based degrees, and proposes a range of proposals to help resolve them. Plenty of those involved in the provision of such degrees would agree with the spirit of the report and many of the recommendations within it, but it doesn't give the impression that higher education (as a whole) is being invited to help find the solution. The perspective of the games industry is a very important and valid one on this issue, but it is not the only one and a whole range of economic, practical and ethical issues need to be taken into consideration to ensure that the

UK can successfully educate a future generation of game developers. Nonetheless, we hope that the report will encourage a more open debate between industry and education about the future of game-based degrees and eventually lead to a better understanding and mutual respect between them.

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