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Reflective Teaching Portfolio

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1 Introduction

This reflective teaching portfolio is a modified version of a portfolio I presented as part of work conducted during my Postgraduate diploma in Training and Education which I have subsequently received with Merit. The portfolio will first discuss my own personal teaching philosophy and my inspiration for its adoption. The next step is to outline my current teaching experience and professional development, discuss what courses I have been involved with, outline my current teaching practice and reflections on my Teaching Experience and Practice.

With an overview of my own personal reflection of my involvement in education, I will then reflect on the current education landscape and the influence of the drivers of higher education on participants, practise and design. This leads to the need to discuss how programme and module design take place as I need to reflect on my shortcomings in this area and what I have learned. My reflection has also shown shortcomings in dealing with Assessment Strategy which will be outlined and have been addressed through this reflection.

Finally, in conclusion I will discuss my over reflections on my professional development, and how I plan to choose my next steps in my continuing professional development.

2 Teaching philosophy and inspiration

When approaching a discussion about my teaching philosophy, I feel I need to express both why I teach and how I teach. First, I would like to approach why I teach. I do not have a story from childhood, nor do I have one teacher who inspired me to emulate them (although I have had some exceptional teachers). I have though, since childhood, liked to find out more about the world, and in particular computers have always been a fascination of mine since I was a child. The idea of how they can magnify and augment ideas translated into code was a concept that came to me easily. I later found specific areas of computer science even more fascinating as I realised how this technology has only begun to change the world, and how much more potential it has to improve the lives of everybody. So with that being said why do I teach?

My first experience of teaching was in 2004 when I started my PhD. I became a

demonstrator in various courses that I had previously undertaken as an undergraduate. Later in this essay I will list my experiences in being involved with multiple courses in different roles from demonstrator to teaching assistant to lecturer.

During my first few years of teaching as primarily a demonstrator I set out to be different to many of the demonstrators who had taught me and took inspiration from the few that actually knew the material before coming to the lab. This decision resulted in me investing more time in teaching than I probably should have if I wanted to finish my PhD quickly. A decision that I do not regret as my work resulted in my former students recommending and telling about part time lecturing posts such as my current post in Griffith College and when many of them subsequently signed up as PhD students they became my colleagues and co-authors for numerous academic papers. The additional time I spent in preparing for my tutorials also helped bring me to the conclusion that I do actually enjoy teaching.

This conclusion was strengthened by the fact that as I progressed in years as a PhD student, I realised that researchers in my field who did not actively teach lost many of their basic skills in computer programming. They may have incredible abilities to see the big picture in a given area but somehow lost the ability to see how small innovations could affect their work. One conference I attended in my first year in the summer of 2005, I watched a researcher make an incorrect claim about his work due to the fact he completely misunderstood the basic underlying hardware of his computer. The room was divided into those researchers who understood the basic mechanics and those who did not. The ones that did quickly looked around at each other and looked to see if another colleague was thinking the same thing. The presenter was to have a 30 minute questions and answers session but not one person in a room filled with 200 computer science researchers put up their hand as half of them were in shock , the others by now knew something was up and did not want say anything in case they looked stupid.

I came to the strong belief that to be a good researcher in a field you must actively teach the basics behind that field and continually develop how you teach the material to reflect advancements in the field. Strangely, that may mean teaching different fundamentals depending on the progress of the field. For instance computing switches from network client models back to stand alone systems every 10 -15 years depending on current technology. At the moment cloud computing is the

current model of network-client, with new advancement in mobile technology and privacy issues in the coming years it will move back to stand alone computing or the cycle may come to the end. Thus teaching material must be seen as dynamic. I would hate to reach a stage when I would see my teaching, as many of my peers appear to see it, as a burden. So I have summed up why I teach but I now need to explain how I teach.

I approach teaching as someone sharing information about a subject that I love. I try my best not to come across as a distant expert who is all knowing. This is important as it can be very intimating for a new student especially in terms of asking questions as they may feel others in the room may have been programming since they were 7 years old. This is a unique aspect of computing where, for the first few years of a course, you can have people who have been coding for 10 years as an amateur, sitting beside someone who is coding for the first time. I do my best to dispel the understandable worries of the newcomers while trying to explain to the programmers that you still need to keep up with the course as they may not fully understand what they have been doing for years. I use the analogy of a builder on a construction site is not automatically a civil engineer, nor is a nurse watching a doctor for years a doctor. They are knowledgeable of course and they have a head start they should use but they must realise it's a head start and not a guarantee. I have seen turtles win more times than hares.

My approach of sharing information and sharing my passion for my subject is reflected in my opinion of experts such as lecturers. You should never be seen as the sole oracle of information. Reflecting on the courses I have taken for the PG diploma I have learnt I naturally teach as a constructivist creating an environment for learning but the classes within the PG diploma were far beyond anything I have ever achieved in my own classroom. My view of expert knowledge is of a people with large knowledge bases around a subject that are amazing to get to talk to and work with as they have insights into areas that are inaccessible otherwise. Experts though can have blind spots that you must forgive and every one of us has them. I am continually surprised meeting amazing figures with my various fields within computer science who have gaps about concepts that I would fail a first year student for not knowing. It's something that humbles me knowing that I more than likely have similar gaps in my knowledge so I do my best to be respectful if I find a gap, hoping that they will do the same for me. It is of

course my hope through research and teaching to achieve that level of ability in my field that people would consider me an expert, although of course technically my PhD says I have that ability already but I feel that is just a really good letter of recommendation from a university saying this guy should probably be listened to when he talks about this area.

To sum up: my teaching philosophy and inspiration is to teach so I can keep my skills updated and I teach as someone who is sharing knowledge hoping to get more people to have passion in my subject which I believe is very quickly changing the world, hopefully creating a better world in the process.

With a discussion of my teaching philosophy complete, next I will discuss and reflect on my professional development.

3 Professional Development

First in this section, I will outline my teaching experience at this time. It was an important task in my opinion as I feel it is a necessary part of my reflection to acknowledge my teaching experiences over the last 9 years, so I hope it is not too indulgent. With my teaching experience outlined, I will then discuss my current teaching practice and sum up this section with a reflection on my Teaching Experience and Practice.

3.1 Teaching Experience

I have been involved in teaching 3rd level courses since 2004. From 2006 on I have been in the role of Lecturer for several courses over 3 separate institutions. The full list of my teaching experience which I will be referring to throughout this portfolio is included in this section. Writing this list has also acted as a crucial point of reflection about my career to date. I have taught on 16 different NFQ certified courses over the last 10 years. Since 2006, 11 of these courses I was the lecturer in charge of the course, I have taught in 7 different modules and in 3 cases I have also been a module leader as the courses were taught simultaneously in two other colleges in Griffth College Limerick and Griffth College Cork at the same time. I have also lectured twice in Ethiopia on two test courses as part of a FETAC CAMARA initiative as FETAC level 5 courses.

The following is a list of 32 different courses that I have been involved with, first though, I define the acronym for each of the teaching institutions I have been involved with.

- UCD - University College Dublin

- ACD - American College Dublin

- GCD - Griffith College Dublin

- Camara - Camara Education limited

The following are all the courses that I have participated in as a teacher

- UCD 2004 COMP30070 Object Oriented Programming **Demonstrator** HEA level 8

- UCD 2004 COMP10190 Introduction to Java (Higher diploma) **Demonstrator** HEA level 9

- UCD 2005 COMP30070 Object Oriented Programming **Teaching Assistant** HEA level 8

- UCD 2006 COMP30020 Computer Graphics **Demonstrator** HEA level 8

- Camara 2006 Introductory to Computing **Lecturer** course not on NFQ level

- ACD 2006 CSC100 Introduction to Computing **Lecturer** HETAC level 8

- ACD 2007 CSC100 Introduction to Computing **Lecturer** HETAC level 8

- UCD 2007 COMP30020 Computer Graphics **Demonstrator** HEA level 8

- UCD 2007 COMP20020 Digital Systems **Teaching Assistant** HEA level 8

- Camara 2007 Introductory Computing **Lecturer** FETAC level 5

- UCD 2007 COMP20010 Data Structures **Demonstrator** HEA level 8

- ACD 2008 CSC100 Introduction to Computing **Lecturer** HETAC level 8

- UCD 2008 COMP20010 Data Structures **Demonstrator** HEA level 8

- UCD 2008 COMP30020 Computer Graphics **Demonstrator** HEA level 8

- UCD 2009 COMP30020 Computer Graphics **Demonstrator** HEA level 8

- UCD 2011 COMP41150 Mobile Application development Android **Teaching Assistant** HEA level 9

- UCD 2012 COMP40620/COMP47120 Mobile Application development Android **Teaching Assistant** HEA level 9

- UCD 2012 COMP3007L Mobile Application development Android **Teaching Assistant** (DL Sri Lanka) HEA level 8

- UCD 2012 COMP30020 Computer Graphics **Demonstrator** HEA level 8

- UCD 2012 COMP40800 Computer Forensics **Demonstrator** HEA level 9

- GCD 2012 CCS-FC Foundations of Computing **Lecturer** Lecturer Springboard HETAC level 7

- GCD 2012(Summer) CCS-FC Foundations of Computing **Lecturer** Springboard HETAC level 7

- GCD 2012 HDC-PDS Programming and Data Structures **Lecturer** HETAC level 8

- GCD 2012 BSCH-CG Computer Graphics **Lecturer** HETAC level 8

- UCD 2012 COMP20010 Data Structures **Demonstrator** HEA level 8 course

- GCD 2012 MSc **Project Coordinator** and supervisor for 3 projects HETAC level 9

- GCD 2012 BCC-SS System Software(repeat course) **Lecturer** HETAC level 8

- GCD 2013 COMP40300 Context Sensitive Service Delivery **Occasional Lecturer to teach on wearable HMD's** HEA level 8 & 9

- GCD 2013 CCS-FC Foundations of Computing **Lecturer** HETAC level 7

- UCD 2013 Mentoring and aiding the supervision of PhD Students **PostDoc** HEA level 10

- GCD 2014 BSCH-CG Computer Graphics **Lecturer** HETAC level 8

- GCD 2014 COMP40300 Context Sensitive Service Delivery **Occasional Lecturer to teach on wearable HMD's** HETAC level 8 & 9

- UCD 2014 COMP30510 Mobile Application Development (Android) **Lecturer** HEA level 9

3.2 Current Teaching Practice

My current teaching practice has involved taking over or being part of existing courses. I have written modules but so far have not being in the position of starting a course from scratch as I will be discussing in the Programme and Module Design section.

From this position I always approach a course in finding out how the material has been presented in the past and attempt to gleam as much institutional knowledge about how the course has been run in the past. In my early years as a demonstrator and teaching assistant in many cases I was now involved with courses I had undertaken as an undergraduate so I was trying to directly improve areas I felt were lacking when I took the courses as a student.

When I have been in the role of lecturer I endeavour to modify the course to suit my teaching style but I do not attempt to start from scratch. I always assumed this was the normal approach but I have found from my colleagues that many find it easier just to redo lecturer notes from the beginning. In this case, I feel energy is wasted on redoing lecture notes that could have been used to examine the courses assessment strategy and labs in general as I feel that this more directly impacts the students in the long term. This view was strengthened by my experience studying assessment strategy which will be discussed later in this essay.

For most courses I attempted to modify or build on the current material and, using Moodle if I find some material not directly useful to myself, I leave it in Moodle as supplementary notes. From the beginning of my time as a lecturer from 2006 on, every course I have used a Moodle page which I show to the students on the first day of class. I find that having a standardised resource like Moodle helps

aid students following the course, and I do take the approach of only releasing the notes on a week by week basis, but once the notes are up they stay online as I wish to build trust with my students. I have seen lecturers remove notes a week before the exam in an attempt to force the students to download them which I feel goes completely against best practise. I find that revealing them week by week does not massively diminish attendance but makes sure the students know at what level they should be at in the course at a given time.

My teaching practise also has now extended to actively facilitating the filming of as many of lectures as possible. I normally aim to teach one topic first before filming, and then film the review of that topic in the follow up lecturer. I find that with every topic I teach I conduct two near identical lectures. A normal 50 minute lecture will be broken down into 25 minutes of review from the last lecture, and 25 minutes of new material. The filming normally thus takes place at the beginning during the review lecture. I also aim to leave a few minutes of time after a lecture to allow students to directly approach me, especially as I am a part time lecturer with no set office hours so it's important that I make time after to address any ongoing issues.

Finally, my current teaching practise also aims to use continuous assessment for up to 60% of the course marks. I still believe, especially for undergraduate courses, that a final exam helps as a summative form of assessment but it should never be an all or nothing component.

3.3   Reflections on my Teaching Experience and Practice

My teaching experience has taking a very traditional route as I have naturally built up my experience from a demonstrator to a teaching assistant and finally to a lecturer role. As I have been involved at every level it has built my confidence in my own abilities. I have learnt and will continue to learn about different teaching strategies. One area which I feel I have made mistakes in the past is in the area of assignments. I believe in the use of continuous assessment in any course I administer, it is the best practise approach but I need to examine the use of formative assignments which is something I have not been using correctly but this will be discussed further in the assessment strategy section of this reflection.

I have found student feedback useful over the years and I have been informed

by all three institutions I have worked for that my feedback has been positive. I found American College Dublin feedback forms the most enlightening as my business and physiology students would not be carrying on in computer science so it was good to see if my approach worked with students not dedicated directly to my field. In general I found that the mature students found my lectures a bit too fast while some of the younger students found them a little bit too slow. On reflection I felt that I had found about the right speed as I had to balance the need of all my students. In terms of inclusiveness I did make sure that the mature students who felt that I was going too fast had the necessary resources to keep up and it influenced me in wanting to make sure my lectures were filmed whenever possible.

Also as part of this reflection essay I had one of my lectures observed; the results are included in Appendix D. Observation Form. For the observation I wanted feedback on how I outlined an upcoming written assignment and how clearly I explained the marking scheme. I also taught some Boolean theorems as part of class.

The feedback from the observation was that I did indeed contextualise the assignment and by using Moodle to present it helped this process. The feedback on my explanation of the theorems for that day was positive but I must remember that text at the back of the room may not be clear. I need to make sure I do not over fill my powerpoint slides with information which is a habit I still need to overcome. One suggestion on the assignment was to use model answers to help student. I am quite resistant to giving out model answers, for personal reasons I got elected to UCD Governing Authority by directly campaigning against them when I was 21, but also now as a lecturer my opinion has not changed. Model answers put the lecturer in a very difficult position as in many cases even in sciences there are many answers that deserve top marks, giving one may limit a students' understanding. I feel one solution which this course uses is giving previous essays as samples. I would not want this essay given out as I feel I have been very frank about my experience teaching which was necessary for me to write in this reflection essay. The next section will cover my reflections on the influence of the drivers of higher education on participants, practice and design.

4   Influence of the drivers of higher education on participants practice and design

In this short section I will reflect on my work studying the influence of the drivers of higher education. The essay I wrote on this subject is included in Appendix A.

The essay discussed the influence of the drivers on programme design and perhaps didn't really discuss enough about its effect on lecturers. My feeling on the developments from the bologna process on has been that the drivers have lead to increasingly standardised roles within teaching at third level. This has lead to improved teaching standards overall, but it has also lead to greater specialisation into pure teaching and pure researching roles. The hope has been that researchers will bring back their research into the classrooms but many researchers are now only willing to teach final year courses so as I explained earlier in this essay, they can lose their perspective on some of the fundamentals of their field.

The credit system has helped standardise courses and allowed much more creative mobility for students. As a lecturer this has not affected my teaching directly, but as a teaching assistant and demonstrator it would lead to situations where students did not really have the correct background to attempt a course and required more support that ultimately resulted in other students overall getting less support. The non-contact hours as part of the credit system does help students, even those naturally academically inclined, to know what is required to gain high marks in a course.

5   Programme and Module Design

The module on Programme and Module design helped me reflect on my previous experiences of writing modules on behalf of American College Dublin. These modules and the course in general did not get accepted when it went up to review by HETAC. Now reflecting on how courses get accredited it makes sense to me why the course was not signed off, and in particular I can now see the deficiencies with my submission in the two modules I wrote for the course. The submissions are included in the Appendix of this document. I have also included my essay on the Influence of the drivers of higher education which includes a sample module

design that does not suffer the same flaws.

5.1 Foundations of Computing

This module design is based on the current Foundations of Computing course and only has a few changes, primarily in the module curriculum section where I stated formally the assessment component of the course to best reflect how it had been changed when I took over as module leader of course. The module descriptor for this course is included in Appendix B.

5.2 BIT courses

These modules are the submissions I made to American College Dublin in their development of a business information technology course The two BIT courses were developed for a proposed Business and IT course to be taught in the college. BIT301 was going to be on IT security and BIT401 would have been on managing Information technology change. I wrote the module descriptions back in 2007. The module descriptor for this course is included in Appendix B.

5.3 Reflections on Programme and Module design

Reflecting on my work on modules design I can now see how why the submission I made were not accepted. The BIT courses lacked a Teaching and Learning Strategy which any reviewer would have noted. I did not understand at the time clearly the difference between intended Module Learning Outcomes and Module Objectives. In my what should have been called Learning outcomes, I used repetitive words as I was not aware at the time of the Bloom's taxonomy [Bloom et al., 1956] and NFQ mappings . EQF and NFQ are discussed further in the essay in the appendix of this document in Appendix A. Crucially in my submission I did not state what a student would need to do in terms of non-contact hours. This would result in a student being unaware of the amount of work necessary to complete a course if they had started it with the bare minimum prerequisites. In hindsight, I did not have the experience necessary to be involved in starting a programme but combining the experience of this failure with my new studies in programme and Module design I feel that I will be ready in future for such a challenge.

With my reflections on Programme and Module design complete, the final section on reflection before my conclusions will be on assessment Strategy.

6   Assessment Strategy

The module on Assessment Strategy aids in clarifying many of my thoughts about Assessment that I have developed over the years as a lecturer, a teaching assistant and a demonstrator. I have always felt the best assessment were ones that students would claim ownership of. My experience in being involved with Computer Graphics courses are a perfect case study. In my Assessment Strategy essay which is attached as Appendix C to this document, I discuss a strategic plan to create an online learning environment which I feel would be best suited to teaching Computer Graphics.

My teaching of computer graphics started with the COMP30020 Computer Graphics course in UCD. This course had been one year old and had replaced the previous computer graphics course in the college, which politely had been referred to as 20 years out of date. I and several members of my lab were asked to be demonstrators after the entire previous set of demonstrators had been fired due to them not been willing to learn new material for the course. Although I had got a 1st class honours in the previous module , I found the new more modern module far more detailed and I took nearly 4 weeks to catch up to a level where I can say I was fully competent to act as a demonstrator. I would act as demonstrator for this course for 5 more years on and off during my PhD. When I took over as lecturer of the Griffith Computer graphics course, I found I needed to replace the Assessment component of the course to be similar to my experiences with UCD.

The Griffith course luckily was not as outdated as the previous problematic UCD course, as many of the previous lecturers had been either industry based or up to speed with Modern developments in the field. The problem with the course was that its assessments did not give the students ownership of their creations. As you can imagine Computer graphics is half a science and half an art form. The whole idea is to teach a student how we can, through clever techniques, trick a user into believing a 3D scene in a way that does not require the real amount of processing to do so. I created a project in three parts for the students to submit. Each part built on the other. At the time I felt this was a formative assessment

but after taking the Assessment Strategy module I now realise that the first two parts were graded so that it was a summative assessment. In the essay included in the appendix C I suggested a series of unlocks, this concept is not entirely new and as the essay references the work of Udacity, which requires specific formative assessment to be complete before a student can progress further. The approach I suggest works differently as it combines the notion of gamification. This involves making the formative assessment a game in which the students can par take to help judge their progress. This formative assessment is not made fully compulsory as its aim is to foster a community as the case study uses the idea of an online graphics course. Overall, I am still very much developing my style of assessment, and unlike my lecturing style it is something that on reflection needs more work to achieve a level I would be satisfied with. Once I reach that level I hope to build upon it as a solid foundation for future development.

7 Conclusions and thoughts on Continuous Professional Development

Primarily my certificate and postgraduate diploma courses on teaching have given me new teaching techniques, reinforced some of my current approaches while making me change certain approaches that in hindsight were not achieving the results I had envisioned. I always feel that when you take any form of CPD that it gives you new tools, and one of my favourite quotes from Abraham Maslow [Maslow, 1966] is that "if all you have is a hammer, everything looks like a nail" emphasises the importance of learning new things otherwise you may just be using an inefficient technique because you do not possess the correct tool. By looking at new tools to help my teaching, I believe I can avoid a static form of teaching which could result in me getting bored teaching a given subject. I have also changed my attitude to how I view continuous professional development. At first I was very much of the opinion that I would only take the certificate because it would be something I would need professionally , now I feel that it will be one of many courses not just in teaching that I will need to take to keep updating my skills throughout my career. The time commitment of completing a post graduate diploma has proven difficult to balance with my duties as researcher and lecturer. When the course is complete,

I plan to take further courses for CPD, but this time building my research skills in different computer programming management techniques like Scrum which is an agile software development framework. These skills will help me in the research components of my career as I begin to manage large numbers of students working on projects I will be either mentoring or supervising. On reflection this course in the long term will primarily affect my attitude to my education, before I would have felt my PhD was my capstone but now I feel it's my foundation, and I will be forever building my skills.

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Appendix A. Influence of the drivers of higher education on participants practice and design

I Abstract

This essay aims to discuss the influences of the drivers of education on programme design. It first gives context to polices developed by the drivers of education and then discusses the effect of European Qualifications Framework (EQF) and Ireland's National Framework of Qualifications (NFQ) on programme design.

II Introduction

There are many drivers of education but this essay will be concentrated on the principal drivers of the European Qualifications Framework (EQF) [EU, 2008] and Ireland's National Framework of Qualifications(NFQ) [NQAI, 2003]. First, within this introduction these principal drivers will identified, the rest of this essay will discuss their influences on programme design as follows. First, the context of their polices will be highlighted. With that context established, their influence can be directly discussed through the use of an example module descriptor.

Internally colleges and other institutions have long driven their own programme design and their own standards , but as education is now seen worldwide as principle driver of economic growth , one of the reasons this happened was the influence of ideas such as Mincer [Mincer, 1974]. Mincer demonstrated the return in investment for an individuals in his study (Caucasian males who were not from farming backgrounds) for every year they spent in education. This and many other pionneers helped influence the now common policy for governments around the world to promote and be involved in the development of education at all levels. Previously governments would have seen their role in providing education for children in primary and then eventually secondary education. After World War 2, this role started to change with the GI bill in 1944 and within Europe the rebuilding after World War 2 lead to s massive increase in education spending . The aftermath of World War 2 directly lead to the creation of the present day European Union and with it a single market throughout Europe. In it is from the perspective of the

single market that the need for a European Qualifications Framework is required. It allows not only mobility for student studying in different European countries but also a common framework to compare qualifications from different countries. The current EQF has its origins in the London 2007 meeting of EU Education ministers as part of the Bologna process [EU, 1999] which started in 1998 [Sorbonne, 1998] . The EQF is now consolidated within the European Higher Education Area under the Budapest-Vienna declaration [EU, 2010].

With the principal drivers of education identified that of the Irish government in the form of NFQ and European Higher Education area in form of EQF, it is now possible to explore the context behind their policies.

III   Context behind the driver's polices

The polices set out by the EQF and NFQ are driven by the need to create a single market for education where standards can compared between different institutions and countries. This essay is is unable to go into a deep analysis of the origins of these polices but can give a brief context for there development.

The concept of trying to create a common language to define different education courses run by different intuitions was pioneered in by the work of Bloom et al [Bloom et al., 1956] in the creation of Bloom's taxonomy which was represented in Bloom's Wheel. This taxonomy broken down teaching objectives to "Knowledge, Comprehension, Application, Analysis, Synthesis, and Evaluation " [Bloom et al., 1956] , it did not deal directly with the nature of intelligence which would be pioneer later by Garnder [Gardner, 1985] as its was as Bloom saw it as an "exchange of test items among faculty at various universities in order to create banks of items, each measuring the same educational objective " [Krathwohl, 2002]. It was "a framework for classifying statements of what we expect or intend students to learn as a result of instruction" [Krathwohl, 2002]. The taxonomy was written with several co-authors, one of which was Krathwohl who later lead the effort to improve upon the original handbook with the handbook 2 [Krathwohl et al., 1964] which expanded upon the affective domain later in 1964 , later he would add to this a concept of "Metacognitive Knowledge" [Krathwohl, 2002] in 2002.

This framework has had a huge influence on the EU when it became a corner

stone of the process of classifying the results of instruction from different institutions from different countries. Even though Blooms's taxonomy, introduced many of the terms that are now used within EQF and NFQ to describe learning outcomes, it was lacking in the describing "know-how and skill" which can be said to represent the concept of a Psychomotor Domain. This work was pioneered by several theorists Dave [Dave, 1975] , Harrow [Harrow, 1972] and Simpson [Simpson, 1971] . Dave was also highly influential as he also pioneer work on the concept of lifelong learning [Dave and Cropley, 1976] which moved the idea that skills could and should be learned continual rather than simple during childhood.

Both EQF and NQF takes aspects of these three domains. In the case of Ireland's NFQ using a 10 level grid to represented a combined taxonomy which is determined by Qualifications(Education and training act) [Oireachtas, 1999] , while the EQF using an 8 level grid. Previously the Bologna used three cycles, first been for primary degrees, second for masters and third for doctoral level. The NFQ is mapped onto the 8 levels [NQAI, 2009] with small changes in terms of ordinary degrees and an additional level for certain Further Education and Training Awards. Most European counties have similar NQF's, most make small modifications with different levels but some like lithuanian have a direct mapping [Laužackas and Tūtlys, 2007].

The final context needed to discuss the policies is concept of Constructive alignment which was pioneered in 1999 by Biggs [Biggs, 1999]. The idea is that modules and overall programmes should be aim to make all students use the higher order learning processes as since higher education has become so crucial and popular, many student will now be in education that may not necessary have the strong academic inclination that previous student groups would naturally have possessed. This is as Biggs puts it simply "common sense" [Biggs, 1999] , but even students with a strong academic inclination can benefit from programmes designed to promote higher order learning processes at their core.

With the context established of how the drivers policies have been generated, there influence on programme design can be now discussed.

IV Influence of the drivers of Education in programme design

In discussing the context of polices of the drivers of education, the influences of Bloom and his fellow education researchers can be seen to directly influence programme design as NFQ has embedded these ideas inside its polices. The 10 level grid used by the NFQ influences the creation of a programme as well as the creation of individual modules. To illustrate this effect this essay has an appendix which includes a module descriptor for a level 6 module on the Foundations of Computing. It has been modified from the original so that it can act as an example for the influences of the drivers.

The three crucial effects that this section will highlighted is how the European Credit Transfer and Accumulation System (ECTS) breaks down the time in which a student should allot to a module, the potential to raise standards indirect through standardisation and influence on the intended Module learning outcomes produced.

IV.I ECTS effects

The creation of ECTS is linked with the notion of a module with set learning outcomes. One of the primary effects of the Bologna process was to force courses to be developed as modules [EU, 1999]. So ECTS before they were implemented created the concept of programme design being that of a series of modules which are link together. Most institutions had a similar course structure to this before Bologna but it formalised this process. So in the act of quantifying the time a student should allot to a module the result has been a large change in how many intuitions design their programmes. Also by limiting the number of ECTS (60) a student can accumulate in a given year, the overall programme structure is thus heavily influenced.

The influence of Bloom and his fellow education researchers can be seen in the idea of student from different institutions being able to take modules in each others institution, this has been applied by the Bologna process to allow for the EU Erasmus programme. Although the ECTS are not linked with different learning domains, they do have the effect of quantifying those aspects internally within a programme. For instance the Module descriptor example is for a 10 credit ECTS

module. Its learning outcomes concentrate on Cognitive and Psychomotor skills, in terms of holistic programme design, the affect domain needs to be address with another module of equal credit weighting. This is achieved by the creation of an "IT in society" module which is not included in the appendix but it is given a 10 credit ECTS weight to balance this requirement. Thus ECTS directly influence effects the scope of a module.

IV.II   Raising Standards

The development of ECTS is most direct effect from EQF but this process also allows comparisons of different modules and programmes. Student mobility between different intuitions has other indirect effects on programme design. By promoting comparisons it also forces institutions to raise their standards and in some cases even improve the students performance. This is not necessary always positive, one example is the debate on 1 ECTS credit representing 20 hours or 30 hours of study. A course may not offer any additional contact hours but could increase its independent work and assignment hours to reflect a higher ECTS hour representation, this would of course not be beneficial and with any quantification comes the risk of become an accounting exercise. The hope is that the influence will increase standards. In the example module used within the appendix , non-contact hours combined are 128 which represents 64 % of the course content. This accounts for 3 hours per week of independent study and 2 hours a week on assignment work. This is an ideal scenario but it does represents a level of work that maybe required if a student did not have a natural academic aptitude. Previously in programme design before the influence of the education researchers that influenced the EQF / NFQ , a natural assumption would be that a student would be studying a subject only if they were academically inclined. This assumption is not made and thus it is more formally stated what is required from the student. This should help all students performance in a course as even those naturally academically inclined will known what is required to gain high marks in a course.

IV.III   Module learning outcomes

The final aspect of the influence of the drivers of education on programme design which this essay will discuss, is the direct effect within Module descriptors.

For each of the learning outcomes a sentence is given to describe that learning outcome will be. The words used may initial appear in some cases to be arbitrary, but they have a crucial effect on the teaching of the module as they reflect the teaching priorities of a module with respect to the Cognitive, Psychomotor and Affective domains whose origins were discussed earlier. Many of the terms are derived from the Bloom's taxonomy, the Bloom's wheel shows [Bloom et al., 1956] how each of these words can be considered at a different level. The example module descriptor in the appendix uses terms like "use" and "apply" representing the fact that this is a level 6 course under the NQF thus students are not necessarily expected to learn higher level outcomes such as in a degree course which would be level 8. That being said though , words like "reason" and "discuss" do suggest that the course is still a higher education course and thus the learning outcomes do reflect a certain higher level that would be above secondary education level. The words used are developed from the strands used by NFQ , Broadly it can be argued that the cognitive domain is represented by the Knowledge strand, Psychomotor domain is represented by the Know-how and Skill strand , and finally affective domain is represented by the Competence Strand.

The terms used to describe the example module lead to a description of a module that be described as one of a cognitive domain and Psychomotor domain, this course is an unusually case as by the nature of computer science these two domains if taught in this way result in an affective domain learning as the action of human apply a computing metaphor can result in them understand the idea of computing in an affect way. This is module is in fact a modified version of a level 8 module taught within the computer science department within Griffith College and in that form the assessment is changed to better the Affect domain.

As can be seen by this final example, the policies of EQF and NQF have been hugely influential in the development of programmes and will continue to do so in the future.

V Conclusion

This essay has demonstrated how both the EHEA and each countries own national frameworks have influenced programme design. It has briefly explored the origin of common framework used to define education outcomes that was pioneer by

Bloom et Al [Bloom et al., 1956] and numerous other education researchers. With the origin of the concepts behind the national framework , an exploration to how this effects a programme was conducted using an example module descriptor. A module was chosen to be used as an example for this essay, it was based on a level 6 certificate course on the Foundations of Computing which is included as an appendix to this essay.

This essay showed that the influence of the drivers can be seen in multiple aspects of the programme design. The three crucial effects highlighted where ECTS which break down in time in which a student should allot to the course , the indirect effects of a common framework that should lead to the raising standards across Europe and finally the influence on Module learning outcomes.

Overall this essay showed how the establishment of a common framework has aided in the reflection of the education task and hopefully the effect of the policies has developed modules and overall programmes that can

> Organise the teaching / learning context so that all students are more likely to use the higher order learning processes which "academic" students use spontaneously. [Biggs, 1999]

A   Foundations of Computing

Intended Module Learning Outcomes Upon successful completion of this module, participants should be able to:

1. Solve simple problems effectively using a selection of algorithmic techniques such as invariants 2. Reason algebraically in a calculational style with Boolean expressions 3. Use concepts and notations of discrete maths to formulate simple models and reason about them by calculation 4. Apply calculational techniques effectively to a selection of problem domains in computing 5. Discuss using vivid examples the underlying ideas of computation, and outline how they can be modelled mathematically 6. Implement programs to solve certain mathematical problems

Module Objectives This module will teach the participant to calculate using discrete structures. These structures form the basis of every computer system. The participant will learn how to represent problems in a mathematical language that allows effective reasoning. The participant will learn how to manipulate these structures so as to generate efficient solutions to these problems. The participant will also learn of the limits of the computer, those problems that the computer needs vast amounts of time to solve, and those problems that current computational models will never be able to solve. The participant will learn of suggested techniques and models that may overcome (or at least reduce) these limits such as randomisation, parallelism, quantum computing, and molecular computing.

Module Curriculum The Curriculum is divided into four parts;

1. Discrete mathematics: modelling and calculations Sets, relations, functions, sequences, bags, numbers, graphs. Algebraic laws. Formulating things using these concepts and notations. Reasoning

(by calculation) about 'models'. Comparing alternative models
by calculation. Structuring large formulas.

Stage	1 of 1
Semester (Semester1/Semester2 if applicable)	1&2
Module Title	FOUNDATIONS OF COMPUTING
Module Number/Reference	CCS-FC
Module Status (Mandatory/Elective)	Mandatory
Module ECTS credit	10
Module NFQ level (only if applicable)	6
Pre-requisite Module Titles	None
Co-requisite Module Titles	None
Is this a capstone module? (Yes or No)	No
List of Module Teaching Personnel	Abraham Campbell

Contact Hours				Non-contact Hours			Total Effort (Hours)
Lecture	Practical	Tutorial	Seminar	Assignment	Placement	Independent work	
48		24		56		72	200

Allocation of Marks (Within the Module)					
	Continuous Assessment	Project	Practical	Final Examination	Total is always 100%
Percentage contribution	60%	40%			100%

Figure 1: Static Scene Marking scheme for Assignment 1

2. Algorithmic Problem Solving Invariants, exploiting symmetry, case studies (e.g. knights and knaves, river crossing, games).

3. Predicate calculus Boolean Algebra Boolean operators, laws, quantification. Extensive exercises in algebraic calculation.

4. Algorithmics Informal but rigorous exploration of notions of algorithm, computational process, program, programming language, programming, specification, correctness, efficiency, unsolvability, intractability, classes P and NP, parallelism, randomization, quantum computing, molecular computing.

Teaching and Learning Strategy Classes are used to explain the concepts, exemplify the techniques, and solve (in workshop style) a series of exercises and problems. The module is centred on a series of worksheets, containing many exercises and problems, which are essential for mastery of the techniques. A good way to prepare for each class is to read the associated notes beforehand and come armed with questions. In addition to classes, you will need to put in at least three hours of study and homework each week.

Reading lists and other learning materials

Primary Reading * Backhouse, R. Algorithmic Problem Solving,

www.cs.nott.ac.uk/ rcb/G51APS/aps.ps, 2008.

Harel, D. Computers Ltd. What They Really Cant Do, Oxford University Press, 2000.

Additional Reading *Dijkstra, E.W. The Manuscripts of Edsger W. Dijkstra, www.cs.utexas.edu/users/EWD/, 2008.

*Feijen, W. H. J. The WF Series, www.mathmeth.com/wf/index.shtml, 2008. Harel, D. Algorithmics: The Spirit of Computing (3rd Edition), Addison-Wesley, 2007. Rosen, K.H. Discrete Maths and its Applications (6th Edition.), McGraw Hill, 2007. *available online

B   BIT301 IT SECURITY

Credits 6

Credit level Stage two

Prerequisites None

Mandatory Yes

Contact hours 40

Academic Year 2008- 2009

Semester Semester 2, January to May

Lecturer Mr. Abey Campbell

Email abey.campbell@ucd.ie

MODULE DESCRIPTION This course is an introduction to computer security. It covers theories and procedures behind computer security, with special attention to risk analysis of security issues related to today IT dependant businesses.

MODULE LEARNING OBJECTIVES We will cover a broad range of topics designed to provide you with an informed knowledge of computer security as well as the necessary tools to assess risks and find solutions to security related problems.

At the end of this class, students will have:

1. Developed a comprehension of the kind of knowledge pertaining to Computer Security.

2. Gained the skills to appraise a company's computer security requirements.

3. Produced an academic essay on a key area of Security under the guidance from the lecturer.

4. Developed Analysis skills required to apply an effective security policy to business.

5. Developed necessary evaluation abilities to support their ongoing learning in the Computer Security field.

TEACHING METHODS Lectures, Assignments in the form of two essays, readings and group discussions, based on various aspects of computer Security. **COURSE OUTLINE**

1. Introduction to Security issues
2. Risk Analysis
3. Security Planning
4. Physical Security
5. User Authentication
6. Program security
7. Viruses and other Malicious Code
8. Threats in Networks
9. Network Security controls
10. Firewalls
11. Economics of Cyber Security
12. Privacy
13. Cryptography

REQUIRED TEXT Charles P. Pfleeger, Shari Lawrenece Pfleeger (2007), Security in Computing , Prentice Hall. **RECOMMEND READING** Clifford Stoll: Cuckoo's Egg: Tracking a Spy through the Maze of Computer Espionage, Pocket Books, ISBN 0-7434-1146-3

Bruce Schneier: Secrets & Lies: Digital Security in a Networked World, ISBN 0-471-25311-1

INTERNET REFERENCES

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http://www.schneier.com/crypto-gram.html
http://www.slashdot.com
http://www.2600.com
http://catless.ncl.ac.uk/Risks/
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Learning Outcomes	Content	Delivery	Assessment
1.	All sections	Lectures, readings and discussions.	Class exercises, assignments, exam and participation.
2.	Sections 2-4,8,11	Lectures, readings and discussions	Assignment through written Essay and exam
3.	All sections	Lectures, readings and discussions.	Assignment through written Essay
4.	Sections 5-10,12,13	Lectures, readings and discussions	Exam and participation.
5.	Sections 1-2,11,12	Lectures, readings and discussions	Assignment through written Essay and exam

Figure 2: LEARNING OUTCOMES MAP

ASSESSMENT/GRADING *Assessment*

The following must be completed satisfactorily by any student undertaking the standard assessment of the course.

Assignment 1 Essay on Security both Physical and Computer related

Assignment 2 Essay on a current security news story in the media discussing how it was managed and what insights can be learned to stop future attacks.

Exam The exam will have five questions in which you must choose three. All questions will be given equal marks and will require essay style answers.

Assessment will take the form of:

Assignment 1 20%

Assignment 2 20%

Attendance & Participation 10%

Final Exam 50%

Total 100%

Grading

Each component of this course will be assessed separately. Students will be graded according to the grading system as outlined in the HETAC Marks and Standards 2001, available at

`http://www.hetac.ie/pdf/hetac_marks_standards_2001.pdf` (page 35).

ACADEMIC DISCIPLINE Refer to the subsection on Academic Discipline in the current ACD catalogue. **ATTENDANCE** Attendance is crucial. In the case of illness, it is the student's responsibility to telephone the college office to notify the lecturer. See academic policies and procedures in the ACD catalogue. Every unexplained absence from class will result in a 1% deduction of the 10% allocated for attendance and participation.

C BIT401 MANAGING INFORMATION TECHNOLOGY CHANGE

Credits 6

Credit level Stage Three

Prerequisites None

Mandatory Yes

Contact hours 40

Academic Year 2009- 2010

Semester Semester 1, September to December

Lecturer Mr. Abey Campbell

Email abey.campbell@ucd.ie

MODULE LEARNING OBJECTIVES We will cover a broad range of topics designed to provide students with an informed knowledge of Information Technology (I.T.) as well as the necessary tools to able to adapt in this changing field.

At the end of this class, students will have:

1. Developed a comprehension of the kind of knowledge pertaining to managing changes in I.T. in an organisation.

2. Gained the skills to appraise a company's evolving I.T. requirements.

3. Produced an I.T. strategy plan for a business under the guidance from the lecturer.

4. Developing the analytical skills required to assess the evolving nature of I.T. and how this can be utilised by an organisation in the future.

5. Developed necessary evaluation abilities to support their ongoing learning in the Information Technology field.

TEACHING METHODS Lectures, Assignments in the form of an essay, small group project, class presentation , readings and group discussions based on various aspects of managing I.T. change.

COURSE OUTLINE

1. History of Information Technology (I.T.) and historical developments.

2. Opportunities and challenges for business as a result of I.T. paradigm shifts.

3. The macro forces and influences of I.T. on business.

4. Using a Technology Roadmap: Planning for future technological development for business.

5. Modern Telecommunication Systems: current and future advances and opportunities in I.T. for an organisation.

6. Introduction to the role of an I.T. department and role of an I.T. manager within an organisation.

7. The changing role and structure of I.T. departments with the advancement in I.T. and the resulting needs for changes in organisational structures and cultures.

8. Managing I.T. change for long term strategic development of an organisation.

9. Assessing I.T. risk management for an organisation with relation to internal and external changes and forces such as ethical and legislative developments.

10. Conducting an I.T. audit of an organisation.

11. Developing an organisation's I.T. strategy, implementing I.T. control systems and policies.

12. Managing I.T. change as an enabling force for employees, management, directors, shareholders and other stakeholders.

13. Measuring I.T. return on investment for an organisation.

Learning Outcomes	Content	Delivery	Assessment
1.	All sections	Lectures, readings and discussions.	Assignments, exam and participation.
2.	Sections 2-13	Lectures, readings and discussions	Group assignment and exam
3.	Sections 8-13	Lectures, readings and discussions.	Group assignment, exam and participation.
4.	Sections 1-5,12,13	Lectures, readings and discussions	Group assignment, exam and participation.
5.	Sections 1-5	Lectures, readings and discussions	Exam and participation

Figure 3: LEARNING OUTCOMES MAP

REQUIRED TEXT Carroll W. Frenzel , John C. Frenzel (2004), Management of Information technology , Thomson Course Technology ISBN 978-0-619-03417-7 **RECOMMEND READING** Kuhn, T.S. The Structure of Scientific Revolutions. Chicago: University of Chicago Press, 1962. ISBN 0-226-45808-3

INTERNET REFERENCES

http://www.tomshardware.co.uk/

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http://www.theregister.co.uk/
http://www.slashdot.com
http://www.2600.com
http://www.foresight.org/nanodot/
http://www.intel.com/products/index.htm
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ASSESSMENT/GRADING *Assessment*

The following must be completed satisfactorily by any student undertaking the standard assessment of the course.

Assignment 1 Essay: On paradigm shifts due to scientific progress and the resulting effects on business.

Assignment 2 Group project: The class will be divided into groups and will make an I.T. strategy for a company. Each I.T. strategy will be submitted as a report and include a presentation to the class.

Exam The exam will have five questions in which you must choose three. All questions will be given equal marks and will require essay style answers.

Assessment will take the form of:

Assignment 1 15%

Assignment 2 25%

Attendance & Participation 10%

Final Exam 50%

Total 100%

Grading

Each component of this course will be assessed separately. Students will be graded according to the grading system as outlined in the HETAC Marks and Standards 2001, available at

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http://www.hetac.ie/pdf/hetac_marks_standards_2001.pdf (page 35).
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ACADEMIC DISCIPLINE Refer to the subsection on Academic Discipline in the current ACD catalogue. **ATTENDANCE** Attendance is crucial. In the case of illness, it is the student's responsibility to telephone the college office to notify the lecturer. See academic policies and procedures in the ACD catalogue. Every unexplained absence from class will result in a 1% deduction of the 10% allocated for attendance and participation.

Appendix C.Assessment Strategy

I Abstract

This essay will outline an assessment strategy for an online module that previously had been taught in a traditional lecture and laboratory style. The goals of this assessment will be discussed for the online course, along with the challenges and opportunities that an online course presents. Using an example course, a formative assessment and summative assessment plan will be presented. Finally a discussion will take place on the potential future of online courses assessment.

II Introduction

With the demand for higher education ever increasing, many courses are being made available as online courses. These online courses are being developed sometimes as freely available courses such as Udacity [Salmon, 2012] or one of the countless other free online courses [Lewin, 2012] or there are ones developed by commercial enterprises. Online learning is not completely new as the concept of distance learning has been pioneered by institutions like the Open University since 1969 but online learning has a crucial difference. Online courses have the potential to meet the insatiable world demand for education as they are relative inexpensive which is why so many can be setup for free. Online courses still have many of the issues that traditional higher level course have such as accreditation, quality and crucial for this essay that of assessment.

This essay targets the specific requirements of an assessment strategy for an online course. This essay will use a modification of the 4th year griffith college graphics course as the basis for discussion. First the goals of this assessment shall be discussed. In the face to face course taught each year, the summative assessment is designed to evaluate

if the students have understood the course work through an examination at the end of the semester and three assignments are given during the term to give them practical knowledge on creating 3D virtual environments. These goals of assessment need to be modified with the additional goal of helping create a community within the course as this is something that will be lacking in an online course. This is crucial as many of the tasks necessary to complete the assignments normally depend not only on the lecturer aiding the students in the laboratory but in peer to peer learning that naturally evolved with the laboratory.

With the goals set for the assessment, the formative assessment will be discussed. This essay will take an approach that the traditional structure of three assignments for the course will not radically change but due to the nature of the online, a potential opportunity to add substantial formative assessment becomes possibly and arguably necessary if the goals of creating a community is part of the assessment strategy. Given that Modern 3D programming is commonly used for the creation of computer games, this formative assignment will be based on the concept of gamification.

With the formative assessment outlined, the summative assignments will be discussed primarily as they do not substantially change, the discussion will take place as to why this is the case and how the new formative assessment will impact on their learning outcomes.

Finally the essay will briefly discuss a potential future assessment strategy that will allow techniques such as group work to be utilised.

III   Goals of Assessments within the course

The courses goals of assessment have been to assess a students ability in both the developing 3D virtual worlds as well as theory of developing 3D graphics. This goal of assessment needs an additional goal of fostering a community, as the students are working online and do not have the shared laboratory environment crucial to develop the necessary skills

in this area. Online learning's first immediate and obvious problem is this lack of a real world class room or lecture hall. An Online course can produce the same learning outcomes using measures like "course projects, grades, and most of the student self-assessment of tasks" [Johnson et al., 2000] as a traditional course if it is organised correctly [Johnson et al., 2000] although student perspectives on the course appear from research to be more positive when the course was taught face to face. Higher education aims to create a learning environment which moves a student from a passive learning in a secondary education environment into an active learner questioning and becoming responsible for their education. Physical buildings are used to create communities to address this goal but potentially online learning could also address this goal as "online material can support active learning in many, also personalised ways and foster more autonomous learning than traditional teaching methods usually do. It is up to us to take profit from combining both ways of teaching" [Beierle and Kern-Isberner, 2012]

One way of fostering this community would be group work, but this approach would not be recommend in the first move to an online course, as group work has "a long list of factors mitigates against teachers taking the risk of exploring the benefits in their own classrooms." [Hargreaves, 2007] but a different approach [Elwood and Klenowski, 2002] in creating a community in which shared practice can take place.

The goal of creating a community is to create a shared practice which will be done by using formative assessments that students must complete but will not be marked towards their final grade.

III.I Formative Assessment

For the formative assessment component of the course, the online nature of the course and submissions can be leveraged. As 3D graphics is a crucial component of modern computer games and most students on the course are very familiar with terminology attached to the gaming, we can use the concept of gamification. Gamification which zicher-

mann et al [Zichermann and Cunningham, 2011] define as "the use of game design elements in non-game contexts" The aspect of gamification which could suit a graphics course would be the idea of unlocking content. Of course the use of the concept of gamification within this context, is that the idea of "fun"[Koster, 2010] must be remembered. The tasks to unlock parts of the course must not only be fun but also easy and not require any previous gaming knowledge. Research has begun to try and adopt gamification to other activities including exercise [Görgü et al., 2010]. The formative assessment will be broken down to 6 assessments/unlocks. Each of summative assessment will have two unlocks, one to gain early access to the assignment page and a second to allow a student to submit that assignment. The changes to formative assessment by gamification aim to change the Students perceptions of assessment as they are not just trying to get marks but also impress others within their peer group. Brown and Hirschfeld state that you must make assignments interesting [Brown and Hirschfeld, 2008]. The unlocks come in two forms one is a team unlock were the students need to work together through forum posts, the other is a personal unlock. In all cases the group unlock will be to get access earlier to the assignments, if they fail to meet the requirements the assignment pages will still be posted but on the normal schedule.

III.I.1 Assignment 1 unlocks

To allow them to view the assignment 1 page, the students as a group will need to post about a 3D graphics technique/art style they like in either games or film to a forum page. Once half the class have posted on the forum then the assignment page will be unlock (set to be viewed by the lecturer).

The next unlock is needed to submit Assignment 1, the students will be given the option to submit a screen shot of their static scene. They are informed at this point that they will need to review two screen shots if they submit their own work or five screen shots if they don't. Once they have submitted or clicked they will not submit then they

unlock the ability to submit the first assignment. This assignment will be accessed formally under the following marking scheme.

III.I.2 Assignment 2 unlocks

The group unlock for the second assignment is past again on a forum post, the students as a group will need to post a unique link to a forum page of a demoscene demo (a 3D virtual animate scene form of Art) after half the class has submitted a link the assignment 2 page will be unlocked.

To unlock the ability to submit their second assignment, each student must mark at least 2 or at least 5 screen shots depending on if they submitted a screen shots for review. The screen shots will be random assigned to the students. The students will give the screen shots a mark. They are asked to to do this using the criteria outlined in the appendix to this essay.

The screen shot competition must be handled correct as you should avoid direct comparison with other students work [Elwood and Klenowski, 2002], but reflect on improvements, they may see other models in other students work and create a dialogue.

III.I.3 Assignment 3 unlocks

The final group unlock will be based on the student posting links to graphics tutorials video online , either on the mathematics behind 3D graphics such as matrix multiplication or techniques like shading or texturing.

To unlock the submission button for the Interactive Scene assignment, the students will have to answer a multiple choice question on matrix multiplication to be allowed submit there assignment. The multiple choice question will be auto generated thus they will have to work it out manually each time. Below is the marking scheme for Assignment 3.

III.II Summative assessment

The primary innovations proposed in this essay are in the formative Assessment area, this is because my experience of teaching in three different colleges has lead me to adopt a practical approach when changing any course. Moving a course online would be major change and allows for the ability to develop the formative assessment mentioned above. At present the course is marked at 30 % for the assignments and 70% for the final exam. In converting to an online course, the summative assessment should be 50 % for the assignments and 50 % for the final exam. Although the assignments are primarily a summative assessment, they do perform a formative role in the students learning and thus giving them a higher weighting in terms of marks demonstrates there importance to the student. As Torrance points out, assessment is a form of learning [Torrance, 2007], by dividing the course in this manner the assessment demonstrates to the student the importance of both the practical and theory side of the course.

As mentioned earlier accreditation and quality are crucial aspects of any course, and to this end the final exam should still be a traditional pen and paper exam at the end of the semester. This does add costs to course and unfortunately defers that cost to the students who must travel to take the assessment. But as Rowe points out "Human-protected traditional paper-and-pencil tests with traditional security procedures should be used for major assessments in distance learning" [Rowe, 2004]. This is the only way that the course will be seen by others as credible and many accreditation bodies make this a requirement.

In terms of the assignments the issue of plagiarism must also be addressed. One must understand that just because a student plagiarises it does not mean that they should be demonised. It is crucial that standards of any course must be maintained as if they do not then the degree will be meaningless. But in dealing with an assessment that has been plagiarised we must except that everybody lies at some point [Ford and Price, 1996] but the reasons will more than likely will be unknown to the lecturer. Rowe [Rowe, 2004] lists points out that the

very nature of the assessment can lead it to be plagiarised. There is a need to "Make the assessment a learning experience. Overly difficult or overly easy tests tend to encourage cheating because the student doesn't see the point, so instructors should avoid them." [Rowe, 2004]

It must also be noted that when using such as system to check online submissions that a student rights must be considered as there assessment are now to be trusted to the lecturer but to the company that uses that assessment. Twomey [Twomey, 2009] sets out best practice in this area in her 2009 article where she states how student must be made aware if there essays are going to be process by a service like Turnitin and give an opt out option. This opt out must be given as [Foster, 2002] [?] the turnitin business model uses student work to check other students thus they are making money from the students copyrighted material. This problem aside, one should as Twomey et al [Twomey et al., 2009] propose "Positive approaches to academic integrity at the university" rather than the lecturer become a judge and jury.

IV Potential future assessment in online courses

One aspect of assessment avoided within this essay was that of group work. Consider the assessment goal of creating a community this becomes the elephant in the room. Group work by its very nature is difficult to assess as you may not be aware of how much each student has contributed to the work. This is beginning to be addressed by the use of collaboration technologies that previously would have only been used within the computer programming field . Collaborative revision control technologies which the most popular would be CVS, Subversion, Git and Mercurial.

Previously these tools where limited to programming but with the move to more standard XML formats for wordpressing documents like words

.Docx format or the OpenDocument standard of .odt, the group could work on a shared document together. Each of their inputs would be recorded so a fair mark could be given to each student. This of course would not take into account students leadership of the group or ideas they contributed but it would give a lecturer a more objective criteria to assess the student along with the taking feedback from each of the students within the group. Probably in the case of the 4th year graphics course it would be possible to make the third assignment into a group project.

V   Conclusion

This essay present a potential assessment strategy for an online course. The assessment strategy was built upon the set goals of the assessment to assess the student ability to understand the course work, to be able to have the necessary skills to develop 3D Virtual environments and to foster a community within the course. The assessment strategy uses the concept of gamification for its formative assessment method where students as a group need to unlock the ability to gain access to an assignment early and then another unlock is needed to gain access to submitting an assignment.

The Summative assessment by taking the more traditional route of requiring a final exam, where the students all physically must present, is important to mitigate against the issues of plagiarism that can emerge in any course but an online courses can be especially vulnerable in this regard.

Finally in the discussion of future potential assessment strategy the argument for bring back elements of group work using advanced collaborative tools like revision control could allow in the future group work to be added to the course to help reinforce the creation of a community and create an environment truly reflective of practice within the real world.

VI   Appendix A:Marking Scheme

VI.I   Assignment 1. Screen Shot Competition and Static Scene

When submitting Assignment 1 the students will be given the option to submit a screen shot of their static scene. They are informed at this point that they will need to review two screen shots if they submit their own work or five screen shots if they don't. Once they have submitted or clicked they will not submit then they unlock the ability to submit the first assignment. This assignment will be accessed formally under the following marking scheme.

Marking Criteria	Complexity of the Scene	Detail of Models	Lighting	Textures	Use of the Scene Graph	Creativity
Criteria weighting to total 100	15	15	15	15	20	20
70-100%	The Scene contains multiple models, each model is positioned in a logical manner and the scene has been contained within either a skybox or suitable indoor environment.	Each of the models is detailed and contain multiple structures	The scene uses multiple directional lights. It also uses an ambient light.	The scene uses multiple textures and the textures aid in making the scene look more detailed than it actually is.	The scene uses a scene graph that creates at least one humanoid body were each of their limbs is a separate branch group.	There is extensive evidence of creativity on the part of the student to create a scene that looks visually entertaining.
60-69%	The scene contains multiple models and each of the models is positioned in a logical manner.	Each of the models is detailed and contains a number of separate structures .	The scene uses a directional light and ambient light.	The scene uses multiple textures.	The scene uses a scene graph and has several branch groups	Evidence of some creativity on behalf of the student and the scene looks somewhat entertaining.
40-59%	The scene contains multiple models.	Each of the models is detailed	The scene uses a simple ambient light.	The scene has at least one texture correctly used.	The scene has a minimal scene graph.	The scene has some element that is visually appealing.
>39%	The scene has only one model or none.	The models within the scene are simple shapes with no detail.	The scene does not use any lighting .	The scene has no use of textures	No scene graph is used in the scene.	The student has demonstrated little or no creativity in the scene,

Figure 4: Static Scene Marking scheme for Assignment 1

44

VI.II   Assignment 2. Animated Scene

To unlock the ability to submit their second assignment each student must mark at least 2 or at least 5 screen shots depending on if they submitted a screen shots for review. The screen shots will be random assigned to the students. The students will give the screen shots a mark. They are asked to do so this using the following following criteria.

Marking Criteria	Complexity	Detail	Lighting	Textures	Scene Graph	Creativity
Weighting 100	15	15	15	15	20	20

The Assignment will be grading using the marking scheme below.

Marking Criteria	Complexity of the Scene	Detail of Models & Use of the Scene Graph	Lighting &Textures	Kinematics	Animation	Creativity
Criteria weighting to total 100	15	15	15	15	20	20
70-100%	The Scene contains multiple models contained within a suitable environment.	Each of the models is detailed and contain multiple structures and uses a scene graph with separate branch groups.	The scene uses multiple directional lights and multiple textures	There is multiple objects moving in a logical manner.	Complex animation in the scene using multiple objects	There is extensive evidence of creativity on the part of the student to create a scene that looks visually entertaining.
60-69%	The scene contains multiple models .	Each of the models is detailed and contains a number of separate structures .	The scene uses a directional light and ambient light which effects a texture	There is at least one object moving in a logical manner.	Complex animation in the scene using at least one object.	Evidence of some creativity on behalf of the student and the scene looks somewhat entertaining.
40-59%	The scene contains multiple models.	Each of the models is detailed	The scene uses a simple ambient light and has at least one texture	Any animation moves in a repetitive manner.	Animation in the scene using at least one object	The scene has some element that is visually appealing.
>39%	The scene has only one model or none.	The models within the scene are simple shapes with no detail.	The scene does not use any lighting.	No logical of any kind motion	No Animation is used in the scene.	The student has demonstrated little or no creativity in the scene,

Figure 5: Animated Scene Marking scheme for Assignment 2

VI.III   Assignment 3. Interactive Scene

To unlock the submission button for the Interactive Scene assignment,
the students will have to answer a multiple choice question on matrix
multiplication to be allowed submit there assignment. The Multiple
choice question will be auto generated thus they will have to work it
out manually each time. Below is the marking scheme for Assignment
3.

Marking Criteria	Complexity of the Scene	Detail of Models & Use of the Scene Graph	Lighting &Textures	Kinematics & Animation	Interaction	Creativity
Criteria weighting to total 100	15	10	10	15	30	20
70-100%	The Scene contains multiple models contained within a suitable environment.	Each of the models is detailed and contain multiple structures and uses a scene graph with separate branch groups	The scene uses multiple directional lights and multiple textures	There is multiple objects moving in a logical manner and the animation is a direct result of the interaction	You can interact in a complex way with the scene and the interaction is intuitive.	There is extensive evidence of creativity on the part of the student to create a scene that looks visually entertaining.
60-69%	The scene contains multiple models .	Each of the models is detailed and contains a number of separate structures	The scene uses a directional light and ambient light which effects a texture	There is at least one object moving in a logical manner and complex animation is used	You can interact in a complex way with the scene	Evidence of some creativity on behalf of the student and the scene looks somewhat entertaining.
40-59%	The scene contains multiple models.	Each of the models is detailed	The scene uses a simple ambient light and has at least one texture	Any animation that moves in a repetitive manner	You can interact with the scene	The scene has some element that is visually appealing.
>39%	The scene has only one model or none.	The models within the scene are simple shapes with no detail	The scene does not use any lighting.	No motion in any logical manner	No way to interact with the scene	The student has demonstrated little or no creativity in the scene,

Figure 6: Interactive Scene Marking scheme for Assignment 3

Appendix D.Observation Form

Part 1: To be completed prior to observation session by the participant
being observed and sent to the observer:

Tutor observing	Fiona O'Riordan
Participant being observed	Abraham Campbell
Module or session title	Foundations of Computing
Venue for observation	V003
Date and time	9.00 am to 9.50 am

1. Session outcome(s):
Outline the written assignment for this semester , (assignment will be due just before the end of term) . Explain the marking scheme of the assignment. Teaching Boolean algebra theorems 0 - 5
2. How will this outcome be assessed (attach copy of assessment brief if you wish):
The assignment is a reflection task for the both semesters The Boolean algebra will be tested in a class test at the end of the semester and in the final exam.
3. Particular areas you would like specific feedback on:
If I explain the assignment clearly and crucial explain the marking scheme in a clear and precise manner. Feedback on how I taught the Boolean algebra theorems to an audience of mixed ability, some only have junior cert level education to some with master's level qualifications. (I had a doctoral student last year in the class)

Part 2: To be completed by the observer after the observation session
and emailed to the participant by the tutor (use this in your porfolio):

4. Alignment (between the outcome and assessment):
Alignment through in-class test and exam.

5. Feedback (per request in point 3 in part 1)

I liked the way you contextualised the assignment in relation to the module,
and indeed the broader Computing Science environment.
It is very good practice to access the resources through Moodle as you do.
This reassures learners regarding Moodle access and navigation.
You might give an example of a topic they might like to discuss in assignment.

You have a lovely natural way of explaining the theoroms. I particularly
like the way you use the 'shape' concepts to demonstrate the mathematical notation
e.g. can just as easily use boxes, cirlcles, triangles for representation.

Be mindful of who is answering your questions re false / true etc. It appeared to be
the same two learners answering all questions. Check in with other
learners to ensure they understand.

You use the projector onto whiteboard very well for constructing the theorems, well
done. A very small point of feedback, perhaps use a very fresh colured marker to
differentiate between the work projected and the development you do on the board.
Your blue marker was quite faded (I do this all the time as I simply forget or don't
realise it, but as a learner mid-way down the class it can make a difference).

6. Advice or guidance of future action:

Maybe put the marking scheme on a powerpoint slide. It was difficult
(in fact impossible)
to read the criteria from where I was sitting - or you might
like to give them a handout.
Equally I would recommend that you put each theorem on a
PowerPoint slide
Some advice a presenter gave at ICEP2012 (more for learners
who do not have English as a first
mark) is to provide a full model answer. Perhaps you
might keep sample good / poor assignments
from this year to share with group next year.
You might like to ask the learner questions regarding each
marking criteria - for example 'what
do you think you might include in order to get good marks
on..' and start to draw up a list of possible inclusions.

You might like to encourage more learner interaction by throwing
some of the questions / recap
explanations back to the learners to share with the rest of
the group e.g.
'if I had true/equivalent/true what would I get' - this was good; more of
this type of questioning and interaction would be useful.
Or you might invite learners up to the board to prove the theorem.

Many thanks Abraham for inviting me into your class.
I certainly learned something about Boolean
algebra theorems, which is quite an achievement for me! So well done.

Fiona O'Riordan
5th February 2013