

# Reflections on Creating the New Academic Field of Computer Games

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## Abstract

In 1997 the University of Abertay Dundee rolled out the first of a series of degree programmes designed to deliver appropriately trained and minded graduates for the then established, but not yet significant, computer (or *video*) games industry. The first, the MSc Software Engineering (Games and Virtual Environments) was the first university degree world-wide to deliver a course designed specifically for this growing industry.

The roll-out of degrees and research were a feature of several unique facets of Abertay: just turned university and desperately needing a niche, past students in the games industry, Dundee City, and staff with relevant backgrounds; in many ways being first was an accident of timing and circumstance, yet Abertay's – then the UK's newest and most inexperienced university - offerings and approach were seen as the standard and guideline for others to follow.

The computer games industry is worth more than each of movie box-office, video sales/rentals and recorded music sales, exceeding \$20bn world-wide and growing at 10%-20% per annum. Yet universities have been extremely reluctant to support this major industry in its requirements for specifically-enabled graduates. In the UK there are only 22 games programming, two visual design degrees offered and no sound/music programmes, these at sixteen 1990's universities, two 1960's universities and one FE college. In North America the situation is even more stark: no universities offer games industry degrees. Outside the English-speaking world – including Japan – there are apparently no universities willing to offer support for this, probably the world's largest entertainment industry.

This paper will consider the issues that have come to light over the past five years in developing this new field: structural inflexibility, perceived academic status, youth/potential student/societal culture, the power of words in acadæmia (e.g. 'game'), difficulties in delivering highly complex, pan-disciplinary, integrated degree programmes in non-traditional universities, pre-21<sup>st</sup> century tertiary education structures in relation to rapidly-developing fields, and external expectations of universities and degrees from HE's funders and from industry.

The authors believe that there are general lessons to be learned for individual academics, universities and the HE sector as pressure grows on HE to deliver, with Abertay's perceived computer games work regularly held up by politicians as an example of how universities should operate in the future and as pressure grows on art, music and other fields to react similarly to external pressures.

## Introduction

*A tale begun in other days,  
When summer suns were glowing –  
A simple chime, that served to time  
The rhythm of our rowing –  
Whose echoes live in our memory yet,  
Though envious years would say ‘forget’.*

*Lewis Carroll (1871)*

This paper primarily outlines the process of developing the degrees that support the video games industry offered by the University of Abertay Dundee. It also makes reference to other establishments’ relevant experiences. The story is told, warts and all, for the benefit of others who might wish to make a similar new academic start. Although some of what is covered is unique to video games, Abertay, Scotland or the UK, much remains, we believe, of more general experience from which wider principles can be drawn.

For simplicity this paper will refer consistently to the University of Abertay Dundee and its precursors, the Dundee Institute of Technology and the Dundee College of Technology, as Abertay. All trademarks mentioned in this paper are acknowledged. Note that the terms *video games* and *computer games* are interchangeable.

## Beginnings

*‘Begin at the beginning, ‘ the King said, gravely, ‘and go on till you come to the end: then stop’*  
*Lewis Carroll (1865)*

This section details a strange tale of many threads that comes together, in a Rushdie-*esque* manner, to the creation of the world’s first degree programmes supporting the video games industry.

In the early 1980’s and for some time afterwards Dundee City’s Timex factory was the world-wide production base for the world’s first home computers: the Sinclair ZX80, ZX81, Spectrum and QL. By the late 1980’s many of these machines, by various routes, found themselves into Dundee homes and many teenage boys and students had easy access to a computer to write and play games upon.

Abertay had offered a probably unique degree of BSc (Honours) in Computing and Microsystems. This proved, by accident not by design, to be the ideal route for the nascent video games industry in the early 1990’s. Such as Dave Jones, who went on shortly after leaving the course to write the multi-million-selling Lemmings game, came out of this degree programme. Some Abertay staff, notably Dr Louis Natanson, also offered an evening games programming club that students from both universities attended as a bit of fun. Russell Kay, now CEO of the Visual Sciences video games development company, was one of these students, then studying for a BSc (Honours) Computing Science at the University of Dundee.

During this time in the early 1990’s Abertay made no attempt to provide any academic or research support for the computer games industry. This seems to have been the case in all other academic institutions worldwide. From the 1980’s through the 1990’s the games industry began to move from a free software distribution phenomenon to a significant part of youth culture, evidenced by such as Lisberger’s (1982) early movie, TRON. However, the required programming skills were easily picked up by standard Computing Science graduates, the artwork was minimal and the music and sound used in games were extremely simple.

In 1995 an Abertay academic, John N Sutherland, decided the time was right to attempt to create virtual reality on the now established and sub-£1,000 PC platform, instead of the over-£10,000 SGI computers that were being used. On submission of a paper to an international conference, VSMM’96, (<http://www.vsmm.org>) he was invited to spend time at Gifu University (<http://www.gifu-u.ac.jp>) in Japan as a Visiting Professor in Virtual Reality. It was his intention of leaving Abertay as soon as possible on return to the UK, having now a significantly important entry on his *curriculum vitae*. Things did not pan out that way.

The day of his return to Abertay a colleague stopped him in the corridor and said, ‘Oh, John, you are in charge of the games degree.’ There was no games degree, no known plans for a games degree and no academic development team for a games degree. It came out soon afterwards that Dave Jones had returned to his old university to voice concerns that no Computing Science degree programmes were of any use any more to the

rapidly developing games industry. A technological leap had taken place with the launch of the Sony Playstation (now called the Sony Psone). Video games were no longer flat, 2D play spaces (as in such classics as Space Invaders, Lemmings and Pong!) but had now become pseudo-realistic, 3D environments (as in the later Tomb Raider and Quake games.)

The technological change required a graduate who was fully versed in programming three-dimensional worlds that the player could move around in, on the computer, in real-time. A bit like having a movie you could self-direct as you watched it. It was clear from Dave Jones that, as well as being deficient in programming skills, the well-established tendency to remove Mathematics from Computer Science degrees across the UK had further weakened the graduate wanting to enter the growing video games industry.

## Developing the Degrees

*All in the golden afternoon  
Full leisurely we glide;  
For both our oars, with little skill,  
By little arms are plied,  
While little hands make vain pretence  
Our wanderings to guide*

*Lewis Carroll (1865)*

John N Sutherland, with input from Mr Ian Marshall (now Professor and Head of the School of Computing and Advanced Technologies which delivers the degrees), was put in sole charge. He called a meeting of significant games and virtual reality developers to produce the core industry requirements for a proposed BSc (honours) degree in Computer Games Technology and Virtual Environments, as there was no previous suitable template for such a novel course. This one-day brainstorming event was exhaustive, covering all aspects of current and foreseen future requirements for these related industries.

Why related? Because, from investigations of the video games industry it could be seen as technologically identical to the virtual reality industry. Abertay's experience of developing virtual reality on technically extremely small and inexpensive computers mirrored what had begun to happen in the video games industry. The technical specification in terms of power of the Sony Playstation was not significantly different from the then PC. Again, not by design, we found a coincidence worked in favour of the development of these degrees.

Certain things were then clear:

- There was a requirement for significant and specialised Mathematics and Physics teaching. This at a time when Abertay, as in many other universities, had shut its Physics degree programme down and was closing its Mathematics degree.
- The level of programming learning required was greater than in a normal Computer Science degree. How could a comparable degree be offered and who would be capable of taking the course of study?
- The industry had a technological half-life of about 2-3 years. This was a real issue as a (i) degree programme requires to run for about 5 years to be viable (ii) would what was taught in 1<sup>st</sup> year still be valid by the end of 4<sup>th</sup> year?
- A small amount of specialised hardware and software were required. In the event, Sony Computer Entertainment Europe first sold us 20 then gave us a further 20 Sony Playstation *Net Yaroze* student development kits.
- There was going to be real academic trouble with the word 'game'. The industry would accept no less than the use of the four-letter word.

Sutherland decided to push out a phased set of four degrees. But he only told the university of two of them to avoid starting some battles too early. However, the Principal and Vice-Chancellor, Professor Bernard King, provided fulsome support. This was not surprising as the University of Abertay Dundee had just come into existence from the Dundee Institute of Technology; a late baby of the great 1990's polytechnics-to-universities conversion. In the process of more than doubling student numbers to get the title *university*, there was a weariness about Abertay that the new Principal was keen to fight his way out from. *Games* seemed just the thing and, extremely significantly, Abertay, bottom of every league table, had nothing to lose in throwing the dice on what was a very big gamble. The subsequent addition of several other low-profile new universities –

including Teesside, Derby, Westminster, Huddersfield and Paisley – probably reflected a similar driving force, and has become one that is probably now holding back the development of the UK video games industry as these are a group that few established universities would volunteer to join. But, more of that later.

## The Degrees Start

*The Lion looked at Alice wearily, 'Are you animal or vegetable – or mineral?' he said,  
and before Alice could reply, 'It's a fabulous monster!' the Unicorn cried out, ...*  
Lewis Carroll (1871)

The first degree was a variation on the successful, funded and established PgDip/MSc Software Engineering that Sutherland had been Course Leader of. The clumsily entitled MSc PgDip/MSc Software Engineering (Games and Virtual Environments) (now retitled the MSc Computer Games Technology) was launched in 1997 to a totally unexpected blaze of glory. The Principal's office decided to hold a formal press launch to which the BBC and ITV turned up, together with national and local radio and press. Thus began a feeding frenzy that ran for three months, culminating in some members of a national newspaper being ejected from the University for trying to find the 'real' story of the games degree and a decision being made by the academic staff to stop talking to the press and get on with teaching.

The first intake were a peculiar cohort. This has been reflected in the other video games degrees which began with a mixture of students who apparently made a last-minute decision to take the degree. Since then we have seen a much more mature set of candidates on all degrees who have often been spending years planning to get onto the course.

The next year, 1998, the BSc (Honours) Computer Games Technology (BSc CGT) was launched. This was originally proposed as the BSc (Honours) Computer Games Technology and Virtual Environments. The plan was to split this into two quite separate degrees after two years of a BSc CGT and a BSc (Honours) Virtual Environments with Mechatronics (that is, Robotics). However, the validation event for the new degree proved extremely difficult. First, it proved impossible to find a UK-based academic who understood what the degree was proposing. Two external candidates withdrew and the third, a Professor of Multimedia, simply refused at the validation event to believe that virtual reality could be done on a PC as his team used SGI computers (see above). One senior Abertay academic supporting the validation bid walked out of the event and Sutherland decided to save the games degree and lose the virtual reality half rather than lose both. Another senior academic from Abertay at the meeting was also not helpful and suspicions were later raised that he might have found it convenient if the new degree had failed validation. Such are the politics of acadæmia.

The degree was validated with one very significant condition that *creativity* be formally added to the teaching. Several years, many book readings, visits from specialists and modules later, this was dropped as nobody in acadæmia could agree what this *creativity* thing was. It also tended to skew the degree away from the serious business of programming and mathematics towards more *fun* activities designed to extend student thought. There was a considerable battle among the Abertay academics before this subject was finally interred.

The first 'secret' degree – the third in the series - was launched in 1999: the BA (honours) in Computer Arts (BA CA). Sutherland's earlier studies of the industry made it clear that the aesthetic components of games were vital to providing both graduates into the industry and to support the studies of the BSc CGT students who could not produce example games without artistic and sonic input. Opinions were sought internally and externally. The School did not want the new degree. Significant institutions such as Sheridan College (who produced the Pixar team, developers of the Toy Story movie series) did not agree that visual and sonic arts could be taught in the same programme. The ultimate plan was to split the BA CA into two separate degrees – a BA (Honours) Digital Art and a BA (Honours) Digital Sound and Music. Again this did not happen, but more of that later.

Abertay pushed ahead and gambled further on adding a *with Japanese Studies* element to the degree and offering this to the BSc CGT students too. This reflected the links with Gifu University in Japan and the importance of Japan in video games. The BA CA validation event was much smoother. For such an aesthetic degree being offered at a technical institution this may be surprising, but was probably due to Abertay's new-found high profile as *the* place to study exciting new things that helped us through what should have been an even tougher validation. There was some unexpected difficulty with the Japanese Studies as it became clear that we had trespassed into a coming tragedy; Stirling University sent a representative of their Japanese Studies staff and it

became clear that the last thing he needed was another Scottish university entering a tight market for students. The Stirling department sadly closed in late 2001. We genuinely hope we didn't precipitate this.

## Degrees up and Running

*Anon, to sudden silence won,  
In fancy they pursue  
The dream-child moving through a land  
Of wonders wild and new,  
In friendly chat with bird or beast –  
And half believe it true.*

*Lewis Carroll (1865)*

There then followed several years of changeover from pure, unbridled enthusiasm and a feeling of we-can-do-anything turning into just another set of degrees. This change from initiative to establishment was not without its pain; often considerable.

Sourcing staff has proved nigh impossible. This has been reflected in many establishments including, the authors know definitely: Abertay, Rochester, Algoma, Paisley, Bournemouth, and Middlesex. No university working in this area, to our knowledge, has found it possible to get academic staff in the same way that staff for existing degree programmes can be found. There are no staff at any of the above institutions teaching games who have a degree in the field or have earned their living in writing computer games. The combination of both skill-sets simply does not exist.

And here is the first great lesson we have learned from developing the video games degrees: acadæmia is simply not responsive enough, indeed is positively sloth-like, in the production of academics qualified to teach rapidly evolving fields that reflect society today. The recent fuss over Media Studies degrees is simply laughable. Media Studies has been an applied field since the 18<sup>th</sup> century (press) and early 20<sup>th</sup> century (television and radio.) That it has taken acadæmia decades to recognise this and that it remains controversially *new* reflects a system that is unreactive to pressures of work and society.

Related to this has been the difficulty in attracting staff with academic conditions. Sutherland headed up the Abertay development, yet was only on 6 month contracts for several years. Another significant Lecturer was initially only on a part-time contract. Another had to be transferred in from another School, forcing him to apply for and be interviewed for the internal change of post. Another teacher cannot get a Lectureship but survives of a much more poorly paid Teaching Assistantship. These out of a teaching staff of nine. The Japanese Studies teachers remain on hourly, part-time contracts. Couple this with wage rates about 50% below industry norm. Yet, job security is slightly better than in the games industry.

Abertay raised £1.5m to establish the IC-CAVE video games research centre (<http://www.ic-cave.com>) in 2000. It could be that this will produce the first pure video games academic in two or three years; 6 years after the first degrees were produced. This is simply far too slow and far too small scale a way of supporting what has in the meantime, ignored by the bulk of acadæmia, become the world's largest electronic entertainment field.

The teaching of the MSc CGT, BSc CGT and BA CA is supported by no Senior Lecturers and all but one of the Lecturers in his or her first academic job. Teaching workloads remain high and little research or personal development is done outwith the IC-CAVE centre. One senior academic had a complete collapse last summer. The IC-CAVE centre does not teach significantly on any of the degrees. However, Algoma and Abertay both note the significant input from practitioners into teaching. Both institutions have appointed significant industry people to work with them and both retain a strong relationship with the computer games industry. The lucky appointment of an extremely strong Lecturer in Music, Dr Kenny McAlpine, with a strong mathematical and academic background has secured this area of degree teaching at Abertay.

Applications for the video games courses is very strong. Abertay regularly get 400+ expressions of interest in the BSc CGT, leading to 70 1<sup>st</sup> year entrants qualified at Scottish Higher AABB (inc Mathematics) or better; AAA at A-Level happens regularly as does AAAAA at Higher. The BA CA course attracts 40 slightly less well-qualified students each year. Both courses are in the ten highest recruiting in this small university. Oddly, the MSc CGT at Abertay only attracts about 10 students each year, despite full fee funding for EU students.

However, the Algoma MSc CGT (a jointly-taught version of the Abertay course) is confidently expected to attract up to 1,000 applicants from across the USA for the 40 places starting in September 2003.

These figures hide a high level of student expectation of the course, the staff and of themselves. There has been a significant drop-out rate from the BSc CGT and only a handful have achieved the full MSc CGT. Only 8 students graduated with honours in the first graduation of the BSc CGT degree from an original intake of 42. Of the few students who have transferred into the BSc CGT degree from other degrees (all non-Abertay) none have completed the degree and a significant number of other students leave the BSc CGT each year for other courses and universities. This is probably due, as mentioned above, partly to unrealistic expectations; some incoming students expected to spend four years becoming better games players! However, an amount of this has to be due to institutional and academic naïveté, poor course design (note that there is no mention anywhere in this paper of reference to good or bad practice in course design, which was based purely on teaching and commercial experiences), lack of resources and internal disagreements over course aims and objectives.

There have been significant internal university pressures to compete with. The BSc CGT and BA CA were initially placed in separate divisions (the equivalent of departments in a larger university) for administrative purposes. In-fighting broke out in 1999 over ownership of the programmes that has only now died down in mid-2002 with small bush-fires still evident. The Japanese Studies programme continues and has grown into two part-time staffing positions. Again, the find of teaching staff has been serendipitous, both teachers are native Japanese, married to other Abertay staff. The Computing School refused to host the Japanese Studies stream and handed it over to a reluctant Business Studies School. It is now the biggest foreign language offered at Abertay (in student numbers) and we are hopeful that it will become fully established.

The issue of academic snobbery against video games has now died down in the UK. At a recent meeting of the British Computer Society's Computer Science Research Committee video games was proposed as a central part of the future of Computing Science research, backed by representatives from Imperial College, Stirling, Edinburgh and Birmingham universities. This is being proposed as an area of future EPSRC funding ([http://umbriel.dcs.gla.ac.uk/NeSC/general/esi/events/Grand\\_Challenges/call.html](http://umbriel.dcs.gla.ac.uk/NeSC/general/esi/events/Grand_Challenges/call.html)).

This may solve the second major area of problem we identified in developing these degrees: major UK universities are driven by a long-term research-funded agenda. It is simply not possible for a department rated as 4, 5 or 5\* to decide to enter a new subfield, particularly one that is nascent and that has no readily available academic journals for publication. Older universities deciding to move across into even something as huge as the video games industry risk taking several years – probably 10-15 - to build up staffing and field credibility, a time period when their research rating will probably fall (Abertay's dropped from 3 to 2 to non-submission over the three RAE's, despite the large sums of money and effort expended) and hence status, finance and jobs sacrificed. The RAE system quite simply appears to work against the development and support of new, even highly significant, fields.

Abroad the situation varies. In Canada, Algoma has found strong support, despite being a relatively small institution in a geographically remote part of the country (Northern Ontario.) Like Abertay, it is part of a wider agenda to modernise and gain full university status. Abertay is working with Algoma as part of Abertay's effort to build overseas income streams. In the United States of America, a market for video games and video games development as large as the European Union, it appears that Rochester will become the first establishment to offer a video games degree: a MSc. The anti-video games feeling among USA academics appears to remain total and there appears to be every possibility that this, one of the largest fields in applied computing, will continue to be poorly served by US academia. In Australia there has been a similar story to the rest of the UK; universities such as Queensland University of Technology have begun to offer video games degrees, but without a significant local/national games development industry there must be doubts about the potential size of this academic market. In Japan, the world's largest video games development and retail country, the university system is strongly driven by tradition and forces of elitism; links between industry and academia are few with only very small national universities like Gifu University tentatively offering students some exposure to games development. On the other hand, major developers like Konami and Namco have their own games teaching schools, an almost unique Japanese phenomenon.

Towards Maturity

*Child of the pure unclouded brow  
And dreaming eyes of wonder!  
Though time be fleet, and I and thou  
Are half a life asunder,  
The loving smile will surely hail  
The love-gift of a fairy-tale.*

*Lewis Carroll (1871)*

Creating something completely new involves creating a vision and following it through with an almost religious zeal. Without the ambition and self-belief required to defeat the many obstacles put up to halt progress – inter-departmental rivalries, intra-departmental conflict, resourcing, academic credibility and others – the goal will never be reached. But, what was the goal and what was achieved?

Like the joke in Punch on whether the French Revolution was successful, it's still too early to tell. Some things have clearly happened and are as will be. Other battles were lost. Others are yet to be fought. In the first category, what could be called the mature parts of the programme, the BSc CGT and BA CA degrees have actually settled down as not atypical of other Computing Science or Applied Arts degrees. Indeed, Professor Ron Morrison of the department of Computing Science at the University of St Andrews once commented on the BSc CGT, 'You cheats, that's just a standard Software Engineering degree.' Unfortunately, in many ways it is: lots of hard programming, hard mathematics and software product development. The BA CA, being taught by artists, has become more theoretical than applied with respect to the original design. However, the Japanese Studies and the Audio/Music Studies streams remain significant and wonderfully peculiar.

One major and unexpected success has been student involvement in entrepreneurship. Schemes such as Dare to be Digital [<http://www.interactivetayside.com/dare/>] and Embreonix (<http://www.embreonix.com/>) have seen half a dozen spin-off companies from Abertay students from all video games degrees. Student entrepreneurship has now become a genuine Abertay strength. The games industry is such that even if you ran a business that failed, as most will, this is counted as experience in a California-*esque* industry.

Most of the lost battles are already explained. One area was degree areas discarded where there wasn't seen to be a commercial need, yet other universities have taken on offering these programmes: game level design, game design, interactive entertainment and others. It is easy to offer attractive degrees in coincident areas that have no obvious employment opportunity. An abortive attempt was considered to set up a School of New Media, taking interested staff from all of the other schools at Abertay. This proved to be a short, bloody and well-lost battle with too many internal opponents. It may prove to be ground given up ultimately to the University of Dundee in a relationship between the Duncan of Jordanstone College of Art and the Department of Applied Computing..

Yet, there are battles still to be fought. The idea for a BA (Honours) in Digital Music and Sound continues. But by now we have left the original idea of video games well behind, which is well covered by degrees and research.

## Conclusions

*Thus grew the tale of Wonderland :  
Thus slowly, one by one,  
Its quaint events were hammered out –  
And now the tale is done,  
And home we steer, a merry crew,  
Beneath the setting sun*

*Lewis Carroll (1865)*

There can be little doubt that the creation of a teaching and research area in video games provided a life-saving role for the new-born Abertay and is planned to play a significantly similar function in Algora, as it has also in attracting hundreds of well-qualified students per annum into the other new universities in the UK desperate for cash from student numbers. The dangers in creating a new academic field are so significant that it should not be tried without total support from those in a higher position able to protect the field developers. While the Principal's office, Head of School and industry were completely behind the Abertay initiative it was possible to fight the many serious battles and come out wounded, but generally victorious.

However, once this support erodes, it becomes impossible to achieve anything new. Such are the forces of conformity in acadæmia today. Forces driven by internal division, external respect, personal prestige and, yes, money. The debilitating rôle of the UK Research Assessment Exercise in stopping new academic development is central as is UK acadæmia's reliance on poor contracts and the limited amount of money that currently reaches the chalk-face.

To look at why Abertay has, in general, succeeded in creating a new field it is necessary to look past mere opportunity towards implementation. A set of crucially co-incident circumstances worked together: a new Vice-Chancellor, a qualified staff member with *chutzpah*, existing industry links, historical academic developments, a genuinely probable new field, little internal opposition and no significant external opposition. Be prepared to see unexpected outcomes generated by working in the new field, such as Abertay's entrepreneurship field. Be prepared too to see treasured dreams evaporate in the cold air of academic reality.

For a similar, and more detailed resumé of the pains and pleasures of starting something from new, the authors would recommend Tracy Kidder's (1981), *The Soul of a New Machine*, which details a remarkably parallel process in the creation of the 64-bit processor for Data General's range of computers at the turn of the 1980's.

If asked of Sutherland, 'Would you do it again?' the answer is a clear and definite 'No!' It cost academic credibility, research presence, money, health, career, sanity, almost a marriage and also burned-out some significant working and personal relationships. If asked, 'Do you regret having done it?' the answer is ambiguous. It benefited Abertay as a whole but not the majority of individual staff members concerned, particularly significant senior staff. Like the French Revolution, it was good for the country, but not necessarily for every Frenchman and -woman.

To end on a positive note, as Sellar and Yeatman (1930) put it, it was, on balance, definitely, 'a good thing.'

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