Implementing an Integrated Web-Based Synchronous eLearning Collaboration Platform at Tertiary Level for Part-Time Mature Evening Students

Author – Audrey Jennings

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Declaration

This work has not been submitted before as an exercise for a degree at this or any other University.

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Summary

This thesis focuses on the lessons learned and new insights gained, from the pilot implementation of a web-based synchronous eLearning collaboration platform at Tertiary Level evaluated on part-time mature evening students.

Over the past ten years, with the advent of the Internet, the convergence of communication and computer technologies has facilitated the development of eLearning models and platforms.

The scope of this research is to explore and evaluate the use of these newly emerging synchronous eLearning technologies in lectures for part-time mature evening students as part of a course at Tertiary Level.

The availability of sufficient base data from projects of this nature is very limited.

A blend of traditional University teaching, pedagogies and strategies coupled with the use of emerging web-based collaboration models and platforms, both synchronous and asynchronous, would appear to offer significant potential for a blended eLearning solution at Institutional, Faculty and Student level.

Through the GENIUS project, this research was afforded the opportunity to put a blended eLearning solution to the test within a traditional University where non-traditional learners engage in continuing professional educational and development, in effect, part-time mature evening students at Trinity College.

The advantages and disadvantages of the approach have been discussed.

A comprehensive literature review and investigation of enabling technologies and currently accepted best practice has been carried out as part of this research.

Lessons learned from the four lecture presentations at the Computer Science Department, at the University of Dublin, Trinity College are detailed. Different perspectives were addressed specifically of Faculty – Management and Administration, Lecturer and Student.

Arising from this research, it is clear that despite stated limitations a blended learning model can be used to address the constituency, but possibly not yet until the effectiveness of the broadband domain.

Acknowledgements

I would like to thank my supervisor, Mr. Alan Mullally, for his support and guidance throughout this project.

I would also like to thank the other members of the GENIUS team – Mr. Dudley Dolan and Ms. Catherine O'Connor for a wonderful eLearning experience.

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1 CHAPTER ONE: INTRODUCTION AND BACKGROUND TO THIS RESEARCH THESIS

1.1 Introduction

In the last ten years technology has dramatically changed how we live and work. If we look at that ten years in particular, the one change that is a key driver and enabler is the availability of Internet technologies to everyone who has access to a computer, a modem and a phone line. Not only have Internet technologies aided globalisation, they have changed our workplace, our methods of communication, how we transact with banks, book holidays, buy products, research products and now they are enabling change in our education systems. Technology, as it has evolved, has enhanced our method of delivery of education.

Now the merging of technologies such as networking capabilities, audio, video, wireless, smaller and more powerful hardware with better software and functionality are pushing educational organisations to provide education using these media and is changing the way the educational institutions compete. The terms globalisation[1], disintermediation[2], customization[3], collaboration[4], competition[5], strategic alliances[6] and added value[7] can all be applied to education and eLearning.

All these terms have been applied to Business Process Reengineering, to eBusiness, to Customer Relationship Management, to Supply Chain Management, to Enterprise Resource Planning, all the Information System initiatives that have been driven by advances in technology. These terms are now being applied in the education and eLearning domain.

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[1] Globalisation – The quality of being global; universality, totality: *spec*. the quality of having worldwide inclusiveness, reach, or relevance; (the potential for) global integration, operation, or influence (esp. in business and financial contexts). Technology has enabled universities to offer their courses outside their local physical location.
[2] Disintermediation – to reduce or eliminate the role of an intermediary. Technology has been an enabler of disintermediation initiatives.
[3] Customization – The action or result of customizing; creation or adaptation (of something) according to customer's requirements. Technology has been an enabler of customization initiatives.
[4] Collaboration – To work in conjunction with another or others, to co-operate. Collaboration between organizations and institutions has been enabled by technology.
[5] Competition – Because of globalisation, disintermediation, customization and collaboration in education, which have in the main been enabled by technology, the way of competing has changed in the education sector.
[6] Strategic alliance – An agreement between two or more individuals or entities stating that the involved parties will act in a certain way in order to achieve a common goal. Strategic alliances usually make sense when the parties involved have complementary strengths. For example in eLearning, the providers of eLearning solutions work with the universities to develop strategic solutions.
[7] Added Value – how technology can be an enabler in adding value to a process. In this case the delivery mechanism in education and eLearning.

eLearning has many definitions, as well as many different ways of using the term – ELearning, E-Learning, eLearning, elearning. I will put forward one definition at this stage. Some more will be discussed in the Literature Review.

E-learning (electronic learning): Term covering a wide set of applications and processes, such as Web-based learning, computer-based learning, virtual classrooms, and digital collaboration. It includes the delivery of content via Internet, intranet/extranet (LAN[8]/WAN[9]), audio- and videotape, satellite broadcast, interactive Televison, CD-ROM[10], DVD[11] and more.
http://www.learningcircuits.org/glossary.html#E

Other terms used in the eLearning arena, are that of blended learning, hybrid learning and distance learning/education. We need to define some terms at this stage:

Blended Learning: Learning events that combine aspects of online and face-to-face instruction. In effect this thesis describes the implementation of a blended learning environment, with the emphasis on implementing and evaluating the online experience that took place under the GENIUS project.

Hybrid Learning: is the name commonly used to describe courses that combine face-to-face classroom instruction with computer-based learning. Hybrid courses move a significant part of course learning online and, as a result, reduce the amount of classroom seat time. (http://www.uwm.edu/Dept/LTC/hybrid/)

Distance learning: The desired outcome of distance education. The two terms are often used interchangeably.
Distance education: Educational situation in which the instructor and students are separated by time, location, or both. Education or training courses are delivered to remote locations via synchronous or asynchronous means of instruction, including written correspondence, text, graphics, audio- and videotape, CD-ROM, DVD, online learning, audio- and videoconferencing, interactive TV and FAX. Distance education does not preclude the use of the traditional classroom. The definition of distance education is broader than and entails the definition of eLearning. (All the above definitions are taken from http://www.learningcircuits.org/glossary.html#E)

[8] LAN – A Local Area Network is a group of computers and associated devices that share a common communications line or wireless link and typically share the resources of a single processor or server within a small geographic area (for example, within an office building)
[9] WAN – A Wide Area Network is a geographically dispersed telecommunications network. The term distinguishes a broader telecommunication structure from a LAN. A wide area network may be privately owned or rented, but the term usually connotes the inclusion of public (shared user) networks.
[10] CD-ROM – Compact Disc, read-only memory
[11] DVD – Digital Video Disc, Digital Versatile Disc

New challenges continue for the providers of education and also for the students, the learners. The ways in which people learn are changing and the need for learning is changing. There is a need for lifelong learning in an adaptive flexible environment. Educational organisations must respond in a cost efficient and effective fashion.

The need for change is recognised at government level and at EU level. The Irish Government acknowledged the need for change in the education system in 1998, in particular primary education, when they established the National Centre for Technology in Education (NCTE), under the auspices of the Department of Education and Science. The NCTE (www.ncte.ie) is hosted by the Dublin City University. As the Government's agency on the use of information ad communications technology (ICT) in education it plays a central role in helping to maximise the benefits for learners and teachers in using ICT. The recognition of "the need to integrate technology into teaching and learning right across the curriculum" is acknowledged. The Higher Education Authority (HEA) are also pursuing other initiatives with a major focus on access for all (www.hea.ie).

The EU has also recognised this and through its Directorate for Education and Culture (http://europa.eu.int/comm/education/programmes/elearning/index_en.html) and the Directorate for the Information Society considerable funding and resources are applied to research and advancement in this area.

The Lisbon European Council of March 2000 set the ambitious goal for Europe to become " …the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion" by the year 2010. It also called for the modernisation of Europe's education and training systems.
(http://europa.eu.int/comm/dgs/education_culture/evalreports/education/2002/elearn_xant/elearnxant_en.pdf)

The EU eLearning initiative, part of the comprehensive 'eEurope 2005 Action Plan An Information Society for all'
(http://europa.eu.int/information_society/eeurope/2005.all_about/action_plan/text_en.htm), aims to enhance the use of new multimedia technologies and the Internet to improve the quality of learning by facilitating access to resources and services as well as remote exchanges and collaboration.

In a recent survey (Students perceptions of the use of ICT in university learning and teaching available at http://www.spotplus.odl.org/downloads/Survey_report_final.pdf) carried out as part of the SPOT+ project (Students' perspective on technology in teaching and learning in European universities (http://www.spotplus.odl.org/) funded by the DG for Education and Culture of the European Commission), 2,000 students from

12 different universities in Europe surveyed were interested in the use of Information and Communication Technologies (ICT), defined as audio-visuals, computer programs and Internet, for information exchange, but expressed a stronger preference for traditional education methods. Just over half the respondents were 21 - 25 years old, and 30% were 16 – 20 years old. All respondents were students at rather similar universities of an older and research-oriented type which largely recruit directly from schools, a very much undergraduate population.

The following is a summary of the students perceptions of ICT relevance for University studies.

"The 12,000 students surveyed in SPOT+ Project were interested in the use of ICT for information exchange, but expressed a stronger preference for traditional education methods.

The opinions and views of students about ICT were analysed by the SPOT Plus Project developed by a consortia of 7 institutions. The project adopted a bottom up approach focused on students' perspectives on the role of ICT for Higher Education curricula, providing an insight into learners' perceptions. The Survey reached some 2,000 students in 12 European Universities.

Students pointed out some views that allow a further reflection and thoughts. In the following lines we've summarized just some of them, as can be consulted in the SPOT+ Survey final Report.

ICT versus traditional methods

University students in SPOT+ sample held a fairly positive view of the different advantages that ICT can bring to learning and education. However, this positive view of ICT was accompanied by a rather positive attitude towards learning with traditional education methods. A closer inspection of the answers on the individual questions reveals that university students were especially interested in the use of ICT for purposes of information exchange, such as ' to ask questions of experts and relevant people no matter where they are' and ' to share information and ideas with people who have similar interests'. With respect to explicit learning purposes the students expressed a stronger preference for traditional education methods (defined as printed text and a classroom setting) than for ICT-based methods. If ICT is to be used in an educational context, students specifically expressed doubts about the quality of the human interaction when there is no face-to-face contact. Also the item 'working on a learning task with people from different countries' was less preferred by these students though still viewed positively.

Perceptions about the Opportunities offered by use of ICT

Students attached importance to all the opportunities that were offered. Students especially supported the opportunities of ICT 'to find out about higher education institutions in their own and other countries before going there to study' and ' to widen the range of sources and knowledge available to students'. This is consistent with other results in which it was found that students especially wanted to use ICT for information exchange.

Students with positive views of the advantages ICT can bring to education were also positively disposed towards its use to facilitate information exchanges. University students were also positive about the use of ICT ' to promote access to higher education' and to ' change the learning process and learning outcomes'.

With respect to the last item, students thought it important to use ICT in order to ' develop employability skills such as teamwork, problem solving, self-learning capability, presentation skills, etc.'. However, they attributed less importance to use of ICT in order to ' develop a more collaborative and less individual approach to

learning'.

The following bullet points propose reflections and critical issues suggested by students, or directly emerging from the survey conducted. These questions are likely to be on the innovative agendas of Universities in the years to come:

- *Students' needs must be considered*
  There is a clear need to take into account students' instances, needs and requests, and expectations in order to design and implement innovative ICT based solutions, be it fully online or blended.
- *Blended is better*
  Blended systems are recognised by respondents - regardless of their age category and domain of study - as the most effective, as the present results of the SPOT Plus survey show. It should be kept in mind that "pure virtuality" may not represent the unique solution for traditional university internationalisation and modernisation processes.
- *Using technology adapted to evolving needs*
  Formative (or user-led) design may represent a valid tool in order to meet students' needs, which should be collected regularly in order to provide them with the most suitable, and most acceptable, technological provisions. In this regard, teaching staff should also be involved in this open and concerted process.
- *Pedagogical approaches should be revised*
  There is a need for coherence between virtual learning environments and existing pedagogical methodologies. Juxtaposition of approaches has proved not to be the right solution. A real integration of methodologies, contents and didactical services should occur, so to provide students with a consistent set of curricular opportunities. Such revision of pedagogical approaches implies the full involvement of teaching staff, as well as of university administrative and managerial bodies, in the attempt to enrich traditional universities with the potential offered by ICT. In any case, traditional institutes should not lose their identity by unthinking use of ICT (ie they should not become "open universities" unless they choose explicitly to do so).
- *Adopting advanced, easy-to access, and user-friendly ICT applications and interfaces.*
  Students participating in the SPOT Plus survey expressed eagerness to use technology as an additional tool smoothing their learning efforts. Portals, interactive websites, communication facilities, online databases should be designed in a way so to facilitate learning processes, and add a real value to the experience of students, without posing problems of usability and accessibility.
- *Support services are indispensable*
  There is a need to set up dedicated support services, providing for guidance and counselling. Students should not be left alone in the use of ICT for learning purposes, otherwise they might encounter difficulties in making sense out of what they have been learning. Guidance and support services would possibly also help students feel part of a "learning community" and overcome possible feelings of isolation. This condition holds particularly true when ICT is introduced in traditional universities, where students are used to face-to-face interaction with teachers, tutors, and administrative staff.
- *Taking into account local and cultural specificities*
  In internationalisation processes, universities' distinctive identity (especially in terms of research traditions) should be preserved as a shared and valuable heritage. At the same time, curricula should be projected on a wider scale, abandoning provincialism and embracing the opportunities offered by academic exchanges and collaborations. In these regards, the impact at cultural level (on students, teachers, tutors and administrative staff) may be of great magnitude and need to be managed with care and vision". available at http://www.elearningeuropa.info/index.php?page=doc&doc_id=5990&doclng=6&menuzone=1

The survey results as summarised above were released on the 25th January 2005. What is of interest is the similarity with some of the findings as will be outlined in this

research project. It must be noted that this research projects' focus is on part-time mature evening students attending a traditional university.

1.2 Background to this Research initiative

Early into this research initiative the Researcher was informed of an upcoming project being undertaken by the Applied Information Systems Group[12] (AISG) within the Computer Science Department, Trinity College. It was decided to link this research into the activities of that project and use the project as the platform for this research. Because of the nature and drivers of the project some limitations were encountered. These will be identified where relevant.

1.3 Focus of Thesis

This research initiative focuses on the impact of online synchronous learning using a web-based collaborative platform on part-time mature evening students at First Cycle Degree (FCD) level.
Online Synchronous learning can be defined as: A real-time, instructor-led online learning event in which all participants are logged on at the same time and communicate directly with each other. In this virtual classroom setting, the instructor maintains control of the class, with the ability to "call on" participants. In most platforms, students and teachers can use a whiteboard to see work in progress and share knowledge. Interaction may also occur via audio- or videoconferencing, Internet telephony, or two-way live broadcasts. (www.learningcircuits.org)

Online Synchronous eLearning is the key differentiator in this research.

Asynchronous learning can be defined as: Learning in which interaction between instructors and students occurs intermittently with a time delay. Examples are self-paced courses taken via the Internet, CD-ROM or DVD, Q & A mentoring, online discussion groups, and email. (www.learningcircuits.org)
These two definitions will be discussed in detail later in Chapter three.

The research sample can be defined, briefly at this point and for this research, as mature students, working full-time and attending university part-time in the evenings. First Cycle Degree can be defined as a student's first Degree at Bachelor level.

[12] AISG – Application Information Systems Group, a research group based in the Computer Science Department of Trinity College, Dublin. The research focus is Information Systems.

1.4 The Focus of this Research

This particular work evaluates synchronous eLearning technology implementation and its impact on education with a particular group of people – part-time mature evening students. The interest in this combination was stimulated by its relevance to the researcher, now working in academia and also having been a part-time mature evening student.

This thesis does not focus on other forms of Distance learning such as asynchronous elearning platforms. Its primary focus is that of online synchronous learning. All the definitions as given to date will be discussed in detail in Chapter Three.

There seems to be a lack of research material in the area of web-based online synchronous delivery of learning to part-time mature evening students partaking in a traditional degree program in a traditional university, such as Trinity College. "*Considering the massive adoption of e-learning, what is surprising and cause for concern, is that we know so little about the use of this medium to facilitate learning (Gilbert, 2000). To date, published research and guides consist of innumerable case studies and personal descriptions and prescriptions but little in the way of rigorous, research-based constructs that lead to an in-depth understanding of e-learning in higher education."(Garrison and Anderson)*

The researcher was interested in investigating the use of such an eLearning environment and evaluating the impact on Faculty, Lecturer and Students.

1.5 Contribution to Research

This work will contribute to research in the area of Part-time mature evening students and their participation in a web-based online synchronous delivery of a series of lectures at third level.

Within Trinity College, the AISG in the Computer Science department are also very keen to review the evaluation. They intend to base their decisions on the future delivery of course modules in an online environment on the outcome and evaluation of the GENIUS project as identified in this thesis.

1.6 Structure of Document

This thesis will outline the implementation of an Integrated Web-Based Synchronous eLearning collaboration platform for Part-time mature evening students at Trinity College. It will also present the evaluation process and results. This chapter has introduced and outlined the background to this thesis and the domains it depends on.

Chapter Two, The Research Project environment, will outline in detail the GENIUS project and identify the focus at Trinity College in participating in the project. It will also identify the functionality and capabilities of the LearnLinc product, the technology used to implement the GENIUS project requirements. It will also discuss the environment at Trinity College. These three areas will 'set the scene' and present the environment for this research thesis.

Chapters Three and Four encompass the Literature Review. Chapter Three, The evolution of eLearning, will trace the evolution of eLearning techniques and technologies. This will be supported by the relevant literature. It will examine how education has evolved and the enabling role of technology. Chapter Four, focuses on social, administrative and management issues as identified in the literature as needing specific attention in implementing and supporting an eLearning initiative.

Chapter Five, The Methodology, will describe the methodology used in the research project, why it was used and the methods of data collection and data collation which were used to support it. The types of data analysis and mode of data presentation are also described.

Chapter Six, TCD GENIUS Project, will outline the response to the challenge, the design and implementation of the project, the background, the exploration, the evaluation of ICT, the administration requirements of such a project and the impact on different areas within a university environment such as academic management – technical and operational, teaching and students.

Chapters Seven and Eight will present the results from the Trinity College experiment. This is broken down into four key factors that were identified – Operational, Pedagogical, Support and Social. Chapter Seven will present the quantitative results and Chapter Eight will present the qualitative results. The results for each of these factors will be presented based on the evaluation methodology as outlined in Chapter Five.

Chapter Nine will put forward the conclusions from this research, focusing on Faculty, Lecturer and Student.

1.7 Summary

This chapter outlined briefly the background to this research thesis, the domains it will focus on, and the structure of the document.

Figure 1-1 Outline of Thesis

Chapter 1 **Introduction and Background to this Research Thesis**
Chapter 2 **The Research Project Environment: The GENIUS Project, The LearnLinc Technology and Trinity College, Dublin**
Chapter 3 **The Literature Review: The Evolution of eLearning**
Chapter 4 **The Literature Review: Social, Administrative and Management issues**
Chapter 5 **The Methodology**
Chapter 6 **The Implementation of the GENIUS Project at Trinity College**
Chapter 7 **Quantitative Results at Trinity College, Dublin**
Chapter **8** **Qualitative Results at Trinity College, Dublin**
Chapter 9 **Summary and Conclusions**

2 CHAPTER TWO: THE RESEARCH PROJECT ENVIRONMENT: THE GENIUS PROJECT, THE LEARNLINC TECHNOLOGY AND TRINITY COLLEGE, DUBLIN

2.1 Introduction

This chapter will set out the environment that this research thesis emanated from. It will identify the role and contribution the GENIUS project made to this thesis and it will also identify the constraints of research in being linked to a particular project. It will outline the background to the GENIUS project, the different players, domains and their roles and contributions and the technology. It will also describe the LearnLinc product, identify its functionality and capabilities. It will also set out the responsibilities of the AISG, Trinity College in the GENIUS Project. In chapter three, the Literature Review, the evolution of the eLearning, eLearning technologies and theories will be identified, defined and supported.

2.2 The GENIUS Project

The GENIUS project is a EU supported project within the Directorate General for Education and Culture (DG EAC) of the European Commission. The GENIUS project emerged from within the Career Space Consortium. It gained support and funding from the DG EAC.

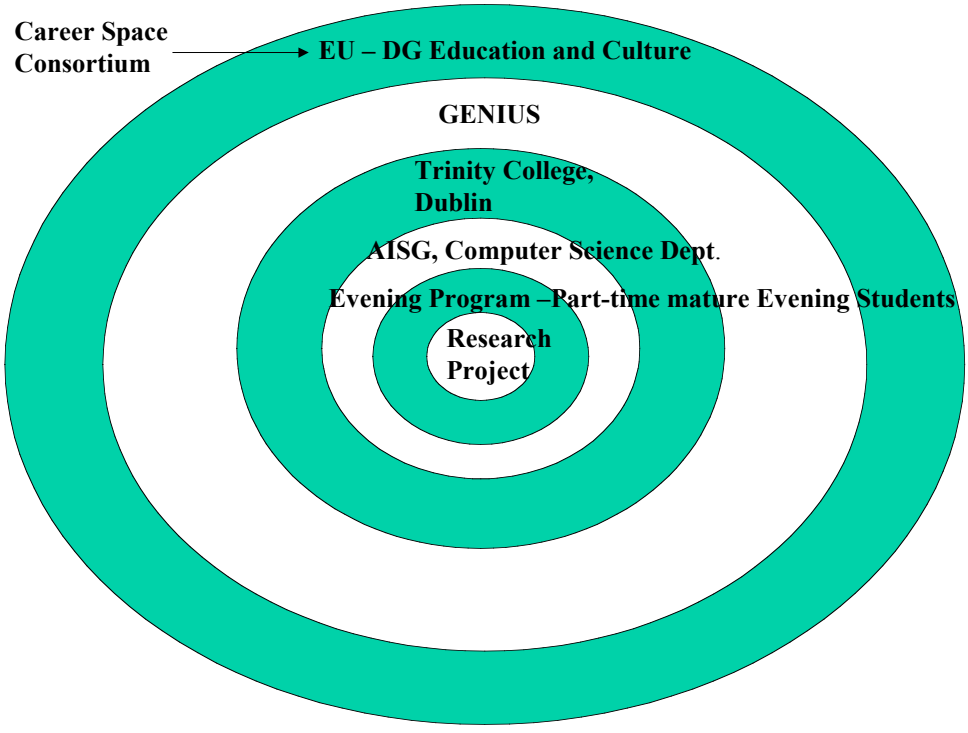


Figure 2-1 – The Environment of this Research Thesis: The GENIUS Project

This was the remit of the AISG at Trinity College as a partner in the EU funded GENIUS project: Generic ELearning Environments and Paradigms of the New Pan-European Information and Communication Technologies Curricula.

2.3 GENIUS Project as a vehicle for this research

The GENIUS project provided the vehicle and platform for an Exploratory Research approach for this thesis.

In expanding the niche foci of this thesis the following domains will be outlined and explored as part of the research work:

- The background to the GENIUS project
- The evolution of education and the changes that face educational organisations
- The evolutionary role of technology as an enabler for Distance Learning and eLearning
    - Different types of eLearning and eLearning technologies
- Blended Learning
- LearnLinc – a technology enabling online synchronous delivery
- Trinity College
    - Computer Science Department
        - Academic –
            - The Student
            - The Lecturer
        - Administrative - Support
- Part-time Mature Evening Students
- Implementation of the GENIUS project and
- Evaluation of the GENIUS project to provide the resources and results for this thesis

2.4 The Career Space Consortium

Career Space is a flagship public-private partnership, which was established with the objective of addressing the ICT skills shortage in Europe through the identification of generic skill profiles to which the higher education curricula can be aligned. It is a cornerstone in the ELearning action plan as identified and supported by the European Commission. The partners in Career Space are nine major ICT companies, (BT, Cisco Systems, IBM Europe, Intel, Microsoft Europe, Nokia, Philips Semiconductors, Siemens AG, Thales), and EICTA, the European Information, Communications and Consumer Electronics Industry Technology Association. *http://www.career-space.com*

2.5 The GENIUS Consortium

Arising from the above developments a number of Universities involved in the development of the Curriculum Guidelines formed a partnership to experiment with these new guidelines and use new technological means for their delivery. This partnership launched the GENIUS project: Generic ELearning Environments and Paradigms of the New Pan-European Information and Communication Technologies Curricula.

Table 1 - The Partners in GENIUS

Academic Partners	Industry Partners
University of Reading, UK	e-Skills NTO, UK
University of York, UK	ICEL, Belgium
Trinity College, Dublin, Ireland	Intel, Ireland
University of Thessaloniki, Greece	IBM, UK and Europe
University of Carlos III Madrid, Spain	BT, UK
INESC Porto, Portugal	Philips Semiconductors, UK
University of Ulm, Germany	
University Claude Bernard LYON 1, France	
University of Linkoping, Sweden	

2.6 Industry Contribution to GENIUS

The companies involved in the project, IBM, Intel, BT and Philips Semiconductors, have substantial experience in corporate eLearning and software environments for eLearning. IBM contributed with its Learning Spaces and 'Domino' software. BT, through Support IT, contributed with their 'LearnLinc' system (now owned by iLinc Communications), the first version of which was deployed in 1994 and has the longest track record with the most customer experience of any company in the live online learning market offering white board, audio and videoconferencing, streaming video and extensive administrative functions. Intel contributed with their advanced prototype eLearning Platform, eCDS, which offers innovative and efficient mechanisms for distributing rich multimedia content, addressing many of the concerns associated with network bandwidth availability. This capability has been successfully piloted internally within Intel over the past year.

2.7 GENIUS Framework

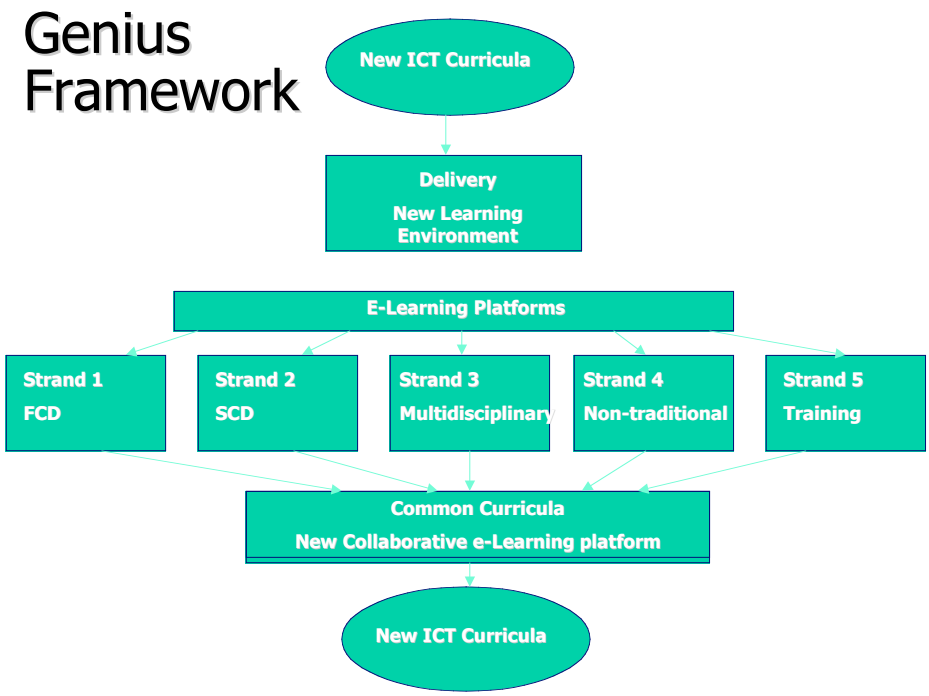


Figure 2-2 – The underlying GENIUS Framework

The GENIUS Framework as depicted in Figure 2-2 identifies the niche focus for this research.

The focus for the AISG in the Computer Science department at Trinity College was Strand 4 Non-traditional learners. Trinity College is a traditional University[13], which has the largest department of Computer Science in Ireland. In addition Trinity has focused on non-traditional learners (part-time mature evening students) in the IT area since 1967.

The other Strands, 1, 2, 3 & 5 were the domains of the other partners in the GENIUS consortium.

[13] Traditional Universities – The purpose of these universities was to carry out teaching and research. Some common features in traditional universities are: that the majority of staff in the traditional universities will actively be involved in carrying out research as well as teaching, a larger portion of the academic staff will have a PhD qualification compared to new universities and a higher proportion of academic staff may be career academics with little or no work experience in industry or commerce. Many of the staff will, however, be carrying out research or consultancy work for industry. (http://www.britishhighereducation.com/British_Education/03Types_of_Universites.asp) Also, in a traditional university lectures are delivered in a lecture hall scenario. Non-Traditional Universities – are for-profit, adult-centered universities; distance education, technology-based universities; corporate universities; university-industry strategic alliances; degree/certification competency-based universities and global multinational universities. (http://www.backingaustrailiasfuture.gov.au/submissions/issues_sub/pdf/i372.pdf)

The reason the focus is on all these five strands is that they correspond to the main groups of learners, i.e. traditional and non-traditional students. In order to narrow the skills gap a wide coverage of learners is required. If we consider US statistics[14], it is expected a 20% rise in enrolments of all students under 25 years and an increase of 4% in the number of 25s, and over, by 2007. The situation in Europe is similar as put forward by the EU. This shows that the number of traditional students is not a minority at all. On the other hand the group of non-traditional students (place bound, part-time, mature (or young and place bound) is significant: 25% of all undergraduate students of graduate students being part–time.

"*In Ireland, the 2001 Report of the Action Group on Access to Higher Education recommended percentage-based targets for 2003 and 2006 for three of the under-represented groups in higher education, one of which is the 'Participation in higher education by mature students'. Recent Higher Education Authority (HEA) and Department of Education and Science data on mature student participation show that, currently, approximately 10% of full-time entrants to higher education were over twenty-three years of age. Comprehensive data for part-time students is not available. The new HEA database will provide more comprehensive data on part-time and full-time mature student participation towards the end of 2004, and from these and other sources, the National Office will review the 2006 targets of 10% of full-time students and 30% of full-time and part-time combined and set national and institutional targets to the end of 2007".* (From the National Action Plan 2005 - 2007 available at http://www.hea.ie/index.cfm/page/sub/id/672)

The original document as received by the AISG at TCD, specifying the GENIUS Project - 'ANNEX 3 – Detailed Description of the project' is attached in APPENDIX A - GENIUS. This document outlines fully the types of activities, objectives, investigation, collaboration, validation and dissemination as required for all the partners in the GENIUS project.

In summary the Project consisted of the following main stages:

1. Detailed curriculum content development based on the Career Space curriculum guidelines for Higher Education
2. Formulation of the new pedagogical and content delivery paradigms
3. Experimenting with Blending the content with the existing and emerging learning environments
4. Testing and evaluating the approaches.
5. Disseminating the findings.

[14] Teaching at an Internet Distance: the Pedagogy of Online Teaching and Learning , Report, 2000 (www.vpaa.uillinois.edu/tid/report/tid_report.html)

The partners in the GENIUS project drew up a work plan. This identified the specific niche foci for all the partners. As outlined, Trinity College had a particular focus and identifiable deliverables within that work plan.

2.8 The LearnLinc Technology

As part of the GENIUS consortium, BT, through Support IT, an Industry partner in the project, provided to the project their product LearnLinc. We had to use LearnLinc under the terms of the GENIUS project. LearnLinc is now owned by iLinc Communications.

LearnLinc (www.ilinc.com), the first TCP/IP-based virtual classroom software, is credited with launching the industry in 1994. While we did not have a choice in the selection process of the technology to be used, LearnLinc has been the chosen platform for many universities, especially in the USA, Canada and Australia, where synchronous eLearning is more prevalent. Universities using LearnLinc include Kent State University, Athabasca University, Brandon University, in Brandon, the University of Manitoba, in Winnipeg and the University of Winnipeg.
LearnLinc (see Appendix B) belongs to the family of Virtual Learning environments or synchronous eLearning products. Other products include Centra, Interwise, HorizonLive, Lotus Learning Space, TopClass, FirstClass.

2.8.1 The LearnLinc Environment

LearnLinc provides users with expanded accessibility, enhanced collaboration, and sophisticated classroom management. As the standard for instructor-led online learning, LearnLinc software is fully deployed at more Global 2000 corporations and universities than any other solution. LearnLinc, combined with LearnLinc's best of breed partner solutions, delivers a robust total learning system to train thousands of employees across the enterprise.

The LearnLinc platform, at present, offers a limited Learning Management System, (LMS) but a wide range of tools for delivering and supporting online learning. As outlined in the above statement ‘combined with LearnLinc’s best of breed partner solutions….’, LearnLinc will be able to provide a comprehensive eLearning environment with a Learning Content management System, (LCMS) for example LearnXact from Giunti Interactive Labs, and it also can be embedded in a portal type facility with products like WebCT to give a complete LMS environment. This is where the role of standards are important, standards for communication, networking, learning objects etc..

See Appendix B - LearnLinc - for full details of the LearnLinc product components and functions

LearnLinc gives two separate environments, the virtual campus and the virtual classroom.

The virtual campus is modeled on a physical college campus in that it provides administrative functions with registration of students for courses, course creation, class creation, adding of course materials and assigning lecturers to lectures.

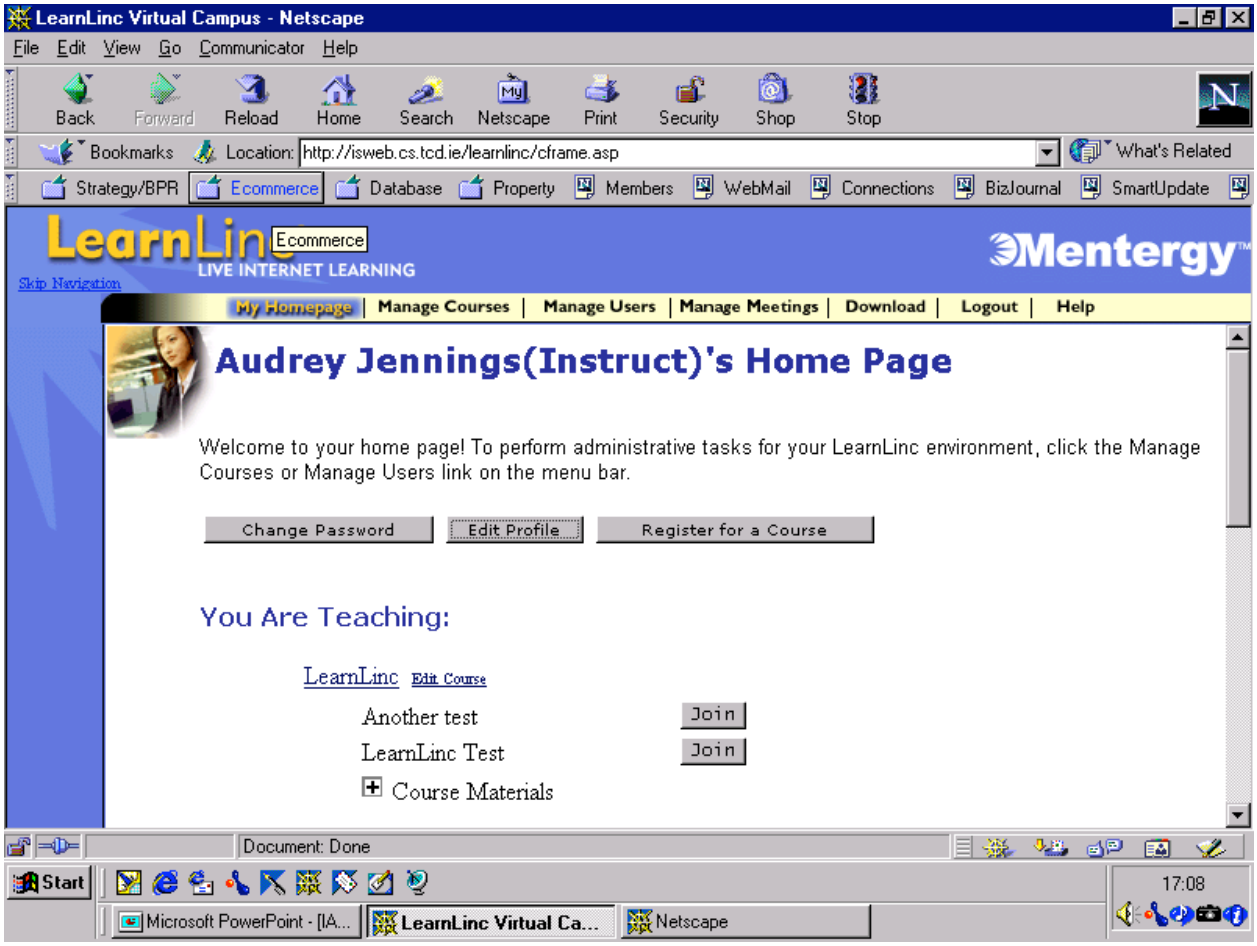
The virtual classroom provides a virtual classroom environment with whiteboard area, synchronized web browser, application sharing, text chat, hand raising, questions and answers, feedback, attendance list and an agenda for the class.

2.9 The LearnLinc Virtual Campus and the Virtual Classroom

2.9.1 The Virtual Campus – Lecturer View

From the Lecturer's viewpoint, the LearnLinc Virtual Campus provides all the functionality of a real college environment. Once logged on, the system provides management facilities for course content and students. Lecturers can upload course materials and content and make sure students are registered. Finally, the lecturer 'Joins' the class at the scheduled time and delivers the lecture.

Figure 2-3 – The Virtual Campus – Lecturer View



2.9.2 The Virtual Campus – Administrator View

This is one of the extra responsibilities that come with implementing an eLearning initiative. The following core activities have to be in place before delivering any lecture. It is like the University building and campus and all the administration must be in place before you have any students, lecturers or lecture halls.

In an ideal situation the Admissions office of the University should take responsibility for this administrative role. In that, when students are registering with the college for the up coming year they are automatically registered with the eLearning system, ie LearnLinc.

For the GENIUS project, students had to be manually registered on the LearnLinc system. Photographs for students, lecturer and any potential observers were uploaded into the LearnLinc environment and registered in the course they were to participate in. They were then provided with the usernames and passwords for to login to the LearnLinc system and the password for the course they were to 'join'. The students were then advised of all of this necessary information by email. (See Appendix C – Instructions for Online Lecture)
The Administrator also has to register the Lecturer on the system and any assistant lecturers, recorders, observers or technical support people.

2.9.3 The Virtual Campus – Student View

When students enter the LearnLinc Virtual Campus, they are able to participate in the courses they have joined, with a similar range of interactions as a traditional campus. They have to be logged on to the LearnLinc system: enabled by setting up their account, they have to be registered on a course. The student then 'joins' the course they are to participate in. Upon joining the course the course materials relevant for the course are available to them. Also after a lecture had been delivered the recording of that lecture is also available to them. This is the asynchronous element of the LearnLinc Virtual Campus and plays an important role in making course materials available anytime, anywhere.

Figure 2-4 – The Virtual Campus – Student View

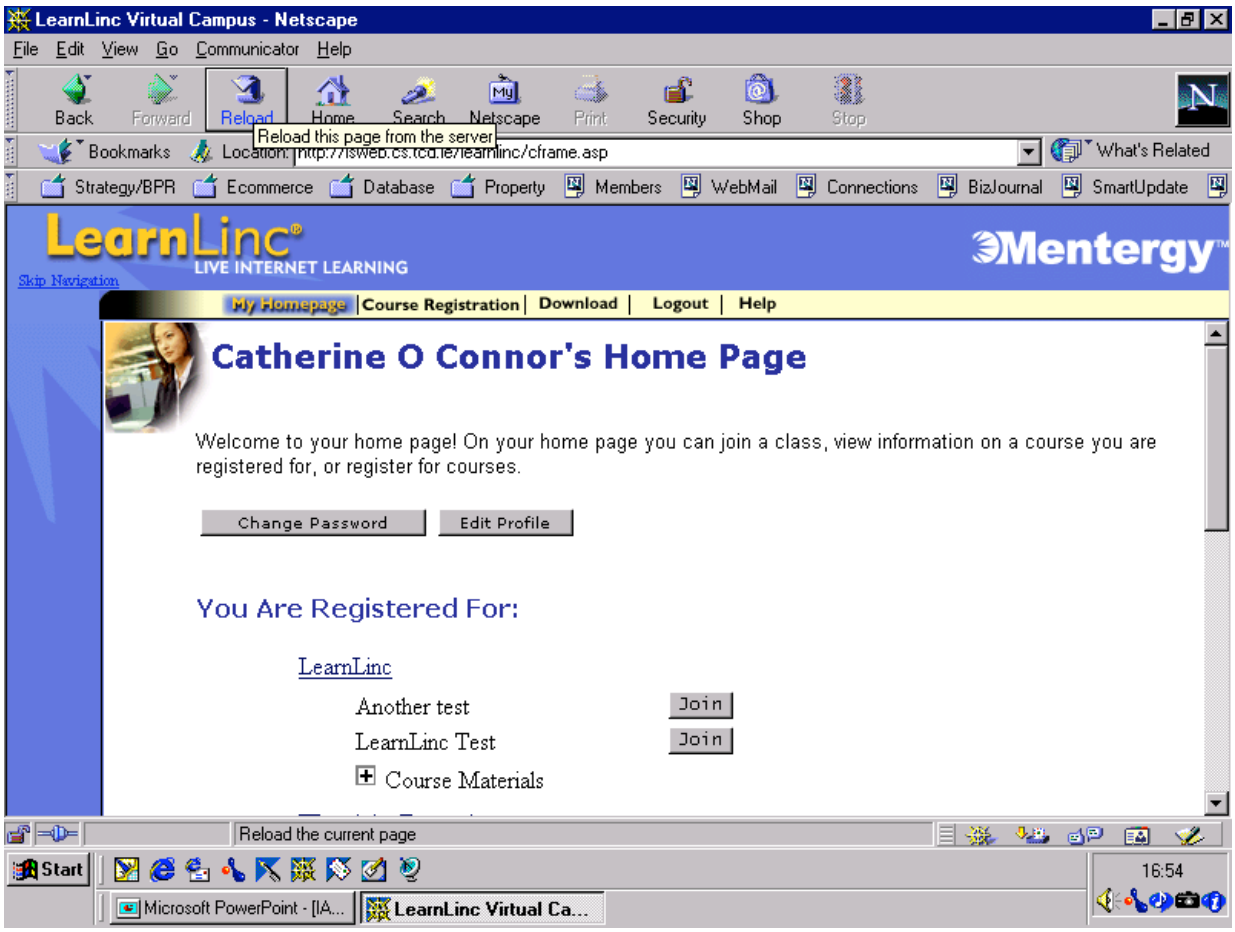


Table 2 - The Physical Campus versus The Virtual Campus Environment

Traditional/Physical Environment	Virtual Environment
Enter gates at Trinity College	Log on to PC
Registration with the College	Log on to LearnLinc environment
Find Lecture Hall	Join Course/Classroom

The above table highlights the differences between the traditional campus and the virtual campus.

2.9.4 The Virtual Classroom – Lecturer

Having entered the virtual campus, the Lecturer joins the classroom, and is automatically given the floor. Their photograph is displayed on the students' desktop. The Lecturer can see which students have joined the class and are currently joining. Each students' username appears under People along with a count of the number currently logged in.

Figure 2-5 – The Virtual Classroom – Lecturer View

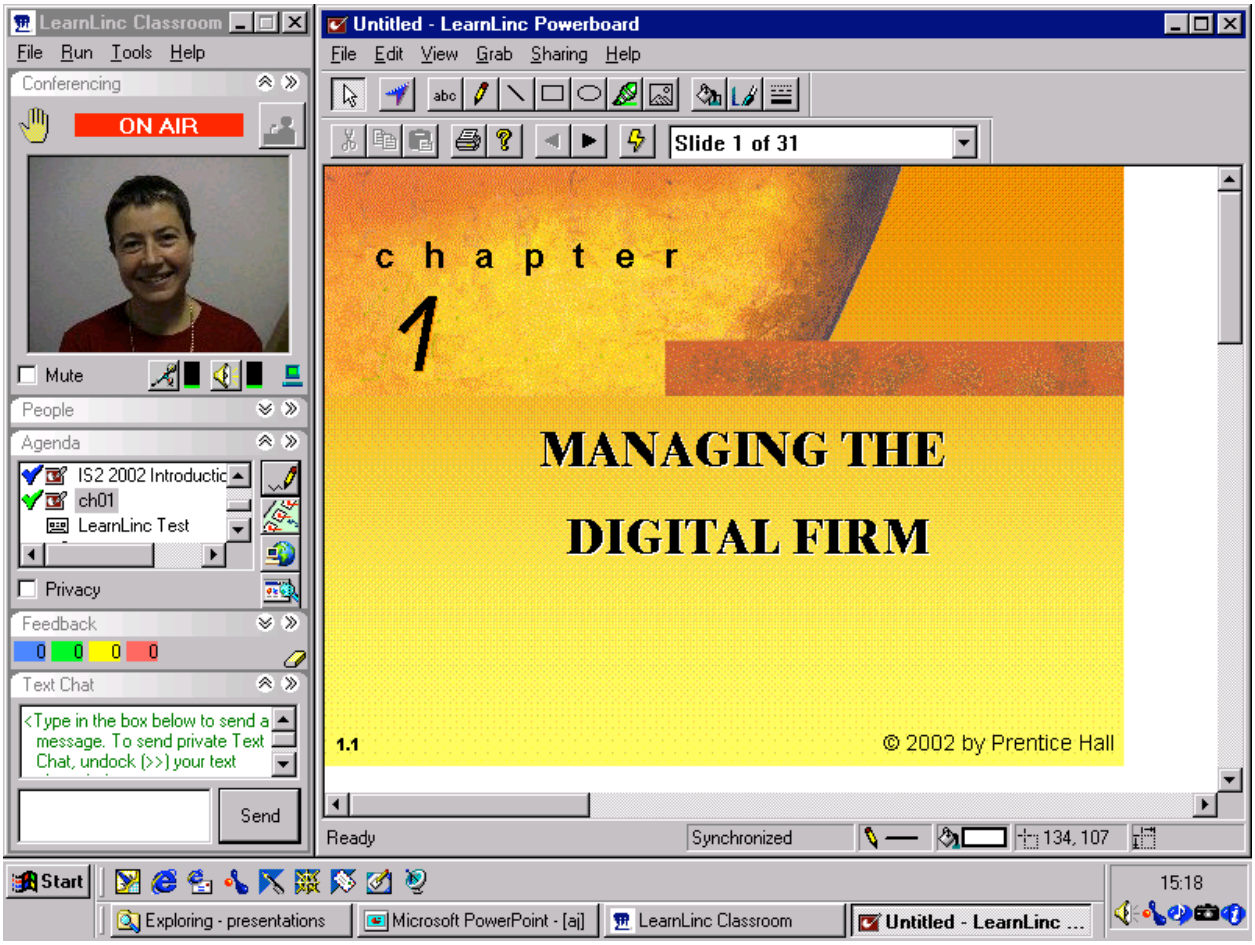


Table 3 - The Physical Classroom versus the Virtual Classroom Environment

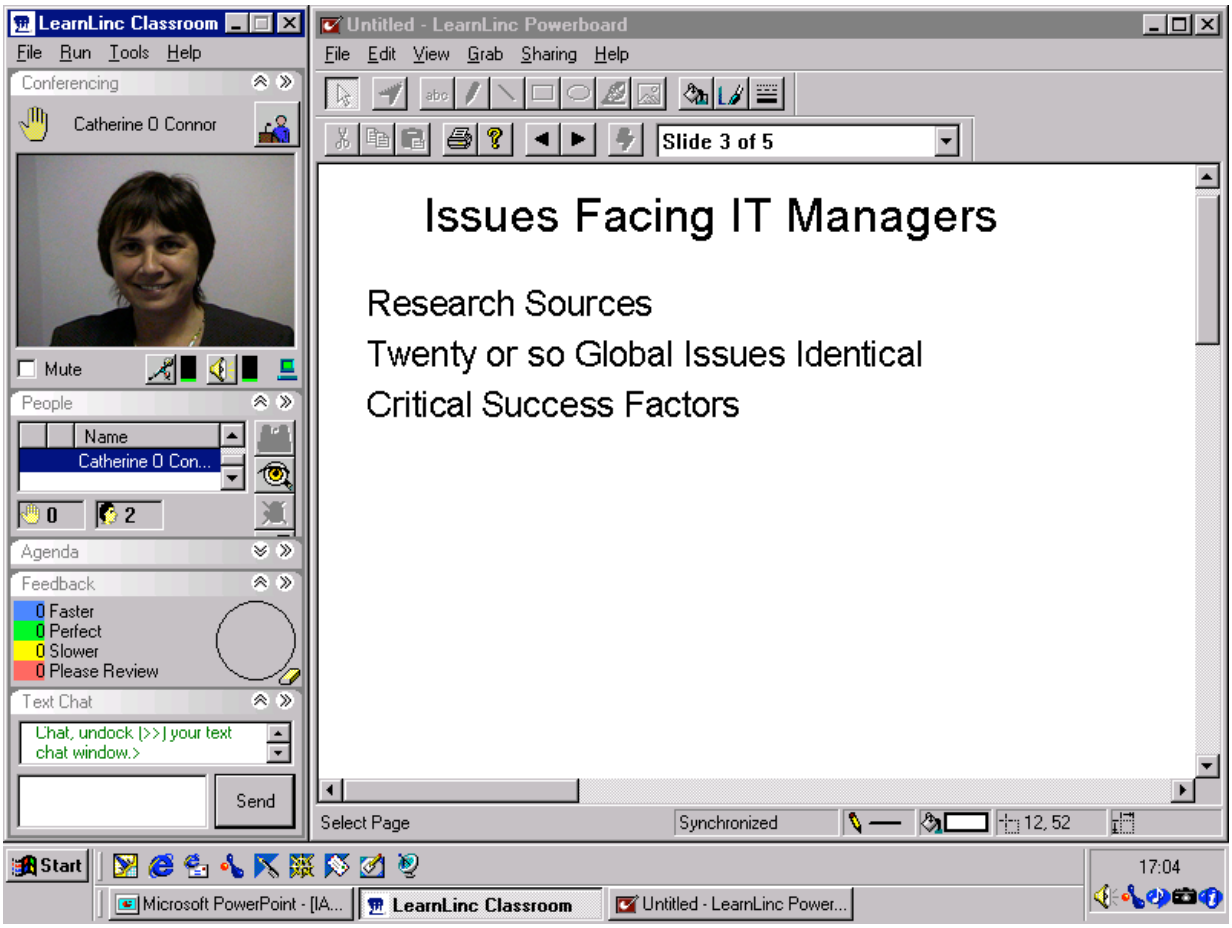
Traditional/Physical Environment	Virtual Classroom Environment
See who is in class	Look at Attendance List
Say Hi to the Lecturer	Text Chat
What is Topic today – Slide	Look at Agenda
Student raises hand to ask a question	Hand-raising
Student ask a question	Text Chat, Hand raise
Student talk to your friends	Text Chat
Lecturer ask a particular question	Question and Answer
Lecturer check the pace of Lecture	Feedback
Can you hear me?	Audio Wizard, Microphone/speaker volume
Slide Presentation Projection	Shared Application
White Board	Shared Whiteboard
Internet Access – Projected from PC	Synchronized Web Browser
See the Lecturer	Photograph (when have the floor)
See the Student	Photograph (when have the floor)
Communicate – email	Communicate - email
Handouts	Materials online
Miss a lecture – tough	Playback Recording
Look for assistance outside Lecture time - Drop into office; Phone; email lecturer, administrative staff or other students	ListServ Email lecturer, administrative staff or other students Set up an online meeting

The above table highlights the differences between the Physical Classroom and the Virtual Classroom environment.

2.9.5 The Virtual Classroom – Student

When the student has logged on to the virtual campus they then 'join' the class they are to attend. There may be a password to join the classroom. On joining the classroom students are presented with a classroom environment where they can see a still image of the Lecturer, (as was used in the GENIUS experiment because of bandwidth restrictions) who has logged in and has the floor. (If video was used the students would see a video image of the lecturer as he gives the lecture). The students can also see the usernames of the other students who have joined the class, the agenda for the class, the current text chat, the whiteboard or other application share that is being used at the time. They can participate in the class by listening to the lecture, asking questions – by hand-raising or text chat, using feedback and participating in Questions and Answers.
When the students are given the floor, a still image of the student is displayed. Again, if they had used video, a video image would have been displayed.

Figure 2-6 – The Virtual Classroom - Student View.



2.9.6 Equipment Required

A student needs to have a Computer with the correct specification as set out by LearnLinc, a network connection to enable connecting to the LearnLinc server. He/she will need to download the client software. The student also needs to have a headset – microphone and earphones, so that he/she can speak to and listen to the lecturer. He/she can communicate with the lecturer through text chat either privately, where only the lecturer sees it, or publicly where everyone in attendance sees the message. The student can also communicate by 'raising their hand', the lecturer sees the indicator for the hand raise and can then give the floor to that student. A photograph of the student appears and he/she can speak to the lecturer and the class.

2.9.7 The Virtual Classroom – The Assistant

The Assistant is a member of staff who joins the class in order to support the Lecturer. The Assistant can play a key role in a busy classroom. The Assistant can have many roles and duties in the virtual classroom. He/she can be an observer monitoring the text chat just in case the Lecturer misses something. He/she can be the recorder of the class, it is better to have a recorder other than the lecturer to record the class as everything that

happens on the recording PC is recorded, therefore private text chat would then be in the recording. The Assistant can also act as an initiator for interaction and discussion during the online lecture.

2.10 Primary Focus for Trinity College

The niche focus for Trinity College in the GENIUS project was to deliver synchronous online lectures to First Cycle Degree Non-Traditional Learners and that was its major remit for the GENIUS project. The student cohort was identified as existing part-time mature evening students all based at TCD for their traditional face-to-face lectures.

2.11 Trinity College

The AISG at Trinity College Dublin is an Academic Partner in a EU funded project GENIUS. This project is funded under the eLearning branch of the EU DG for Education and Culture.

Trinity College is a traditional University established in 1592. It is located in the heart of the city of Dublin. It currently has a student body of approximately 15,000. It has the largest Department of Computer Science in Ireland. Established in 1967, this department facilitates learning for approximately 1300 students at both First Cycle Degree and Second Cycle Degree level. An estimated 750 of these students are part-time mature evening students, average age of twenty-nine years, in full-time employment attending evening courses at the college. This project was targeted at this body of students, specifically a selected cohort of 49 students was chosen, the rationale for selecting this group will be outlined later.

2.11.1 The Department of Computer Science

The AISG under the Department of Computer Science at Trinity College places particular focus on Continuous Professional Development, Second Chance Education and Lifelong Learning and is committed to producing high calibre graduates sought by industry, the professions, public service and academia. The cohort of 49 students specified are following a five year degree programme of study in the area of Information Systems. Typically the students work full-time and attend college for three evenings each week over the academic year. The programme is fee-paying, with a considerable number of students receiving subsidies from their employers. In some cases, students avail of a small income tax exemption.

I mention later in the chapter when discussing the role of technology, that there is a fear attached to using new technology in an untested environment. The Course Director was anxious that this project would be successful, having previously suffered an embarrassment on this Degree programme with another technology related initiative.

2.11.2 The Student – Part-time mature evening student

As outlined above the Department of Computer Science places a particular focus on providing education to the lifelong learner. The Computer Science department has offered courses on a part-time evening attendance to mature students for over 35 years. These courses have been tailored to the requirements of the IT sector and have evolved with the times. The students come from all industry sectors - financial organisations, government organisations and departments, the software industry, manufacturing etc. Many students learn about the course offerings from previous students who have attended TCD from within their organisations. In some cases the students' employers support them throughout the course by paying some or all of their fees and also allowing study leave during the year. All the course modules to date have been delivered in a face-to-face environment, i.e. students attend the college campus on two or three evenings a week.

We now wanted students to attend lectures online ideally from their home or workplace. Where this was not possible an alternative location had to be in place. This was identified as a computer lab in Trinity College. The students had not enrolled for nor had been advised before enrolment that they would be part of an online delivery experience.

2.11.3 The Lecturer and the course module

Identifying the Lecturer and the course module were deemed as being key to the success of the project. The Lecturer had to have a confident and suitable personality to carry out and adjust to the online environment. The course content had to fit to the project, and eLearning had to be seen as a component of that module.

2.11.4 The Researcher

The Researcher had also been a part-time mature evening student and was interested to be involved in this project and to follow its path. The GENIUS project provided the platform to apply theory with practical implementation and an evaluation process suitable as a base for this research.

2.11.5 The Evaluation

A requirement of the GENIUS project was to carry out an evaluation and disseminate the findings. This was seen as vital within the AISG in the Computer Science Department. It too needed to learn from the project, so that the knowledge could feed back into future decisions for further eLearning modules on other courses. Other issues were how students accepted or didn't accept the opportunity to use eLearning technologies, how the department coped, what the lecturer thought of the experience, would he do it again. All of this had to be captured. With that in mind and to fulfil the GENIUS requirement the services of an Academic Advisor, Professor Dan Remenyi, were engaged. His main role was identifying a suitable evaluation process.

2.12 The Technology Issues

The use of technology to deliver online lectures, synchronously, formed the basis of the project. As with all new technologies there is concern that it won't work. The project was limited to using the technologies being offered by the Industry partners in the GENIUS consortium. What was available to us was a Learning Management System that had the facility for a virtual classroom and virtual campus, LearnLinc.

2.12.1 Connectivity

Apart from the LearnLinc technology, there was the issue of connectivity. Would students be able to connect? Would the 56k or 64k bandwidth in most homes using analog or ISDN phone lines be enough? Could the project become an embarrassment with the students and for the college? Would employers allow their employees to stay on and use the technology available to them at work to connect in?

2.12.2 Training and Support

Whenever people are asked to use a new computer technology, their level of computer literacy comes into question. The students identified to participate in this project were in Year two of an Information Systems Degree programme. However, that of itself does not guarantee sufficient computer literacy. With that in mind and also the nature of technology it was obvious that training and technical support would have to be made available. This again is a new demand for a faculty involved in delivering online lectures.

2.13 Education

This project was a departure from the normal traditional offering at TCD for the part-time mature evening student, which involves attending lectures in a lecture hall at TCD in the evening time after work. While TCD has a Centre for Learning Technologies, the focus there is WebCT, which in effect is a Content Management System. It has only been used in undergraduate courses for traditional learners. The proposed Learning Management System planned for use in this project, LearnLinc, was a completely different environment, providing an online synchronous eLearning environment for the part-time mature evening student, "same time, different place learning" with the possibility of "any time learning" provided with the recording facility of the LearnLinc solution.

All course modules delivered in the Degree in Information Systems, up to now, were delivered in a traditional face-to-face lecture hall environment. This project involved a change to the delivery process for the part-time mature evening students. In effect the students would be participating in a blended learning approach. Where initially lectures would be delivered in a face-to-face environment, they would then partake in the series of online lectures and then revert to face-to-face delivery. It was hoped that the

majority of students would partake in the course off campus. As will be explained in the Literature Review the learning environment was to be 'Same Time Different Place.'

This was a new venture for a traditional university. It presented many possibilities both nationally and globally, but it also highlighted the deficiencies in the college structure to adapt to this environment in order to have a long-term strategic role in online synchronous eLearning.

2.14 Summary

We have outlined here the background to the GENIUS project. The GENIUS project was the driver for the AISG in the Computer Science department of TCD to embark on an eLearning initiative with a particular focus on Part-time mature evening students partaking in a First Cycle Degree using synchronous eLearning technology and techniques. The GENIUS project was also the platform for this research contribution. This chapter also gave a detailed insight into the functionality and capabilities of the LearnLinc product as used in the GENIUS project at TCD. The chapter also set the scene for the project implementation at Trinity College. All three – the GENIUS project, the LearnLinc Technology and Trinity College are the environment and vehicles for this research initiative.

The next two Chapters, Three and Four, focus on the Literature Review. They will explore in detail the domains as outlined in this chapter, the changing role and availability of education, the enabling role of technology in providing web-based online synchronous eLearning and the impact on all the participants – Faculty, Lecturer and student.

Chapter Six will outline the implementation of an Integrated Web-Based synchronous eLearning collaboration platform for part-time mature evening students at a third level institution, Trinity College, in fulfilling the requirements and working within the constraints of the GENIUS project.

3 CHAPTER THREE: THE LITERATURE REVIEW – THE EVOLUTION OF ELEARNING

3.1 Introduction

This chapter will discuss the enhancements in technology that have brought us to where we are today and how Information and Communication Technologies have enabled eLearning, in particular Internet technologies, in enabling synchronous eLearning. It could be related to Zuboff's (1988) 'Automate, Informate, Transformate' model of the evolution of technology in education.

It will look at:

- The evolution of Education and also the changes in Society;
- A background to the Internet, how it has evolved and what it offers today in the Distance Education and eLearning environments in enabling products to deliver synchronous eLearning;
- The evolution of learning to eLearning;
- The evolution of eLearning approaches;
- Some university initiatives in responding to the use of enabling eLearning technologies;
- Evaluate the position of non-traditional learners, as specified in the GENIUS requirement, but focus on part-time mature evening students as this was the project's sample cohort, and their participation in eLearning;
- The difficulties and challenges for Universities in implementing an eLearning solution and
- It will also pose questions as to the changes and opportunities education and technology are bringing to the student and to the University.

As Windschitl (1998) notes, research on the use of the World Wide Web (WWW) lacks disciplined scholarly articles. "*The vast majority of published work is a description of technology implementation in classrooms*" (p.28) or reflection of what has been done in distance education.

In fact, for the particular niche focus of this thesis – "synchronous eLearning for the part-time mature evening student", very little research exists in the arena.

eLearning, based on Internet technologies, is another, more recent, channel for education. It is certainly not optimal in all situations. It may be effective and perhaps relatively cheap in some niche situations, at this point in time, but even this needs to be questioned and evaluated. Chapters Three and Four will focus on the various issues that

need to be examined in a proposed eLearning implementation and have been identified in the literature.

3.2 Have we arrived?

It is nearly 40 years on from Marshall McLuhan's book, Understanding Media written in 1964, in which he proposed the idea of the global village. His global village was a contracted globe facilitated by advancing technology. "Today after more than a century of electric technology, we have extended our central nervous system, itself in a global embrace…. as electrically contracted, the globe is no more than a village."

Can this thinking be applied to education, to eLearning?

He may have been right, and for ideas expressed in 1964, he was on the right track. Modern communications have made the world more of a big city of strangers, with neighborhoods and communities being eroded. Will physical universities be empty too as we take our education anytime anywhere?

In a village we know everybody and are forced into interactions with almost everybody. This is certainly not the case in the modern Internet driven world. We ruthlessly pick and choose those with whom we will electronically interact. Our physical interactions are governed by proximity, time and effort and have been changed by the way our cities and communities have developed. Technology has become a facilitator in maintaining our physical interactions, for example, the telephone, mobile phone, email, SMS.

Will this apply to Education? Has technology become a facilitator?

Even 30 years ago there was an awareness and concern for what the changes and advances in technology would bring. Would it divide the real world into 'Haves' and 'Have nots' and create another world for the 'haves', Cyberspace? Will this happen in the availability of education?

Alvin Toffler, in 1970, with his book Future Shock, advanced the theory that huge technological changes were taking place and had arrived, but politicians were unaware of the future impact of technology on society and industrialism and the economy. In 1980, his book The Third Wave, mapped out three gigantic waves of change – tracing the Agricultural Revolution, the Industrial Revolution and now the Third wave of high technology and its transforming power. He described the transfer of brute-force to a brain-force economy, which does not create employment. So much of what is happening today was seen by so few early on!

3.3 So how has education changed and evolved?

The following text traces the evolution of education and highlights the requirements and challenges of education and learning today. In particular in the area of the 'Information era', which is now.

In the move through these waves, it can be seen that concepts such as work, schooling and teaching are actually 'social constructs'. Their existence and current meaning are created and defined by the needs of the society in which they are located, and these social constructs can, and will, be changed or modified by these socially derived pressures. (Professor Michael Hough, Teachers of the Future)

For example, in an agrarian society, everyone worked – including children, women and old people. However, they only worked cyclically (during the warmer growing months) and in daylight (no electricity). They worked especially hard during the period of the summer harvest (which is why schools today still have long summer holidays). It was important that the work demands of this type of society did not conflict with the – then less important – requirements of attending school.

The 'modern' arguments about women's rights to work, protection of children against labour, and so on, are actually issues connected with the constructs of a later industrial social era and its accompanying definitions of work.

3.4 Schools and Social Constructs

In that same context, it is important to realise that the organisational logic of a 'modern' school and 'teaching' are actually social constructs of the industrial era society, and largely represent ways of meeting the needs of that era for 'educating' and 'sorting' young people for work suitability. Equally, the 'subject content deliverer' role of a (particularly secondary) teacher was also developed to meet these particular societal needs. (Hough)

So where to with the Third Wave of High Technology, the Information era? The Knowledge era?

Hough identifies power sources for the different eras. For the Third Wave, he sees the new power sources as: robots, computers, research, education, management improvement, electronic finance, communication and market research. He also puts forward that *'there is a major social discontinuity in values and attitudes as our society moves from an industrial (second wave) to an information (third wave) society'*. He also identifies some educational implications.

3.5 Educational implications

3.5.1 Successful Learners

One commonality amongst societal commentators is support (in differing ways) for the underlying viewpoint that this societal period of 'discontinuity' is one in which 'the future' is not simply a projection of the 'the past'. It is likely that the general requirements of successful people – both individually and collectively – to thrive in this emerging post industrial 'information era' will be based on a set of human learning characteristics, such as:

- Being flexible;
- Being adaptive;
- Developing to a high degree the set of knowledge, skills and understanding relevant to the current context;
- Anticipating and coping with change;
- Being skilled in information technologies;
- Being willing to continue learning across a lifetime.

3.6 Developments and Changes in Learning

3.6.1 Eras and Characteristics of Learning

- Nomadic Era - Learning was acquired by observation and occurred in 'one-to-one' or small group learning situations, and was focused mostly on skills of survival, i.e., the physical challenges and practical training of survival experiences whilst moving around. (Hough)
- Agricultural Era -. Learning was acquired through more stable community (First Wave) structures and focused on the needs of survival in local and static locations. There was some emergence of higher order social learning (e.g. painting, clothing). Learning was by observation, apprenticeships and small group-based learning. (Hough)
- Manufacturing Era - Learning had adapted to the needs of a society that had (Second Wave) 'untied' itself from natural biorhythms and was learning to work in fixed locations over artificial times (e.g., at night, in 'shifts'). Learning was directed both at the technology of production and at a growing range of non-essential, higher order understandings. Learning was through specialist organisations based on a teacher-class interaction – the emerging specialist role of the teacher was to establish learning through mostly neural connections (chalk and talk). Learning was focused on the codified knowledge of a society, and not the needs of individuals. (Hough)
- Post Industrial Era - Learning is central to the needs of a society faced with rapid change; High levels of customer demand (and expectations) (Third Wave). Learning is increasingly created by a learner controlled activity, e.g., by direct interaction with learning technologies (Cassette, CD ROM, Internet). The rapid pace of change, and the complexity of modern work, has also shifted

the focus more to co-operative (e.g., team-based) learner-managed learning. (Hough)

So where are we now? Where to for teachers? Where to for Learning? Are eLearning technologies going to be the enablers of lifelong learning, self-paced learning, build your own course?

3.7 Where to for Universities?

Are we on the verge of a new social construct?

"*Another wave of online communities is underway. The first wave, beginning with The WELL*[15]*, took advantage of the social adoption of email to build community upon Usenet, bulletin boards and forums. A basis of trust in email-style interfaces and conventions enabled pooled discussion. This wave takes advantage of the social adoption of the web to build community upon web-native tools. Because the web is a more diverse environment so too are the tools. The physical and logical infrastructure of the web has reached a maturity while usage has surpassed a tipping point where it is ingrained in most people's lives. As people have become participants on the web, they are building a new social infrastructure, connection by connection*." From Ross Mayfield's Weblog; http://radio.weblogs.com/0114726/2003/03/30.html#a376

Is this McLuhan's global village?

What about the Traditional University - is its physical presence an inhibitor to change? Do the physical representations of Universities need to be redesigned to enable innovation and further change?

"*eLearning and its implementation do not take place in a vacuum. Introducing any new concept or way of doing business involves changes in people's behaviors, organizations and people's roles within them, ways of thinking and looking at the world, and seeing opportunities in the challenges that change brings."* Mona Engvig. http://www.engvig.com/mona/expertise.shtml

[15] The WELL is an online gathering place like nolec other – remarkably uninhibited, intelligent, and iconoclastic. For more than seventeen years, it's been a literate watering hole for thinkers from all walks of life, be they artists, journalists, programmers, educators or activists. These WELL members return the WELL, often daily, to engage in discussion, swap information, express their convictions and greet their friends in online forums known as WELL Conferences. The WELL is a cluster of electronic villages on the Net, inhabited by people from all over the world. Where is The WELL? There's no simple answer to that question, but as Gertrude Stein might have said, "There's a there there." http://well.com/aboutwell.html

What about the human element? Will the conservatism and comfort zones of Academics be an inhibitor to change and advancement in using technology in education?

3.8 Traditional University

In a traditional university the students come to the campus. They are registered in a particular course. Most courses are lecture based. The courses that are on offer adhere to a relatively stable curriculum. The outcome of attending and fulfilling the requirements of a particular course normally results in the awarding of a qualification, e.g. a degree. For this research project, the students were part-time mature evening students attending lectures three evenings a week on campus at Trinity College.

Academics are normally fulltime staff. The campus is an extensive physical structure and provides many facilities, e.g. libraries, sports amenities, social outlets, restaurants, bars, clubs, computer laboratories, science laboratories and so on. Technology is there as an enhancement, a support to learning.

The traditional university is under pressure. Virtual universities, other global universities, such as the Global University Alliance (http://www.gua.com), educational organizations and industry universities (e.g. Cisco Academy, Oracle University, Microsoft) are direct competition. Many universities depend on the international community to boost not just their student population but also their financial contribution. (There are currently 26,000 Chinese students in Ireland, Morning Ireland, RTE, 17/01/05) The virtual university is available anytime anywhere. The traditional university must respond. New forces are intensifying competition and technology is one of those forces. It is enabling globalisation in education. The rapid expansion of the Internet as a potential course delivery platform, combined with increasing interest in lifelong learning and budget restrictions, has created a significant incentive for universities to develop online programmes (Volery & Lord).

"*Despite all the rhetoric to the contrary, institutions seem unable to take concerted steps toward the conception of the 'new university' that so many have insisted is needed to accommodate a full flowering of the technological and knowledge revolution*" (Frye 2002:10) sourced in eLearning in the 21st Century, Garrison and Anderson.

3.9 The evolution of learning to eLearning

Traditionally, educational learning takes place in a physical location. Primary and secondary education in the main, still take place in physical locations – schools and colleges. However, with the advances in technology, new solutions are available for students with illnesses or disabilities to avail of education at other locations, for instance the home. At tertiary level, the majority of students still attend their third level institution, college or university. However, for some students, like non-traditional

learners or part-time mature students, it is not always feasible to travel to a particular location to take part in a particular course of learning.

Some organisations were quick to recognise this, and began to offer a distance education solution. In the main, study packs for courses, also known as correspondence courses, were produced and the mail system was used to send these to students and for students to submit their coursework. The largest example of this on this side of the world would be the Open University in the UK. Here in Ireland the National Distance Education Council (NDEC) established OSCAIL hosted initially by National Institute of Higher Education , Dublin (NIHE) and thereafter by Dublin City University. Prior to that Kilroys College was a private initiative in the area of Distance Education.

3.9.1 Distance Education

"Distance Education is instructional delivery that does not constrain the student to be physically present in the same location as the instructor. Historically, Distance Education meant correspondence study. Today, audio, video and computer technologies are more common delivery modes." (from "What is Distance Education" by Virginia Steiner, DLRN 1995)

The level of interaction in Distance Education is affected by the choice of synchronous or asynchronous delivery. If the medium is synchronous, then the interaction that occurs takes place in real time. Delayed or asynchronous, communication is any transfer of information that is stored or archived and then later accessed. It is important to determine the most effective delivery mode since it directly impacts the level of interaction (Steiner, 1996) .

As education can be traced through different eras, so too can Distance Education. Moore (1994) put forward the idea that Distance Education has moved through three different generations (correspondence, telecommunication and computer) and is still moving on. The fourth generation, the virtual classroom, is just emerging.

Nipper (1989) also identifies three generations of distance education. The first generation was provided mostly through paper-based instruction; the second through integrated multimedia such as delivering courses via television; the third was provided through two-way communications media such as video-conferencing.
http://www.firstmonday.dk/issues/issue4_12/hara/

However, just because modes of distance education are categorized into generations, does not mean that a generation has been replaced or outgrown its existence. Many first- and second-generation distance education modes are still in use.

Garrison and Anderson in their generation classification of the technology of eLearning, look at the bigger picture, not just the lecturer and the technology, they recognized that it takes a team to produce a course. They identify four generations.

3.9.2 The First Generation

In their first-generation system, where the technology is the printed textbook and accompanying course guide, they see the course team to include an Instructional designer, Subject matter experts (ideally, but not always, with considerable teaching experience acquired in both campus and face-to-face contexts), Graphic artists capable of illustrating complex events and creating a consistent and graphically stimulating look and feel to the materials, Editors capable of translating all team production in language that is appropriate to the targeted learning group and a Project manager to manage budgets and time lines and to facilitate collaboration and coordination of various course components. In effect these would be in-house at the publishers.

Early distance education employed different delivery methods compared to traditional, classroom-based teaching. Most of the time students worked independently, at their own pace, with deadlines for coursework submission. There were limited opportunities for face-to-face contact with tutors and other fellow students, usually telephone support and weekend intensive seminars. This first generation of Distance education then evolved to using recorded audio, video and broadcast programmes. (Moore, 1994)

3.9.3 The Second Generation

The second generation, as put forward by Moore, focused on the Open University model, and many countries initiated national Open Universities. These were different from correspondence institutions in many respects: “they were autonomous, degree granting and spent huge amounts of money on sophisticated course design and intensive student support networks”. (Moore, 1994)

The Second generation, put forward by Garrisson and Anderson, evolved with an era defined by the newer technologies of mass, broadcast media. The initiative here was that of independent study, with limited restrictions of access to radio and television. Expensive to produce, with large production teams, these tele-courses gave students access to laboratories, workplaces and classrooms. Technologies such as CD-ROM and Video enhanced this generation of distance learning.

In Ireland the British Open University model was also in operation. However, in 1982, OSCAIL, which is the Irish word for ‘Open’ came into being. OSCAIL is the National Distance Education Centre of Ireland that is hosted at Dublin City University. It was established as a response to prevailing conditions in Ireland that saw higher education restricted to relatively few individuals, quite a low proportion of adults with degrees or

other third level qualifications, and an under-developed provision for access to degree level qualifications through part-time or adult education. Students can achieve an Irish university qualification without changing their current lifestyle. Students study in their own time, at their own pace and wherever is most convenient, with the help of OSCAIL's specially written self-instructional course texts. To support this environment, tutors are assigned to a student, support is through tutorials, telephone[16] and e-mail[17]. Some programmes also offer support through computer conferencing systems. OSCAIL also has a network of twelve study centres around Ireland. More than 3,500 adults, located throughout Ireland, are currently pursuing Irish University qualifications with OSCAIL. (http://www.oscail.ie)

New information and communication technologies, such as email and FTP, provided tutors with the opportunity to enhance communication between the student and tutor. Whilst these early distance education initiatives were very successful and still are, the advancement of teleconferencing technologies and the availability of the personal computer[18] was changing the landscape..

3.9.4 The Third Generation

The third generation, as put forward by Moore, provided interaction, the possibility of applying new teleconferencing[19] technologies to education.

The Third generation, as put forward by Garrisson and Anderson, sees the introduction of synchronous interaction such as audio, video and computer mediated conferencing[20].

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[16] Telephone The improvements in telephony focused on end-to-end voice communication up to the invention of the computer. There was then a requirement for computers to be able to communicate remotely. Various technical solutions were developed to enable computer communication over telephone wires, which led to the development of modems. Today, of course, we have the ubiquitous mobile phone and the texting facility. The telephone is still one of our main means of communication. If we look at recent statistics in Ireland, we are one of the highest users of the mobile phone.

[17] Email - as we know it today evolved from these early computers and networks. The first internet email was sent in the early 1970s, however, the use of telex before that was also a form of email back in the 1950s and 1960s.

[18] Personal Computer -The next step was the development of personal computers (late 1970s). It was now feasible for individuals to communicate electronically. "*In the mid-1980s, the personal computer became a reality in that it became accessible to a huge and growing number of people. Today, it is the essential interface to the Internet and the World Wide Web, and is transforming teaching and learning.*" (Garrison and Anderson)

[19] Teleconferencing - The first initiatives for synchronous 'eLearning' involved teleconferencing. Teleconferencing means any kind of multi-way communication carried out in real-time using telecommunications or computer networks and equipment. It was used in education where teaching and learning had to take place over a distance or between sites at multi-campus institutions. As a real-time medium, teleconferencing enabled the reproduction of traditional face-to-face teaching formats to participants at a distance. Teleconferencing can only be carried out with quite limited numbers, particularly where interaction is required, as large scale interactive sessions, especially those involving multiple sites, are extremely hard to manage.

[20] Computer Mediated Communication -

They see that the third generation opened up opportunities for students to create and re-create knowledge, both as individuals and as part of learning groups. This generation encouraged collaboration in course content and in hosting problem-based curriculum designs.

At this time more advanced Internet technologies were becoming globally available. Initially for many organisations the move was to use asynchronous mode communication and then, more recently, to move on to platforms such as WEBCT and Blackboard. For example, OSCAIL, as described above has moved to the WEBCT platform to support eLearning. However, OSCAIL are also exploring the use of Moodle – an open source software, that is a course management system. The main advantage is that you can modify the product to suit your requirements, and of course it is free! Cost is becoming an issue for many organisations as licensing of some eLearning products soars.

However, synchronous technologies are again pushing to change the landscape, but are being very slowly embraced.

3.9.5 The Fourth Generation

Moore puts forward a fourth generation: virtual reality. The concepts of virtual class and global university have emerged since the teleconferencing media made it possible for learners in distant groups to communicate in real time. Moore (1994) states that computer controlled "multimedia" programmes combine new forms of recorded and interactive media which allows "learners to receive instruction from any source and from a variety of sources". (Makin)

The Fourth generation outlined in Garrison and Anderson's text, focuses on the contribution of the Internet, information retrieval, computer mediated communications and web-server implementation. This is where many products such as WebCT,

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Computer Mediated Communication (CMC) consists of the exchange of information between persons by way of computer networks. This can include various types of information, for example text, images, audio and video. The exchange of information can be real time communication or synchronous, this means that people are communicating with each other at the same time. Another form of communication is asynchronous, this means that people are communicating at different times. Then can send and receive their messages at any time they want. Applications of CMC technology began with networked communication systems and information-driven management to improve efficiency and productivity. As with other technologies, people begin to use them within the information system for their own social needs.
CMC provides us with a variety of communication methods. Email, WWW, Newsgroups, Bulletin Boards, Computer conferencing, Teleconferencing, Audio conferencing, Video conferencing, Voice Mail Systems, IRC, MUDs/MOOs, Whiteboard environments, Work flow applications and the potential for community. In the eLearning arena, what really attracted attention to this technology was its ability to support a truly collaborative learning experience, at a distance and independent of time and space.

Blackboard and Lotus Notes belong. However, these have many shortfalls and can be deemed to be just content management systems.

3.9.6 The Fifth Generation

Looking to the future, the fifth generation, there is a need for evolution and integration of these products with other systems, yielding an 'intelligent, flexible learning model'. In using the product LearnLinc, we had the benefit of a content management system, a virtual campus and a virtual classroom, the combination of a synchronous and an asynchronous environment. However, one of the issues with this type of project is the administration function, duplication of student records with the main administration function of the physical college. In an ideal scenario, one entry point at registration should also update the eLearning system. In the opinion of Garrison and Anderson:

"*E-learning will inevitably transform all forms of education and learning in the twenty-first century. Notwithstanding that e-learning's influence in traditional educational institutions has been weak – in reality, little more than an enhancement of current practices – as we gain a better understanding of its potential and strengths, e-learning will effectively transform how we approach the teaching and learning transaction."*
(Garrison and Anderson, 2000)

Bates (1995, p.30) listed the development of new technology in teaching since 1980. And it can be seen that, as time goes on, the technological developments are involved with enabling interactive distance education rather than providing a media solution.

Table 4 – Development of new technology in teaching since 1980. Bates (1995, p.30)

Audio cassettes
Video cassettes
Telephone teaching
Computer-based learning
Cable television
Satellite television
Computer-based audiographics systems
Viewdata
Teletext
Video discs
Computer-controlled interactive video
Video conferencing
Electronic mail
Computer conferencing
Internet
Computer-based multimedia
Remote interactive databases
Virtual reality

Bates (1995, p.16) also identified the different one-way and two-way media.

Table 5 –One-way media and Two-way media, Bates (1995, p. 16)

One-way media	Two-way media
Print	Audio conferencing
Radio	Live interactive television
Audio cassette	Video conferencing
Educational broadcast television	Computer-mediated communication
Pre-recorded instructional television	
Video cassettes	
Computer-based learning	
Multimedia	

The first experience of eLearning for many people was to have Power point type slides projected on to a screen. Slides gave academics an opportunity to move away from 'chalk and talk' or acetate projection, whiteboard and marker.

Another user of early eLearning techniques was Linguaphone. It used cassette tapes to enable people to learn different languages. They also have evolved with the times and offer courses on cassette, CD-ROM, Video, DVD and now over the Internet with their 'Daily Services' product.

3.9.7 CBT and WBT

In seeing how information could be prepared and packaged, disc/file based Computer based training (CBT) packages came about, and these were enhanced by animation. CBT[21] in the main was used by Industry and Corporate organisations before Academic organisations. The Internet brought with it the evolution of Computer Based Training to Web Based Training (WBT). The Internet technologies along with the improvement in networking capabilities have taken that evolution to enable synchronous eLearning.

3.10 The Evolution of eLearning approaches

3.10.1 Definition

To try and define eLearning one has to trace its origins. Simply put we can assume the 'e' stands for Electronic. There are many definitions for Learning, I will put forward one definition: "The action of receiving instruction or acquiring knowledge; a process which leads to the modification of behaviour or the acquisition of new abilities or responses, and which is additional to natural development by growth or maturation"(www.oed.com). In searching for definitions of eLearning the following are put forward:

[21] CBT – Computer-Based training: An umbrella term for the use of computers in both instruction and management of the teaching and learning process. CAI (Computer assisted intruction) and CMI (computer managed instruction) are included under the heading of CBT. Some people use the terms CBT and CAI interchangeably.

"*eLearning : the use of new multimedia technologies and the Internet to improve the quality of learning by facilitating access to resources and services as well as remote exchanges and collaboration*."
The eLearning Action Plan: Designing tomorrow's education, 2001.
(http://europa.eu.int/eur-lex/en/com/cnc/2001/com2001_0172en01.pdf)

"*eLearning can be defined as the use of electronic technology and media to deliver, support and enhance teaching, learning and assessment*."
Institute for Learning and Research Technology, Bristol

"*E-learning (electronic learning)**:** Term covering a wide set of applications and processes, such as Web-based learning, computer-based learning, virtual classrooms, and digital collaboration. It includes the delivery of content via Internet, intranet/extranet (LAN/WAN), audio- and videotape, satellite broadcast, interactive TV, CD-ROM, and more*". (http://www.learningcircuits.org/glossary.html)

So it can be seen that eLearning can be CD-ROM based, DVD based, Network based, Intranet based or Internet based. It can include text, video, audio, animation and virtual environments. It can be a very rich learning experience that can even surpass the level of training experienced in a crowded classroom. It can be self-paced, hands-on learning.

The quality of the electronic-based learning, as in every other form of learning, is in its content and its delivery. eLearning can suffer from many of the same pitfalls as classroom training, such as boring slides, monotonous speech, and little opportunity for interaction. The advantage of eLearning, however, is that new software allows the creation of very interactive learning environments that can envelop the participant in the material.

Garrison and Anderson (p.34) put forward a definition for educational technology as "*those tools used in formal education practice to disseminate, illustrate, communicate, or immerse learners and teachers in activities purposively designed to induce learning*".

3.10.2 The evolutionary role of the Internet

An eLearning environment can usually be accessed by using a Web browser over the Internet or Intranet and supports several learning strategies and provides different ways of interaction, communication and collaboration.

Today, eLearning environments often include administration and management utilities and interfaces to other systems to support the organisational part of learning as well. Other terms are used for eLearning environments however some of these refer to a specific component of an eLearning environment.

Table 6 – eLearning environments

Type	Abbreviation
Content Management System	CMS[22]
Learning Content Management System	LCMS[23]
Learning Management System	LMS[24]
Virtual Learning Environment	VLE[25]
Web Based Training System	WBT System[26]
Distributed Learning Environments	DLE[27]

With the evolution of standards in the eLearning arena these components and their roles are becoming much more defined. It is making it easier for organisations when implementing an eLearning environment to know exactly what they are getting and what a particular component should do. It is making it easier to identify the potential to grow and evolve their eLearning environment in the future.

In effect there are parallels between an eLearning environment and any IT System, and from experience, the same level of application that is employed in designing and implementing an IT system should be used when putting together an eLearning solution.

As such, the System Development Life Cycle (SDLC) can be applied to developing an eLearning system, where the components are building blocks, the solution may be in-house or from different vendors. Like the SDLC, which is also called the Waterfall Model, it is an iterative process. As such we can relate the evolution of the eLearning environment to the evolution in Business Systems of the environments Supply Chain Management, Customer Relationship Management and Enterprise Resource Planning

[22] CMS – Content Management System – A centralized software application or set of applications that facilitates and streamlines the process of designing, testing, approving, and posting e-learning content, usually on Webpages.
[23] LCMS – Learning Content Management System – A software application (or set of applications) that manages the creation, storage, use and reuse of learning content. LCMSs often stored content in granular forms such as learning objects.
[24] LMS – Learning Management System – Software that automates the administration of training. The LMS registers users, tracks courses in a catalog, records data from learners; and provides reports to management. An LMS is typically designed to handle courses by multiple publishers and providers. It usually does'nt include its own authoring capabilities; instead, it focuses on managing courses created by a variety of other sources.
[25] VLE – A Virtual Learning Environment is a set of teaching and learning tools designed to enhance a student's learning experience by including computers and the Internet in the learning process.
[26] WBT – Web Based Training: Delivery of educational content via a Web browser over te public Internet, a private intranet, or an extranet. Web-based training often provides links to other learning resources such as references, email, bulletin boards, and discussion groups. WBT also may include a facilitator who can provide course guidelines, manage discussions boards, deliver lectures, and so forth. When used with a facilitator, WBT offers some advantages of instructor-led training while also retaining the advantages of computer-based training.
[27] DLE – Distributed Learning Environment

systems. The same terms and terminology can apply, as can the identification of Critical Success Factors.

From the experience of the GENIUS project, this could also apply to the building of an eLearning environment from different vendor components.

Again, there always was an element of technology in Learning. Power-point slides, projection, email to submit projects and to communicate with lecturer. These are now packaged in an eLearning solution like LearnLinc. However, no product can deliver all the elements of an eLearning solution - content management, synchronous delivery, asynchronous delivery. Vendors have to work together to ensure their products are compatible. This is where standards are critical.

3.11 eLearning technology today

The recent advances in communication technology coupled with the Internet have enabled rich media, such as sound and images, to be exchanged at relatively high speed and low cost. In the context of eLearning, this provides a viable means to connect students and lecturers, and opens up new possibilities for the delivery of teaching materials remotely and the enrichment of these materials.

Communication over the Internet can be broadly classified as *asynchronous* – users send information to common repositories which can be accessed by other users later on – and *synchronous* – users share virtual meeting spaces and exchange information in real-time. There are obvious differences between these two types.

3.11.1 Asynchronous Definition

Asynchronous learning: Learning in which interaction between instructors and students occurs intermittently with a time delay. Examples are self-paced courses taken via the Internet or CD-ROM, Q&A mentoring, online discussion groups, and email. (http://www.learningcircuits.org/glossary.html)

There are several advantages to this type of delivery system, including:

- Flexibility – access to the teaching material can take place at any time
- Time to reflect –rather than having to react instantly, it allows the learner to reflect over ideas, check references and take time to prepare a reply. If the teaching session is recorded and archived then students can go back and review the lesson
- Situated learning – the technology allows access from home or work, learner may have opportunities to integrate ideas being discussed on the course
- Cost effective – text based systems require little bandwidth and low-end computers to operate, making access more equitable. (Mason)

Asynchronous communication places fewer demands on participants' time, as it allows them to choose when they can or want to be online. As there may be prolonged time intervals between communications, it also allows for more time for reflection. On the other hand, it may yield interactions that are artificially protracted over time. This seems to indicate that asynchronous communication is more suitable for situations in which participation has to be flexible, e.g., participants have differing time availability, or is optional, or there are activities that require personal reflection or investigation in between communications.

3.11.2 Synchronous Definition

Synchronous learning: A real-time, instructor-led online learning event in which all participants interact at the same time and communicate directly with each other. In this virtual classroom setting, the instructor maintains control of the class, with the ability to "call on" participants. In most platforms, students and teachers can use a whiteboard to see work in progress and share knowledge. Interaction may also occur via audio- or videoconferencing, Internet telephony, or two-way live broadcasts. (http://www.learningcircuits.org/glossary.html)

There are several advantages to synchronous delivery, including:

- Motivation – Focuses the energy of the group and encourages students to keep up with their peers and continue with study
- Telepresence – Helps create a feeling of community and classroom cohesion
- Feedback – rapid feedback foster consensus-building in group activities
- Pacing – helps keep students up-to-date with the course (Mason)

Synchronous communication is more spontaneous and provides a greater sense of participation. Some studies have reported that the use of synchronous systems enables effective learning practices and improves group performance and productivity (Marjanovic, 1999). Compared to the traditional setting, some studies have indicated greater improvements in the level of active participation, discussion quality and group dynamics when synchronous collaborative systems are brought into teaching (Davenport and McKim, 1996 and Butler 1990 cited in Marjanovic, 1990)

It is important to note that synchronous multimedia systems require more sophisticated information technology solutions than asynchronous ones, in order to sustain a quality of communication that is acceptable to human participants. For instance, in a real-time audio conferencing system, users expect the voice streams to travel fast and accurately through the network, so that the system provides a good approximation of a face-to-face conversation. There is little or no time for the software to recover from, say, data lost on the network, buffering, without the users noticing. In effect humans are familiar with television and its quality and as such expect the same level of delivery and realism.

3.11.3 Four-Square model of distance education technologies

McIsaac and Gunawarden (1996) have adapted the distance learning elements from R. Johansen's book and created a four-square model of distance education technologies. A simple four-square map of distance learning options was developed by Johansen et al. (1991, p.16), which is based on two basic parameters that must be configured in a web-based education system: time and place. An education system can serve students in any of four configurations.

Table 7– The Four square map of Distance Education Technology Options

(Adapted from Johansen R., et. al. 1991, p. 16)

Same time, Same place	**Different time, Same place**	**Same time, Different place**	**Different time, Different place**
Face-to-Face	Labs	Teleconferencing (audio, audiographics, video)	Print
	Study centres	ITV	Audio cassettes
		ISDN	Video cassettes
		Broadcast and cable television	Computer conferencing
		Radio	Computer Assisted Instruction/Computer Based Training
			Interactive video
			Videotex

3.11.4 Same Time-Different Place Technologies

From the above model 'Same time, Different place' applies to Trinity College's implementation of synchronous online learning where the lecturer and student can be involved in live discussion, with the lecturer delivering the lecturer from his office or home and the student participating in the lecture from home, work or a lab within TCD. Technologies in this grouping have evolved and developed into products like LearnLinc. LearnLinc is an integrated classroom management/computer conferencing system that enables participants to speak to each other via the Internet. Later on in this chapter the components of LearnLinc are outlined in detail.

3.11.5 Blended Learning

The GENIUS project as implemented in the Computer Science Department at Trinity College fits the definition of Blended Learning. A blended learning solution consists of learning activities supported by a mix of Information and Communication Technologies

combined with traditional classroom activities. For the GENIUS project the mode was the delivery of face-to-face lectures in a lecture hall, interspersed with a series of online lectures.

3.11.6 The role of Enrichment

Certainly, the ability to transfer topic-related images and documents synchronously, when 'talking about' the topic enriches the interaction because of the added visualisation aspects. Visualisation enhances audio conferencing by providing the means to share visual representations of the concepts discussed and makes it easier to talk about the task in hand. Again with the LearnLinc product the 'Shared Whiteboard' component can be passed between Lecturer and student to enable exchanges in ideas or diagrams, for example. This is a key feature in simulating the classroom environment.

"*Visualisation exploits the ability of the visual system to identify patterns in images. In the fields of art, physics, and science, inquiry is often hard when only based on numerical or textual data. Visual representation often facilitates investigation and makes learning easier. In fact, visualisation is considered one of the most productive features of new technologies. Recent software and particularly that of the desk-top virtual reality type, provides users with numerous possibilities for the visual representation of objects. The combination of different media (graphics, sound, animation, text) also reflects the multiple representations that humans are capable of.*" Ligorio (2001)

Overall, the use of synchronous multimedia communication seems to broaden the role of computer mediated communication in teaching and learning, and multimedia communication systems that make use of narrow to medium bandwidths are becoming widespread (McConnell, 2000). However, there is still limited research published on the nature and use of these systems, and in particular on how such systems could be used to the best advantage of learners and teachers.

4 CHAPTER FOUR: THE LITERATURE REVIEW: SOCIAL, ADMINISTRATIVE AND MANAGEMENT ISSUES

4.1 Introduction

This chapter continues with the literature review but focuses on literature that identifies the social, administrative and management issues in implementing an eLearning initiative. It will also discuss the enabling role of technology in eLearning.

4.2 Social implications

So how do students react when participating in a synchronous online lecture? Do students feel and operate more effectively in a traditional environment using traditional resources?

Berge, (1995) outlines the following – "*For instance, it has been observed that synchronous communication impose psycho-social conditions on participants which can both enhance and detract from the instructional event. For example, participants may be reluctant or shy to talk in front of a live audience; international students may experience additional pressure due to language difficulties; conflicts may arise during live discussions. In addition in an electronic environment, the elements of group dynamics such as member roles, informality, the effects of humour and sarcasm may be perceived differently, and may result in unintended consequences*."

This may not be as prevalent a problem with non-traditional learners or mature students, many of which are quite comfortable with technology. Mature students will have lost some of their shyness, insecurities and inadequacies from playing an active role in their work environment. They bring this experience and also their acquired knowledge with them to the classroom.

Garrison and Anderson also identify the importance of the technologies used in eLearning to be able to support interaction. "*Integral to the technologies utilized in eLearning is the capacity to support interaction. This interaction focuses on that involving students – between and among other students, faculty, and non-human forms of content. However, the interaction between teachers, teachers and content, and among content agents themselves, are growing capacities that aid and enhance eLearning program development and delivery*."

As part of the project in Trinity College, the LearnLinc environment allowed communication between the students and lecturers using voice (the hands up facility) and by text messaging while online. A ListServ was put in place for students to communicate and collaborate with each other and they were also provided with email addresses as part of their student registration.

4.2.1 Facilitating

"Related to the above is the teacher's role in facilitating effective conferencing as a discussion leader and group moderator. In synchronous systems, the spontaneity of the interaction and the consequent effect of psycho-social conditions increases the importance of the teacher's role in helping students understand how to work in this type of environment. For instance, the teacher may have to greet the learners and help them access the system and the classrooms that are set up for the lecture sessions to take place. The learners who are most likely to be new to this sort of environment may require some initial guidance on how to transfer their existing, familiar metaphors for learning into the new medium (see Salmon and Giles, 1997 for more on, 'moderating' online)".

From Computers and Learning Research Group, CALRG Report No. 199

Even when the applications have been selected and learned, translating traditional classroom skills into synchronous classroom challenges even the seasoned instructor. The intent isn't to duplicate the exact traditional classroom environment, rather, it is an opportunity to think of new ways to incorporate the technologies and online classroom applications available to the instructor and the student. During the training workshops with the Lecturer it became obvious that this would be an evolutionary process, as both lecturer and student became more comfortable with the eLearning environment.

"*unless the teacher facilitates the networking activities skillfully, serious problems may develop. A conference may turn into a monologue of lecture-type material to which very few responses are made. It may become a disorganized mountain of information that is confusing and overwhelming for the participants. It may even break down socially….rather than building a sense of community*". Harasim et al. 1995

This was something that we were very conscious of before setting out on our project. In order to avoid such a scenario, some introductory sessions were put in place to encourage student participation.

4.2.2 Groundwork

In an article "Preparing Students to Join the Online Learning Community" (Differding), a good point to remember is that "*Most students spend years in traditional education. They are familiar with the classroom environment: desk, text, whiteboard, teacher and other students. Many students even look forward to the next class where we will renew friendships, rejoin the student camaraderie and face new challenges. They know what to expect. They are in a comfort zone*."

As part of the preparation for the experiment at Trinity College, Students took part in an induction evening to demonstrate the technology that would be used in the experiment,

they were shown the online tutorial that comes with the LearnLinc product. The students were encouraged to use the online tutorial in their own time.

A pilot session was set up to enable students to become familiar with the environment. They were asked to test their own technical environment and speak to the lecturer testing their headset equipment. The audio wizard component that is part of LearnLinc enables users to test their sound – voice and hearing, before they come online.

This pilot session proved to be an extremely positive exercise in the experiment, opening up communication channels between the student and the lecturer, but also the student realized that help and support were in place and would be in place throughout the experiment.

4.3 However, technology is not learning

I hear, I forget; I see, I remember; I do, I know...
-Chinese Proverb

Technology does nothing on its own. Technology is a tool. Learning will not happen just because we have or use eLearning technology. But learning can be supplemented, enhanced, made more accessible because of technology. Technology can now be a component of a comprehensive end-to-end eLearning solution. We need to capture the learning process of the brain and apply this to the building and delivery of materials for eLearning.

As Charles Handy points out, "*Real learning is not what most of us grew up thinking it was*." Information is not instruction, telling is not teaching, schools are dysfunctional. Learning isn't pouring knowledge into heads; it's igniting a fire. A true learning organization is foremost a doing organization.
http://www.internettime.com/itimegroup/elearn.htm

But choosing technology and implementing it is only the beginning of using technology to assist learning. The crucial part of the process is deciding how to use the technology to help achieve eLearning goals. Many learning technologies are actually communication and data storage technologies that have been customized and marketed to the eLearning industry by software companies. In effect many are standalone solutions that allow access by the learner at any time anywhere, but in an unsupported real time situation. LearnLinc in a way offers both. For students attending a lecture, they can participate in ‘same time, anyplace’ synchronous eLearning. Students who are unable to attend, for whatever reason, have the benefit of being able to participate in ‘anytime, anyplace’ asynchronous eLearning. The course materials are available to them, but also the added bonus of a recording of the live lecture, which many asynchronous eLearning systems do not have. Volery & Lord (2000) put forward three main variables that affect the effectiveness of online delivery: technology, instructor

characteristics and student characteristics. With regard to technology, reliability, quality and medium richness are key issues. They highlight that the network set up should allow for both synchronous and asynchronous exchange; students should have convenient access and the network should require minimal time for document exchange.

4.3.1 eLearning at the Computer Science Department

For the experiment at Trinity College we had a particular niche to satisfy, that of the mature student, the non-traditional learner, who had enrolled in an evening programme at a Traditional University to be delivered in a traditional face-to-face mode. We had a requirement from the GENIUS project to introduce eLearning technologies into this environment. LearnLinc was the technology solution on offer within the GENIUS project.

4.4 Other Education and eLearning issues

4.4.1 Modularisation

Many degree programmes follow a particular curriculum over three terms or semesters and constitute a major drawback to fit a flexible eLearning model. Universities need to modularize their course content to enable it to move into an adaptable lifelong learning role. This will cause major cost and change within universities. What about transferability between institutions? In Europe what about the credit system? A credit system is a systematic way of describing an educational programme by attaching credits to its components. The definition of credits in higher education systems may be based on different parameters, such as student workload, learning outcomes and contact hours. The European Credit Transfer and Accumulation System (ECTS) is a student-centered system based on the student workload required to achieve the objectives of a programme, objectives preferably specified in terms of learning outcomes and competences to be required. ECTS was introduced in 1989, within the framework of Erasmus, now part of the Socrates programme. ECTS is the only credit system which has been successfully tested and used across Europe. ECTS was set up initially for credit transfer. The system facilitated the recognition of periods of study abroad and thus enhanced the quality and volume of student mobility in Europe. Recently ECTS is developing into an accumulation system to be implemented at institutional, regional, national and European level. This is one of the key objectives of the Bologna Declaration of June 1999.
(http://europa.eu.int/comm/education/programmes/socrates/ects_en.html

4.4.2 The Bologna Declaration

The European Commission took an initiative with the “The Bologna Declaration on the European Space for higher education”. The Bologna Declaration is a pledge by 29 countries to reform the structures of their higher education systems in a convergent way. The Declaration reflects a search for a common European answer to common European problems. The process originates from the recognition that, in spite of their differences,

European higher education systems are facing common internal and external challenges related to growth and diversification of higher education. Notably, the employability of graduates, the shortage of skills in key areas and the expansion of private transnational education etc. The Declaration recognizes the value of coordinated reforms, compatible systems and common action to create a European space for higher education in order to enhance the employability and mobility of citizens and to increase the international competitiveness of European higher education. The Bologna Declarations set of specified objectives include:

- The adoption of a common framework of readable and comparable degrees, "also through the implementation of the Diploma Supplement (a document attached to a higher education diploma aiming at improving international 'transparency' and at facilitating the academic and professional recognition of qualifications (diplomas, degrees, certificates etc.)";
- The introduction of undergraduate and postgraduate levels in all countries, with first degrees no shorter than 3 years and relevant to the labour market;
- ECTS-compatible credit systems also covering lifelong learning activities;
- A European dimension in quality assurance, with comparable criteria and methods;
- The elimination of remaining obstacles to the free mobility of students (as well as trainees and graduates) and teachers (as well as researchers and higher education administrators).

The Bologna Declaration also recognizes the need for global competitiveness of European higher education for students, influence, prestige and money in the worldwide competition of universities.
(http://europa.eu.int/comm/education/policies/educ/bologna/bologna.pdf)

4.4.3 Role in Lifelong Learning

In a paper titled 'Lifelong Learning – Rising to the Challenge', Luker points out that American universities are in a much more readied state than in the U.K. where education at higher education level is seen as 'one-shot deal', where a student pursues a three-year full-time degree programme, "*the very antithesis of the concept of lifelong learning….All this must change, if lifelong learning is to be a concept with any value and meaning*". He further states, "*Academic programmes need to be flexible enough to take entrants from all backgrounds, so that they may succeed in obtaining a qualification at a level commensurate with their ability and performance."*

In United States of America modularity has been around for about 100 years and because of that flexibility and mobility in lifelong learning is closest to being realized. Technology can be an enabler and facilitator for lifelong learning. European universities need to realize that anyone in Europe could participate in a programme/module at an American university. Competition is now in the education arena.

The EU has recognized this in the Bologna Declaration and in November 2001, the European Commission adopted a Communication of Making a European Area of Lifelong Learning a Reality: "to identify coherent strategies and practical measures with a view to fostering lifelong learning for all." Lifelong learning is defined in the Communication as "all learning activity undertaken throughout life, with the aim of improving knowledge, skills and competence, within a personal, civic, social and/or employment-related perspective." In effect, all kinds of abilities, interests, knowledge and qualifications from the pre-school years to post-retirement, attained through all forms of learning, including: formal learning, such as a degree course followed at university; non-formal learning, such as vocational skills acquired at the workplace; and informal learning, such a inter-generational learning, for example where parents learn to use ICT through their children, or learning how to play an instrument together with friends. (http://europa.eu.int/comm/education/policies/lll/life/what_islll_en.html)
The document also highlights that learning opportunities should be available to all citizens on an ongoing basis, that lifelong learning is also about providing "second chances" to update basic skills and also offering learning opportunities at more advanced levels. The enabling role of Information and Communication Technologies and in specific eLearning technologies to contribute in this arena is apparent.

In Ireland, the Higher Education Authority (HEA) have launched their "HEA Action Plan 2005-07 for Widening Access to Higher Education". (http://www.hea.ie) The document calls on universities and institutes of technology in Ireland to provide the HEA with feedback on the plan and also to review their own processes and targets in this regard. In the Foreward to the document it identifies that: "This plan sets our the rationale behind equity of access and the practical steps that are required to create this. These include learners with a disability, mature students, disadvantaged school leavers and members of the traveller community and ethnic minorities. Effective implementation of the plan will mean that these groups are enabled and encouraged to enter, and successfully participate in, higher education."

4.4.4 Qualification and Accreditation

But what about qualification and accreditation? What about the Credit Transfer and Accumulation system? This has also to evolve into an internationally recognized mechanism for validation and transfer, not only in Europe. Only then can real global lifelong learning be a reality. Much work has to be done to standardize the environment to enable a seamless global education spectrum. This will take time and money at institutional level and government levels.

4.5 Faculty

Change is the word that has to be used when it comes to Faculty. The implementation of eLearning technologies will impact on many administrative and academic tasks within the faculty that heretofore were not required to support delivery of lectures. As will be

seen later in the evaluation of the GENIUS project, the cost is in additional man-hours to setup and support the technology and the virtual campus and class environments.

"*The use of technology entails an inevitable extension of working time and an intensification of work as faculty struggle at all hours of the day and night to stay on top of the technology and respond, via chat rooms, virtual office hours and email….*" (Noble)

However, the pressure is on for universities and institutions to take on board new technologies in enriching and enhancing and making available education options.

Some analysts argue that the Internet-supported distance education courses do more than bring new students into online classrooms. In addition they form "*a critical pressure point for challenging the dominant assumptions and characteristics of existing traditionally organized universities in the 21st century*" (Hanna, 1998).

4.5.1 Need to respond to the Net Generation

The level of computer literacy is on the increase within the school-leaver group. Therefore third level institutions will have to respond to this. Students have greater expectations, expect higher delivery standards and expect to use technology to enhance their learning experience and participation in education. They are used to interacting with play-stations, the internet and other media with a high level of graphical user interface.

"*If the faculties of small institutions resist technological advances, they will face yet another threat. Over the next 2-3 years the first wave of what Tapscott (1997) calls the Net Generation will be arriving at our gates. These students will be not only computer-literate but computer-sophisticated. They may or may not know more than previous generations but they will know significantly more about how to find information quickly and reliably using their computers. They will begin arriving on campuses where only a minority of faculty will have commensurate ability. Current progress in alerting faculty to this possibility is slow, so that that there will inevitably be a period in which some students are more proficient at finding current information within a discipline than do most instructors in that discipline. If this does occur, it will weaken the position of the instructor even more, forcing us to rely even more on extracurricular activities as an attraction for new students."* (Beard, 1998)

But there are other difficulties, as outlined in the following paragraph, and this was recognized during the GENIUS project. It isn't just the cost of the lecturer and the lecture hall anymore, and the cost isn't just money, it is also time.

4.5.2 Cost

Bates (1995) listed six criteria to be used in selecting any medium: student access; cost; teaching and learning; interaction, user friendliness, and control; organizational issues; novelty; and finally speed. Bates also attempted a comparative costing of educational media. At the lowest end of the range he called the production costs of on hour's face-to-face teaching "one unit". In comparison, the production of one hour of computer-mediated communication (CMC) costs between two and five units, one hour of high-quality television, twenty to fifty units, and one hour's interactive multimedia, fifty to one hundred units.

Also back in 1993, Laurillard recognized the cost of media-based materials. *"Media-based materials are too expensive to be developed by individuals, or by departments, or even by individual institutions. To be economically feasible, they must be made available, and used by larger numbers of students than any one institution could possibly muster before the materials are out of date…campus-based teaching institutions cannot turn themselves overnight into media-based teaching institutions. Moreover, they do not have sufficient numbers to justify in-house production of materials, so there will always be a need for inter-institutional collaboration…the two key criteria for selecting specific areas of the curriculum for development are that topics must be taught widely, and widely acknowledged to present difficulties for students."*

While the above figures are for 1995 and 1993, in the Computer Science Department at Trinity College, we saw the level of time and costs for the support that went into the delivery of four online sessions. A responsible institution cannot do it any other way. Administrative support and technical support must be available. Also, the cost of licenses must be taken into account. Technology may have advanced and become more user friendly, but so has the selling and distribution of technological solutions. In effect a business case should be made for any eLearning project, just like any IT project.

4.5.3 Partnerships

The emergence between telecommunications and the computer industry also enables the setting up of collaborative networks between universities and educational institutions. These collaborations are also recognized by Industry to be a source of future potential outlets for their technologies and they in turn are working with the universities.

This was envisaged in the early 1990's – *"the breaking down of conceptual distinctions between distance education and place-based education. The changing of traditional roles of faculty, administrative and support staff, adjunct tutors. And the provision of an opportunity, which never existed before, to create a network of scholars, "space" for collective thinking, and access to peers for socializing and serendipitous change."* (Paulson, 1992, 56)

Universities that go into partnership with each other hold great potential. Where course material in specific areas can be shared, different universities may present different modules to deliver a full programme of education. Again this is a major challenge as regards standardization, validation and accreditation. It also challenges the whole administration system within a traditional educational institution.

Also the roles of national education networks like JANET[28] and HEANET[29] potentially have a huge role to play.

4.5.4 Skills Set Identification

Across the World and in Europe educational organisations are trying to respond to the requirements of the workforce. What jobs do people do and what are the skills they require to do these jobs? This is also happening with some of the large IT vendors, who have provided training to customers and employees who have purchased their products over the years. Now these vendors have evolved this in to a new dimension – Certification. In effect they are competing with formal education.

4.5.5 Industry Universities

Why should someone who wants to work in an IT environment go to University for four years, then go out into the IT industry and start from the bottom again with on-the job training in a particular skills area? What if they can join a company that will support them through certification to enable them to be a qualified Oracle Database Administrator, for example, and attain this qualification and job standing within a much shorter period and along with that be getting paid for it? The IT vendors have even gone so far as to use the word university, for example, Oracle University.

Now we have the IT vendors making available their certification courses to educational institutions so at least the material and skills can be incorporated into formal education. But educational institutions are wary of this practice, because education is not just about

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[28] JANET - The range of activities facilitated by JANET allows individuals and organizations to push back the traditional boundaries of teaching, learning and research methods.
(http://www.ja.net/documents/JANET_booklet_4_03.pdf)
JANET provides many services to its members including email, global connectivity, Support - computer security, fault reporting, customer service, performance monitoring, consultancy. Access to other networks including HEAnet (Ireland), GEANT (Europe) and US Research Networks – Abilene[28] and Esnet, CERNET[28] (China) and (NII) Japan It publishes a wide variety of material including detailed technical material.

[29] HEANET – Higher Education Authority Network provider in Ireland. HEAnet is Ireland's National Education and Research Network, providing high quality Internet services to over 130,000 students and staff in Irish Universities, Institutes of Technology and other educational and research organizations. Today it is one of the largest Internet Service Providers in the country, although it is exclusively geared to meet the needs of the academic and research community through the highest quality telecommunications links and value-added Internet services. Like JANET it provides connections to networks in Europe, the USA and the rest of the world.

having a skill. It should be about sowing a seed and creating an appetite in the student to enable them to see and understand the bigger picture. To enable the student to understand the role of theory that undermines particular knowledge and enables knowledge building and growth, the university of life. It is possible that industry certification is extremely limited to a particular version of a product.

In Europe, the Career Space consortium, which was an initiator and partner in the GENIUS project (http://www.career-space.com), has identified particular skills that are required within the IT sector. The following is taken from their website –

"*With the support of the European Commission, a consortium of nine major ICT companies, (BT, Cisco Systems, IBM Europe, Intel, Microsoft Europe, Nokia, Philips Semiconductors, Siemens AG, Thales), and EICTA, the European Information, Communications and Consumer Electronics Industry Technology Association, has been exploring new ways of addressing this skills shortage. A project was set up, co-ordinated by International Co-operation Europe Ltd., to put in place a clear framework for students, education institutions and governments that describes the roles, skills and competencies required by the ICT industry in Europe.*
The first step was to develop generic skills profiles relevant to key jobs in ICT and to create a dedicated website (www.career-space.com) and use other communication tools to make this information widely available. The generic skills profiles presented on this website cover the main job areas for which the ICT industry is experiencing skills shortages. These core profiles describe the jobs, setting out the vision, role and lifestyle associated with them. The specific technology areas and tasks associated with each job are also outlined, as well as the level of behavioural and technical skills required to carry out the profiled jobs.

The second step was to work with over twenty universities and educational institutions across Europe to develop new ICT curriculum guidelines. These guidelines, which can be seen on our website, are intended to assist the design of courses to match the skills profiles and needs of Europe's ICT industry and eEurope."

The Consortium, together with the support of the European Commission, can see the role of eLearning technologies to be an enabler for collaboration between universities and industry within Europe. Similar initiatives have been undertaken in the US.

4.6 The Lecturer

Change abounds for lecturers in delivering lectures in a synchronous eLearning environment and also in an asynchronous environment. The main benefit with synchronous delivery of lectures is real-time interactivity without lengthy travel. As Mason (1995) points out, however, teachers often resort to what they know best, lecturing, when using video conferencing and audio-graphics systems. Marshall

McLuhan (1995) argued that "the content of a new medium is initially always an older medium". There is a failure or lack of confidence to take advantage of better presentation methods to enrich the experience. Although this remains an efficient way of transmitting information, the impact of the lecture can suffer when it is transferred to these new media. Students find it difficult to concentrate for an hour on information coming from a relatively small screen.

4.6.1 New Skills

It is vital that both students and lectures receive training in the new technology environment. Pilot sessions should be set up in order to gain a level of confidence with the environment before live sessions take place.

"*Various projects and their evaluation have demonstrated that both students and teachers need to learn new skills to interrogate distant information systems and to communicate with each other using the network. In many existing cases, educational providers have simply adapted or added some telematics onto face-to-face or other designed for the strengths and weaknesses of the particular medium (Paulson 1992). ... The technology does not in itself contribute to improved education. In regard to CMC generally, however, there is agreement about crucial issues, including scalability and tutor involvements, the structuring of activities, and changing the role of the learner and teacher." (Kirkup and Jones, 2000)*

4.6.2 Change in Lecturer role - Facilitators/Moderators

The lecturer should ideally be experienced, as a novice starting off as a lecturer and as an online lecturer will have too many things to concentrate on.

"Above all, the online teacher must be prepared to be flexible and to adapt and develop the premises on which he/she has hitherto based his/her work. He/She should be patient and, like his/her students, be willing to take risks, ask for help, accept criticism and admit mistakes. A sense of humour is also vital in order to keep sane while dealing with the inevitable technological hitches which occur with any course delivered online. Rather, he/she should be wary of "technological utopianism" (Kling, 1994) *or of becoming one of the "ubiquitous technozealots who simply view computers as the panacea for everything, because they like to play with them" (*Noble, 1998*). He/She must never fall into the trap of thinking that her own possible fascination with the potential of the technological medium is necessarily shared by her students, most of whom view the computer simply as an innovative means of study in new and complex circumstances."* (Ernest, 2003)

4.6.3 Role of Assistants

Another area identified in this new environment: "Can the Lecturer manage the class alone?" Is an assistant required? Especially in a large class, if there is a lot of text

communication, is an assistant required to monitor messages and to prompt the lecturer if a key question has been raised by a student…. who has just scrolled by?

"*There are fewer examples of computer conferencing being used with very large numbers of students (e.g. over 1,000), but it is clear that the potential number of messages for both students and tutors to deal with could easily become unmanageable*." (Pincas, 1995)

4.6.4 Technical capability

Harasim (1990) found that 2 critical factors of success in computer conferencing include: adequate user access to equipment and the instructor's effort and skill in teaching online. Burge and Haughey (1993) agree that the teacher's skill at using computer-mediated communication for "real" dialogues is important to positive online learning outcomes: "*We have to learn to make the hardware transparent, and to refocus our facilitation techniques on listening and responding rather than talking and directing"* (p.110).

Bonk and Cummings (1998) list several activities that can both personalize the web experience as well as providing interaction and interesting assignments using advanced technologies and discussion boards:

- Occasional videoconferencing
- Synchronous discussions with a guest speaker
- Small group work where everyone plays a role: i.e. CEO, HR manager, etc.
- Small group work where everyone adopts a character identity; e.g. Ghandi, Robin Williams, etc.

Bonk and Cummings also state that students need to be provided with several choices of activities and opportunities to explore the Web.

4.6.5 Interaction

Lack of eye contact between lecturer and student and vice versa in a face-to-face environment is a very important indicator as to how a lecture is being understood. In a virtual classroom setting where there is little or no face-to-face feedback, feedback is even of more importance. It is important for the lecturer to engage the students in regular communication during the lecture time, but also after a lecture for the lecturer to be responsive. For some students the online environment proves to be too impersonal and perhaps that leads to students dropping out from the synchronous experience and relying on the availability of course material asynchronously.

"Feedback in the online learning environment serves various purposes. It is a means of monitoring participation, motivating students and focusing and redirecting discussion. It helps to foster a sense of community and learning collaboration which in turn helps

*combat feelings of isolation, offering encouragement to the different types of students: "the swimmers, wavers and drowners"". (*Salmon, 2000:112*). In addition, it is a way of publicly praising exemplary work and of stimulating learning by indicating problem areas and strategies for improvement."* (Ernest, 2003)

An onus falls on the lecturer to encourage participation in the online environment. Students should not be left to lurk. One would wonder if students should be selected so as to enable them to become comfortable with the technology, the environment and hearing their own voice. The use of discussion questions are effective for generating dialogue, also having an assistant who at times participates or comments on a part of the lecture will also fuel interest. Text chat in a way is an opt out for students, but at least it may stimulate discussion.

4.6.6 Fallback

What if any part of the technology fails? The lecturer has to be experienced enough to handle the situation. A long-term failure of technology is more of a problem and with it comes the impact of distance. If a student is located very far away from the college what is the recovery strategy? What if the materials are very slow in downloading? What if the bandwidth of the students' connection is not capable of handling the materials (Kerka)? Various fallback and recovery strategies need to be in place. Technical support people need to be on hand.

Course material tends to be covered faster in an online environment, therefore the lecturer will need to allow for this, as more than likely, there will be less interaction between students and lecturer. He may need to have a fall back supply of course material. The structure of a course may change significantly because studies have shown that any lecture, whether online or traditional, should not last for more than an hour.

4.7 Non-Traditional Students as required by the GENIUS project

Like the definition of eLearning there are many definitions of Non-Traditional Students. One put forward by the U.S. Department of Education National Centre for Education Statistics (NCES) is as follows:

4.7.1 Definition

*"The term "nontraditional student" is not a precise one, although age and part-time status (which often go together) are common defining characteristics."(*Bean and Metzner, 1985). An NCES study examining the relationship between nontraditional status and persistence in postsecondary education identified nontraditional students using information on their enrolment patterns, financial dependency status, family situation and high school graduation status (Horn 1996). Specifically, in this study, a nontraditional student is one who has any of the following characteristics:

- Delays enrolment (does not enter postsecondary education in the same calendar year that he or she finished high school);
- Attends part time for a least part of the academic year;
- Works full time (35 hours or more per week) while enrolled;
- Is considered financially independent for purposes of determining eligibility for financial aid;
- Has dependents other than a spouse (usually children, but sometimes others);
- Is a single parent (either not married or married but separated and has dependents); or
- Does not have a high school diploma (completed high school with GED or other high school completion certificate or did not finish high school). (This is a particular requirement in the US)

Horn (1996) defined "nontraditional" on a continuum based on the number of characteristics present. Students are considered to be "minimally nontraditional" if they have only one nontraditional characteristic, "moderately nontraditional" if they have two or three, and "highly nontraditional" if they have four or more."

In another article "GIS Education in the Rockies for Traditional and Non-traditional students", Hick puts forward that "*Non-traditional learners are highly motivated adults with careers and families. They know why they are back in school. Their reasons usually include job enhancement and personal growth. Time is of the utmost importance to non-traditional learners*." We will observe this in our evaluation and analysis later.

For the GENIUS project our participants were part-time mature evening students. They had an average age of 29 and they were working full-time and attending college three evenings a week. For the majority of the group it was their first-cycle degree. They were also fee-paying.

4.7.2 Get what you pay for

Because the students were fee-paying, should they be asked to participate in an experiment that they had not enrolled for? Some comments and issues of students are discussed in the following websites:

"*Students want the genuine face-to-face education they paid for, not a cyber-counterfeit*."
Digital Diploma Mills: The Automation of Higher Education by David F. Noble
http://www.firstmonday.dk/issues/issue3_1/noble/index.html

"*If students are being used as guinea pigs in product trials masquerading as courses, should they be paying for these courses or be paid to take them*?"

Digital Diploma Mills: The Automation of Higher Education by David F. Noble
http://www.firstmonday.dk/issues/issue3_1/noble/index.html

Also the students came to Trinity College, a prestigious traditional university, to experience face-to-face traditional lectures and in doing so to be partaking in what they perceive to be the 'Trinity experience'.

The above quotations are fair comment, but it has to be noted, that this was not some cheap excuse for an eLearning experiment. More thought, management, administration and support went into this project than its face-to-face counterpart, so that in the end many students realized this and valued it.

4.7.3 Access

Harasim (1990) includes the necessity of access to functioning computers, with the required specifications to handle the client software, in her discussion of facilitative features critical to online success. Fast Internet connectivity is also important since slow modems hamper delivery (Kerka, 1996). It becomes a necessity when intending to offer an online course or module that students have to be advised of the specification requirement of their PC or laptop in order to participate. If they cannot comply alternative arrangements have to be put in place by the university or educational institution, for example, a computer lab may need to be specially upgraded.

Women may have particular access issues, in that they may not be the primary user of the PC in the home. In an UK Open University survey, students were asked about "the locus of control of" the home computer, (i.e., who had first call on it, who made decisions about it). "*Men students were twice as likely as women to report themselves as the decision makers with respect to the choice of whether to buy equipment; women were seven times more likely to report their spouse as the main decision maker. In terms of their own use of the equipment, men were more than twice as likely as women students to report using it every day, whereas women were more likely to use it once or twice a week or less*." As regards upgrading equipment, which is sometimes a requirement for a PC to handle a particular piece of software, "*Women students overwhelmingly did not know when equipment would be upgraded or replaced because, it can be presumed, the equipment was not primarily for their use"* (Kirkup and Jones, 2000).

When it comes to participation in an online environment it is also the case that "*researchers have found that men contribute consistently more than women. In fact when women contribute more than 30 percent on the conversation, they are perceived by the online community to be "dominating*" the discussion. Even in feminist forums…in a study of the newsgroup alt.feminism….men contributed 74 percent of the

postings, women 17 percent and 9 percent were of unidentifiable gender (Wylie 1995, 4).

Therefore a special effort may be required to involve women, especially with the level of PC literacy and training in the eLearning environment, perhaps the traditional environment suits women more?

As part of the GENIUS project, initially it was hoped that all students would be in a position to attend the online lectures from either their home or workplace. But from the results of the first questionnaire it was obvious that Trinity would have to make a computer lab available to students. This was done along with giving the students headsets and providing technical support in the computer lab for the duration of the lectures. This was an additional cost to the project.

4.7.4 Training

Training is vital for students to be comfortable in the online environment. Faculty at Grant MacEwan Community College (GMCC) in Canada said that students need "*advanced preparation*" in technology before taking distance courses via the Internet because, "*they feel some students overestimate their computer skills*" (White, 2000, p. 68). Perhaps, this is where supplementary training should be required to be provided by the university to bring students up to speed, or there should be a prerequisite to have at least the level of the ECDL[30].

As part of the preparation of the students at TCD, they were asked about their computer experience, were shown a demo of the environment and also participated in a pilot session. They were asked if they felt comfortable with the environment and felt confident to proceed. If they felt in any way inadequate further training was available, though found not to be necessary. However, a help desk support environment was made available to the students for the duration of the project and also afterwards if they wished to access the recordings of the lectures. Both training and support are additional costs in providing online eLearning.

4.7.5 Support

Support of students is also vital, Ragan (1999) emphasizes the significance of support to the success of a distance learning programme: "*Among the most important components in the design of distance education programs are those that establish organizational and administrative infrastructures to ensure that such programs can be efficiently and effectively developed, managed, and executed"* (p.5). In order to provide these services, Ragan (1999) suggests that institutions offering distance learning programmes adhere to the following 5 principles:

[30] ECDL – European Computer Driving Licence

- Provide a "comprehensive" system of technical support to ensure that distance learning technologies are used effectively (p.5)
- Provide faculty with support and development services in applied instructional technology and distance learning methods.
- Provide support systems to faculty and learners 24 hours a day, 7 days a week.
- Provide for feedback mechanisms to assess the support systems in place.
- Extend institution policy to accommodate distance learners and instructors.

All of the above entail additional cost and resources from the department.

The difficulty in providing support for students online in a traditional university is that you are asking staff, administrative and technical support staff, to take on a new role, changing their work load and their work schedule. This is an area of change that has to be handled cautiously to ensure everyone is satisfied with the arrangement. It is also an extra cost to the department.

In "Supporting E-Learning & Mobility in Higher Education: The Changing Role of the Information Systems Services Department" (Murphy & Pathnak) they focus on the issues at Trinity College in supporting the Centre for Learning and Technology in encouraging academic departments to put more of their course materials and documentation online and the introduction of blended learning (All outside the remit of this research). The focus at the Centre for Learning and Technology is on the WEBCT platform. The issues identified in that paper are as follows:

- Full support of senior management particularly senior academics
- Formal change management plan and communication with staff
- Identification of the "business" benefits (economies of scale, cost)
- Change in organizational structure and culture
- Funding
- Evaluation of best of breed technologies and vendors
- Skills training for staff and students
- Provision of appropriate ICT equipment
- The IT support service will need radical change to meet the new demands. There will be changes in the products supported and the way people work. The current IS Service would no be able to deliver the level of support and expertise required

These issues may also concern external organizations such as Unions in trying to come to work arrangement agreements with staff.

Online students are more likely to feel isolated and require more support in that area. When students have a problem, its seriousness multiplies because they feel they are on their own, and it becomes much more frustrating (Hara and Kling). To enable a sense of

community students should be encouraged to help each other, by using a facility like a Listserv or chat room. This also gives a feeling of belonging to a community.

Also many students who connected from home had only one telephone line. A mobile phone would be required to call the Help Desk to seek assistance. More advanced connectivity, i.e. Broadband can get over this problem while they were 'online' with both an Internet connection and a phone line on the one circuit.

4.8 ELearning in Action

Universities such as Regis University, Denver, University of Phoenix Online, Kaplan University Online, University of Maryland University College and many more offer online courses. Some online universities piggy back on existing traditional universities while others have been created to fill the online space. Potential distance students have a difficulty assessing the quality of education and reputation of the university.

4.8.1 University of Liverpool

We have examples like the University of Liverpool and its link with KIT (now called Laureate Online Education BV after its takeover by Sylvan Learning Systems) to provide online Masters programmes. They aim to have 10,000 online students. (http://www.whatpc.co.uk/news/1154405) The university has complete academic control over matters such as admissions, assessments and course content, while Laureate Online Education handles all the management and administration. Again, in the main, the delivery and support of their courses is asynchronous, but there is an emphasis on a community of students and small classes to enable this.

4.8.2 UkeU

The success of that collaboration is in sharp contrast to the UK government's £62m UK eUniversities Worldwide (UKeU) scheme, which was also set up four years (2000) ago to support the online provision of high quality, flexible and accessible higher education and professional development courses from UK universities to students globally. One of the conditions of the government's £62m grant was that the business should seek 50/50 public/private funding to put commercial drive and accountability into the venture. In 2001 a strategic alliance was signed with Sun Microsystems to build the technology platform which would deliver programmes and services for the e-Universities project. The mission of UkeU was that any UK higher education institution would be able to deliver courses and student services through the e-University, provided they satsfied the quality and standards thresholds. The e-University was not developing its own programmes along traditional lines, but was to act as a facilitator and broker, working with universities and colleges to develop, assemble and deliver a diverse range of courses aimed at individuals, companies and public organisations, both at home and overseas. (www.hefce.ac.uk/Partners/euniv/)

In November 2002 UkeU announced that it had recruited nearly 900 students from 38 countries studying online courses from 16 UK universities. This level of recruitment was below planned numbers.

So what went wrong? In an article published by the Observatory on Borderless Higher Education, they identify the following problems:

- First of all timing, UkeU was launched just before the dot.com crash and the hype of new technology transforming many aspects of society. A factor in the launch was a fear that the UK's international student market would be overrun by aggressive online universities from the United States;
- The second problem was focus. The dotcom boom presented online delivery as an alternative to the conventional campus rather than a supplement. Wholly online higher education had taken off in the US, but elsewhere take-up was much more limited, due mainly to the lack of sufficient status, scale and sophistication;
- This lead to a third problem – branding. Mainstream UK Education's brand emphasising tradition, place and quality and the UkeU attempting to marry the 'best of UK Higher Education' with online 'convenience'. It wasn't a one to one relationship, as has been successful for many US universities, for example the University of Phoenix Online and its strong alignment between the branding of the parent body the University of Phoenix itself. The University of Phoenix has grown to become the largest private university in the US with over 227,000 students who take classes online and at one of their 158 campuses;
- The fourth problem was platform investment. Early on the company took the decision that existing commercial and other platforms were inadequate, and that competitive advantage lay in developing a 'world class' platform in-house, enabling better alignment of the traditional UK higher education brand and 'high quality' online provision. The UKeU platform may indeed by among the best in the world, but this is very difficult to demonstrate to potential students. If they had used an existing platform, they would have been up and running faster and saved money;
- Finally, the fifth problem – impatience. Recruitment in the first year did not meet planned targets, however, because of the investment in the in-house platform, they took three years to recruit. Again, timing was an issue. Today, UkeU has been wound down, and the remaining 145 students are finishing their courses directly with the Universities providing those courses.

So in contrast, what works? The University of Liverpool in its alliance with Laureate Online Education BV has been very successful. Figures in November 2004 indicate 20,000 students from more than 95 countries.
(http://www.uol.ohecampus.com/pressreleases/291104.phtml)

The Open University continues to grow and evolve enhancing new eLearning technologies. Over 2 million people have studied with the OU, over 100,000 students study online from home and work and about 80% of students are working while they study. (http://www3.open.ac.uk/courses/about/index.shtml)

Here in Ireland, OSCAIL continues to grow and evolve also with over 3,500 students.

In the analysis of the results for this research project the key issues in implementing an online sysnchronous eLearning initiative will be presented.

4.8.3 The enabling Role of Technology

Technology has not just happened. People made it happen. They saw the benefits of merging different technologies and the benefits of collaboration in technological evolution.

We have a difficulty accepting some aspects of technology as our own creation, because they are intangible. Everybody could see the arrival of the car, trace its development and see the consequences (or could they!!) – it was on the road, but where is the Internet, where is cyberspace[31]?

The following sections will trace the evolution of communication advances and technology advances, which identify the building blocks of our current synchronous and asynchronous eLearning solutions.

"The qualities that will be valued in the 'knowledge-based future' will be the ability to access and understand information. That is, the ablity to order and construct knowledge. This is an enormous challenge and there are no simple rules or recipes for designing and delivering an effective e-learning experience." (Garrison and Anderson, 2000)

4.8.4 The role of Standards

The World Wide Web protocol standards are controlled by the World Wide Web Consortium. It ratifies new standards for the core protocols HTTP and HTML, and attempts to maintain some order in one of the most rapidly changing areas of human endeavour.

We also have existing organizations such as Intel, recognizing the niche in eLearning and education, and identifying some of the shortfalls of what is available to enable

[31] Cyberspace – The nebulous "place" where humans interact over computer networks; term coined by William Gibson in Neuromancer

online and distance education. They have introduced products such as eCDS[32] (an intelligent peer to peer file transfer utility) and are also very involved in the skool.ie[33] programme in Ireland.

4.8.5 eLearning standards

In the eLearning arena standards are also to the fore at the moment. Different organizations are working along with the Technology vendors striving to be the first to build products according to the evolving standards of IMS[34], SCORM[35], IEEE[36].

The evolution of standards in the eLearning environment is very important. The critical issues of reusability, portability, adaptability will be key to any organization building an eLearning environment. It is also vital if educational institutions are to collaborate.

4.9 So why mention all the above technologies and issues?

In Chapters three and four, the enabling technologies and the issues have been discussed. All of these technologies have become the enablers for asynchronous[37] and synchronous[38] eLearning. and they are still evolving. They are the foundation stones for eLearning platforms and technology solutions.

"*We shape our tools, and thereafter our tools shape us*" McLuhan, Understanding Media.

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[32] ECDS – Content Distribution Software from Intel.

[33] Skoool.ie – is a collaboration between AIB Bank, The Irish Times and Intel Ireland in association with other leading corporate supporters to bring you highly innovative, interactive and exciting learning. Focusing on the Irish Junior and Senior Cycle curricula, skoool.ie is the first resource of its kind designed specifically for Irish students and teachers.

[34] IMS – Instructional Management System: Global Learning Consortium: Coalition of government organizations dedicated to defining and distributing open architecture interoperability specifications for e-learning products.

[35] SCORM – Shareable Content Object Reference Model: A set of specifications that, when applied to course content, produces small, reusable learning objects. A result of the Department of Defense's Advance Distributed Learning (ADL) initiative, SCORM-compliant courseware element can be easily merged with other compliant elements to produce a highly modular repository of training materials.

[36] IEEE – The Institute of Electrical and Electronics Engineers: An organization whose Learning Technology Standards Committee is working to develop technical standards, recommended practices, and guides for computer implementations of education and training systems.

[37] Asynchronous Learning – Learning in which interaction between instructors and students occurs intermittently with a time delay. Examples are self-paced courses taken via the Internet or CD-ROM, Q&A mentoring, online discussion groups and email.

[38] Synchronous Learning – A real-time, instructor-led online learning event in which all participants are logged on at the same time and communicate directly with each other. In this virtual classroom setting, the instructor maintains control of the class, with the ability to "call on" participants. In most platforms, students and teachers can use a whiteboard to see work in progress and share knowledge. Interaction may also occur via audio- or videoconferencing, Internet telephone, or two-way live broadcasts.

They have evolved into becoming the environment for Learning Management Systems and will continue to evolve to become the complete eLearning solutions encompassing Learning Management Systems, Learning Content Management Systems, and the delivery mechanism, the Virtual Classroom and the Virtual Campus. Not all are used to full potential at the moment, i.e. like MUDS[39] and MOOs[40], but maybe this is where the future of eLearning will go with these types of environments useful in practical subjects.

4.10 The role of the Internet

Why have I gone through the evolution of education, technology, Internet, computer mediated communication? Because all of what we have in eLearning technology has come from there, and behind every technology is the capitalisation of human knowledge to take the thoughts and build the components, to continually evolve and revolutionise technology and what it can enable, especially in the arena of web-based collaborative sysnchronous eLearning. The Internet has been the main enabler enabling connectivity that would be impossible to initiate and coordinate from start, with every participator trying to connect their private networks. The Internet provided a platform to build upon.

4.11 Public Private Partnerships

The GENIUS project originated from a consortium of industry and academia. And it has proved that the two streams need to work together closely to identify the real needs in an eLearning environment. It is important that there be two-way communication between these two sectors for all to benefit.

4.12 Society today

Living, working and learning today has become a challenge. Traveling five miles into a city to college three nights a week after a day's work in the business is an unnecessary stress for anyone, never mind someone married with children or trying to have a good life. The ongoing issues of traffic chaos, no parking and perhaps no dinner, all of these add up to being big inhibitors to taking on an evening degree programme for four or five years. Is synchronous eLearning the answer?

4.13 Future evolution of the Internet technologies

4.13.1 Broadband

ADSL[41] is a technology that allows you to have both a phone connection and a broadband data connection (Usually to the Internet) on the same phone line. The broadband data connection has different speeds in each direction. The broadband data

[39] MUDs – Multi-User Dungeon or Dimension, a cyberspace where users can take on an identity in the form of an avatar and interact with one another. Also known as 3-D worlds or chat worlds.
[40] MOOs – Mud, Object Oriented.
[41] ADSL – Asymmetric Digital Subscriber Line – A type of DSL that uses the majority of the bandwidth to to transmit information to the user and a small part of the bandwidth to received information from the user.

connection is 'always on' without affecting the use of the phone. ADSL is delivered over the existing PSTN line (an ordinary telephone line).

In a recent Forfas survey, "Launch of Broadband Benchmarking Study", November 2004, Ireland is still performing poorly and is slipping in the global rankings. "*The rollout of broadband continues to be an issue and the results in this report show that we have slipped further behind both average and leading countries. The report estimates that compared with the average across countries surveyed, there is currently a broadband deficit in Ireland of up to 360,000 connections*" Martin Cronin Chief Executive, Forfas.

However, at this current time, initiatives are being supported by the Government to ensure greater availability of broadband around the Country.

Since this report a major promotional drive has now been launched by the providers of Broadband, offering free connections and use over a two-month period. However, difficulties in Ireland, include that whilst most homes are connected with cable that can handle ADSL, the exchanges that service some areas have not been upgraded to support the technology.

Eircom boasts 100,000 connections at this time, and estimates 500,000 connections by the end of 2007. This is seen as a requirement for the late 1990s not as of now. The limited availability of broadband and the cost are the two main inhibitors for most householders.

4.13.2 Wireless

Internet architecture is going through an exciting evolution with the emergence of wireless access technologies. This new Internet access method not only requires a larger IP address space, but also a number of fundamental features to enable wireless networking and mobility. The current state of IPv4-NAT architecture simply does not adequately serve this new Internet especially in terms of security, mobility, extensibility, and dynamic reconfigurability. IPv6[42] is rapidly emerging as the preferred platform to meet the many needs of the new Internet (http://www.isoc.org/briefings/014/index.html).

[42] Ipv6 - IPv6 is short for "Internet Protocol Version 6". IPv6 is the "next generation" protocol designed by the IETF to replace the current version Internet Protocol, IP Version 4 ("IPv4").
IPv6 fixes a number of problems in IPv4, such as the limited number of available IPv4 addresses. It also adds many improvements to IPv4 in areas such as routing and network auto configuration, global addressing, improved security and data integrity, integrated quality of service (QoS) and mobile computing. IPv6 is expected to gradually replace IPv4, with the two coexisting for a number of years during a transition period. (http://www.ipv6.org/)

There are many good reasons for educators to look into wireless technology. Many new wireless products are coming on the market; hitherto undreamt of educational uses are becoming possible as a result of wireless technology (Dan Page – February 2003, http://www.convergemag.com/magazine/story.phtml?id=42778).

From an Interview -

"*Q: There is a Chinese proverb, "Teachers open the door, but you must enter by yourself." What door have you opened for the students of Johnson C. Smith? And what will those who are willing be entering?*

A: Some students went to Mexico a couple of summers ago to study. They came back, and several told me they wanted a cybergarden. I said, "What do you mean?" They had gone to some school that had a wireless set-up -- where you could sit out and work in the gardens. And here I was trying to figure out how I was going to finish making sure all the racks and wires and everything worked; they were already into the cybergarden. They said, "Just think about it. We could sit and work anywhere." One day we don't have a computer. They next we have a computer lab. The next it was a laptop, and I can plug it in. And then it was I want to be free. And they are right. There is a digital revolution going on, and if you're going to survive, you have to be a part of it."

(President of Johnson C. Smith University, DOROTHY COWSER YANCY: MOVING FORWARD IN THE DIGITAL REVOLUTION http://www.convergemag.com/magazine/story.phtml?id=42776)

4.13.3 Client Server/Web Server

The advancement of client server technology has enabled the development of eLearning products, where users connected to a remote Server over the web. They do not need the complete application running on their PC, but just need a thin client front end which just takes seconds to download from the host site on to their PC. This was the case with LearnLinc. Once the download is complete users can use the LearnLinc environment to log on to the virtual campus and the virtual classroom. Users must have been given the URL[43] of the server and a login and password to enable them to log on.

4.13.4 e-books

Brand new to the market is a new class of wireless devices often referred to as "e-books." These tablet-size devices weigh less than laptops, but have larger screens than PDAs, thus making them easier to read and to display detailed graphics. An advertised advantage of some of these devices is the ability to accept handwritten input, but e-books are still too new to have had real impact in actual school situations.

At the closing conference of the GENIUS project, a member of staff from Intel's innovation centre in Dublin took the podium along with his daughter's school bag, and

[43] URL – Uniform Resource Locator – location of a resource on the internet, the global address.

showed us the future – not a schoolbag, but the equivalent of an e-book, the future of going to school. But who is going to pay for e-books? Industry? Government/Schools? Parents? Not all will be able to afford this luxury.

4.13.5 Networking Initiatives

Networks like JANET and HEAnet are currently not exploited to enhance eLearning. They pose huge possibilities for collaboration amongst educational institutions supported by Government.

4.14 Summary

This chapter along with chapter three, has outlined the literature to support this research. The Literature reviewed traced the evolution of education, Distance Education, eLearning, the Internet, technology, eLearning technology, the status of universities and academic staff in embracing eLearning. Questions have been raised as to how ready are traditional universities to play a strategic competitive role in a global eLearning sector. Many questions are embedded within the several critical success factors of doing so. The analysis from the data collected as part of the GENIUS project will put forward answers to most of these questions.

The next chapter will outline the methodology behind the data collection, collation and analysis.

5 CHAPTER FIVE: THE METHODOLOGY

5.1 Introduction

Chapter five will describe the methodology used in the research project, why it was used and the methods of data collection and data collation which were used to support it. The types of data analysis and mode of data presentation are also described. In Chapter six the actual implementation will be discussed in detail. Chapters Seven and Eight will put forward the results.

The intent of this research is:

- To evaluate the fit of web-based synchronous online delivery of a series of lectures to a class of part-time mature evening students at a traditional university, Trinity College;
- To determine the level of acceptability, accessibility, practicability, feasibility, workability of implementing the above;
- To evaluate the above at three levels – Faculty, Lecturer and Student

Four key factors were identified during the research – Operational, Pedagogical, Support and Social. The identification of these factors will be discussed. PEST (Political, Economical, Social and Technical) analysis also took place. The inclusion and contribution of the Assignment (Appendix H) will also be outlined. The results from these sources will be reported on in Chapter Seven – Quantitative and Chapter Eight – Qualitative.

5.2 Research Design

The design of the research approach for this experiment was driven and constrained somewhat by the requirements and timings of the GENIUS project. The evaluation required for the GENIUS project, as specified in the project document (Appendix A - GENIUS), was to capture the impact on students, lecturers and faculty. The evaluation to be based on top-down accountability and bottom-up instructional improvement approaches according to Harasim (1995), which are also known as “summative” and “formative” evaluation.

Separate from the GENIUS EU project requirements, there was a realization early on in the project by the researcher that this level of evaluation would be necessary for Trinity College. It was obvious that the project was going to have an impact in different areas of delivering a course from an Academic perspective, management perspective, both Technical and Operational, teaching perspective and student perspective. This information would be of great benefit to the AISG in the Computer Science Department in making future decisions on eLearning initiatives.

With the above issues in mind the initial approach to the GENIUS project was that of Exploratory Research, which underlies this thesis.

5.2.1 Exploratory Research

The following quote encapsulates the environment of this research project. The original GENIUS document as provided by the EU was somewhat vague in its specification of the parameters of the experiment. It was left very much up to the GENIUS team to identify the implementation boundaries, the student sample, the evaluation process and the analysis methods. From the outset the willingness of the students to participate was unknown and their level of compliance with the evolving evaluation process was also unknown.

"*As the term suggests, exploratory research is often conducted because a problem has not been clearly defined as yet, or its real scope is unclear. It allows the researcher to familiarise him/herself with the problem or concept to be studied, and perhaps generate hypotheses to be tested. It is the initial research, before more conclusive research is undertaken. Exploratory research helps determine the best research design, data collection method and selection of subjects and sometimes it may even conclude that the problem does not exist!*

Another common reason for conducting exploratory research is to test concepts before they are put in the marketplace, always a very costly endeavour. In concept testing, consumers are provided either, with a written concept or a prototype for a new, revised or repositioned product, service or strategy.

Exploratory research can be quite informal, relying on secondary research such as reviewing available literature and/or data, or qualitative approaches such as informal discussions with consumers, employees, management or competitors, and more formal approaches through in-depth interviews, focus groups, projective methods, case studies or pilot studies.

The results of exploratory research are not usually useful for decision-making by themselves, but they can provide significant insight into a given situation. Although the results of qualitative research can give some indication as to the "why", "how" and "when" something occurs, it cannot tell us "how often", or "how many". In other words, the results can neither by generalized; they are not representative of the whole population being studied"
(from http://www.ryerson.ca/~mjoppe/ResearchProcess/ExploratoryResearch.htm)

In effect this was the starting point for the GENIUS project and in putting in place the evaluation process. The approach to the designing and evaluating the project evolved

from this exploratory research position. This research thesis was then somewhat constrained by the limitations already in place. The research process was enhanced by introducing quantitative methods through the use of questionnaires.

The following sections will outline the rationale of conducting an evaluation.

5.3 Why Conduct an Evaluation?

The following quotation summarises the evaluation process as required by the GENIUS project. It is taken from the User-Friendly Handbook for Mixed Method Evaluations, Edited by Joy Frechtling, Laure Sharp, August 1997 (http://www.ehr.nsf.gov/EHR/REC/pubs/NSF97-153/CHAP_1.HTM). This source was identified as a 'good fit' for the approach and background to this EU funded project. It has been used to evaluate the progress and effectiveness of projects funded by the National Science Foundation's (NSF) Directorate for Education and Human Resources (HER).

The researcher felt the following described the initial feelings in the approach and reasoning as to how the GENIUS project was going to be evaluated and how the data was going to be collected, analysed and used in this Thesis. She also felt that by focusing primarily on quantitative techniques, evaluators may often miss important parts of a story. "*Experienced evaluators have found that most often the best results are achieved through the use of mixed method evaluations, which combine quantitative and qualitative techniques".*

In supporting the evaluation process:

"*There are two simple reasons for conducting an evaluation*:

- *To gain direction for improving projects as they are developing, and*
- *To determine projects' effectiveness after they have had time to produce results*.

Formative evaluations (which include implementation and process evaluations) address the first set of issues. They examine the development of the project and may lead to changes in the way the project is structured and carried out. Questions typically asked include:

- *To what extent do the activities and strategies match those described in the plan? If they do not match, are the changes in the activities justified and described?*
- *To what extent were the activities conducted according to the proposed timeline? By the appropriate personnel?*

- *To what extent are the actual costs of project implementation in line with initial budget expectations?*
- *To what extent are the participants moving toward the anticipated goals of the project?*
- *Which of the activities or strategies are aiding the participants to move toward the goals?*
- *What barriers were encountered? How and to what extent were they overcome?*

Summative evaluations (also called outcome or impact evaluations) address the second set of issues. They look at what a project has actually accomplished in terms of its stated goals. Summative evaluation questions include:

- *To what extent did the project meet its overall goals?*
- *Was the project equally effective for all participants?*
- *What components were the most effective?*
- *What significant unintended impacts did the project have?*
- *Is the project replicable and transportable?*

For each of these questions, both quantitative data (data expressed in numbers) and qualitative data (data expressed in narratives or words) can be useful in a variety of ways."

The chapter continues….

"It is important to stress that there are many ways of performing project evaluations, and that there is no recipe or formula that is best for every case. Quantitative and qualitative methods each have advantages and drawbacks when it comes to an evaluation's design, implementation, findings, conclusions, and utilization. The challenge is to find a judicious balance in any particular situation." According to Cronbach (1982),

"There is no single best plan for an evaluation, not even for an inquiry into a particular program at a particular time, with a particular budget."

As outlined earlier in Chapter Three, the students identified to participate in this experiment had not enrolled for an eLearning course, or even for part of their course to be delivered using new technologies. It was felt that questionnaires would be the least invasive means of getting the students to provide an evaluation. All of the team involved in the project completed the questionnaires also. The technology being used for the project, LearnLinc, also provided various outputs for analysis – text chat, attendee list, recordings, the Server Log.

5.4 Data Collection

5.4.1 Quantitative, Qualitative and Triangulation

In this experiment it was decided that both quantitative and qualitative data could be gathered.

5.4.1.1 Quantitative

Quantitative collection is used to quantify data and generalize results from a sample to the population of interest and to measure the incidence of various views and opinions in a chosen sample through statistical analysis of data. It can sometimes be followed by qualitative research that is used to further explore some findings.

5.4.1.2 Qualitative

Qualitative research focuses on the experiences, interpretations, impressions or motivations of an individual or individuals, and seeks to describe how people view things and why. It relates to beliefs, attitudes and changing behaviour. It has to do with the nature, characteristics and attributes that make something what it is. There are different methods of data collection including depth interviews, focus groups, observation, participant-observation, projective techniques, a collection of images, textual sources.
The methods for data analysis include identifying patterns, themes, coding, grouping into coded categories and relating to theory. This is an iterative process. Negative case analysis must be included.

A problem that is associated with qualitative research is that of validity and reliability. There are no statistics to back up any conclusions that are drawn. In this experiment the quantitative data supplied the statistics. Each method of data collection has its strengths and limitations. Because of this it is essential to use a combination of techniques of data collection. By applying this theory of triangulation i.e. using as many techniques as possible, you are not only getting what people say they do and what you see them doing, but also what they are recorded as doing. It is a way of verifying and strengthening the validity of the research results and allows us to hone in on the reality of the events under consideration. (Kane, 1993 and Hoepfl, 1997).

The following quotations from Thomas were identified by the researcher to capture the essence of the GENIUS research evaluation.

Thomas (2000) also puts forward that "*Qualitative evidence can be useful in the following circumstances….(3) To complement quantitative data gathering."* He also puts forward the issue of Trustworthiness of qualitative research – "*A key issue for qualitative research is developing a shared understanding of appropriate procedures for assessing its credibility or trustworthiness ("validity"). In a broad sense,*

trustworthy qualitative research, like quantitative research, needs to be based on systematic collection of data, using "acceptable" research procedures, and allowing the procedures and findings to be open to systematic critical analysis from others. The following specific procedures can be used to assess the trustworthiness of qualitative research. These techniques can also be used to assess quantitative research."

5.4.1.3 Triangulation

Thomas (2000) on Triangulation – *"Triangulation refers to comparison of findings derived from two or more data gathering procedures or sources of information. Using this technique, emerging findings can be assessed for the extent of consistency or inconsistency among data derived from different sources*. Transparency *refers to the extent to which the researcher makes clear how the raw data were gathered, how the analysis was carried out and how the findings were derived from the data analyses. A related concept is the* audit trail*; providing a clear and defensible link for each step from raw data to the reported findings. Links to the raw data are important to qualitative research. A good practice is to report the findings so they are "grounded" in the raw data, through the use of* quotes *or case studies. Replication, the repeating of the research (especially by different researchers in another location) to see if the same findings emerge, is a robust technique for verifying trustworthiness. Replication requires transparency in the reporting of original research methods.* Stakeholder *checks refer to the process of taking the draft findings to people such as research participants, service providers and others who have an interest. The researcher seeks comment on the extent to which the findings are consistent with their experiences, and whether the findings assist understanding of the topic being investigated."*

The data gathered in the course of the GENIUS project, as will be outlined below, gave qualitative, quantitative and triangulated results.

5.4.2 Questionnaires and Surveys

The advantages of questionnaires and surveys are that you can glean information about many people quickly in an inexpensive, non-threatening way. The results are easy to compare and analyse. The disadvantages are that it is difficult to check the accuracy of the answers and the data does not yield a 'full picture' (McNamara, 1999). As mentioned earlier, we wanted to carry out our analysis in a non-invasive way.
With that in mind it was decided that questionnaires administered in the Lecture Hall environment would seem most appropriate.

5.5 Questionnaires Used

In this experiment three questionnaires were used. A preliminary questionnaire, Questionnaire 1, (Appendix D – Questionnaire 1) was created to establish starting point details with regards to the students, their computer experience and the technology available to them to partake in the project. A set of questionnaires, Questionnaires 2

(Appendix E – Questionnaire 2) and 3 (Appendix F – Questionnaire 3), were designed to capture the before and after mindset of the students. The project objectives and central questions were uppermost in the design of the instruments used. The GENIUS Project Team included an Academic Advisor, Professor Dan Remenyi, who put forward the outline of the questionnaires to be used. The following will detail the design of the questionnaires, the gathering of data and the approach to the data analysis.

5.5.1 Questionnaire One (Appendix D – Questionnaire 1)

This questionnaire, with an introductory page, introduced the project and was presented on the first night of term to the students after the Lecturer had advised the students of the upcoming project. A few students reacted on the night, the others taking time to consider the reasoning for this project. The few students who did react verbally, about two in number, were negative, setting out that they had paid a substantial fee to attend this particular course which was to be presented in a traditional lecture hall face-to-face environment and "*if they had wanted to attend an online course they would have chosen to do so"*. The lecturer presented the case of the practical element that this project would bring to the course material for the module, 'IT and the Enterprise', and that eLearning was a good fit for the subject. Some students contributed enthusiastically and some shared their experience of using technology from home in a teleworking environment.

5.5.1.1 Focus and Purpose of Questionnaire One

The questionnaire was used to gather information about the availability of computers with the required specification to partake in online lectures. Ideally students were to use either a computer in their workplace or in their home, whichever location suited best. Because the students had not opted to partake in an online course, an option to attend the online lecture at a computer laboratory at Trinity College had to be made available. Students were to advise GENIUS team as to which location they intended to connect from, what type of internet connection they would be using, e.g. Internet Service Provider, whether it was a free service, modem speed, telephone line or ISDN and finally whether they intended to use a headset or speakers and microphone.

The main purpose of this questionnaire was to find out technical requirements and support information so that a support team, administrative issues and a computer lab could be made available for students.

The remainder of the questionnaire focused on personal and contact details. This was required in relation to support issues that might arise during the term of the project. In hindsight, more specific student information should have been gathered, i.e. the students educational background, whether it was their first-cycle degree and their reasons for taking the course.

This questionnaire gave valuable information to the Administrators of the project in identifying the level of support that the students would require. It also identified the

need for PCs to be made available in a computer lab at Trinity College for those students who did not have access to their own equipment.

The students on the first night they attended lectures and were advised of the upcoming experiment took the questionnaire home with them in order to check the specifications of the equipment that they proposed to use to partake in the experiment. 46 students out of 57, deemed to be registered, completed the questionnaire.

As this was preliminary support information and it was not considered to be 'statements of commitment' but rather of intent, no detailed analysis was carried out on the data, as it really was more for information/support/planning purposes than for critical analysis.

5.5.2 Design of Questionnaires Two and Three (Appendix E – Questionnaire 2, Appendix F – Questionnaire 3)

A set of two questionnaires, (Questionnaires 2 and 3), were to be used as part of the main data gathering and analysis for the experiment. The two questionnaires, in outline format, were designed for the GENIUS project by the Academic Advisor, Professor Dan Remenyi, who has considerable experience in the field of research in the Information Systems area. The original questionnaires had been used in previous Information Systems/Information Technology research initiatives. The questionnaires were in two parts, Section 1 and Section B. Section 1 had 27 quantitative questions and Section B had 10 qualitative questions. The terminology of the questions on the questionnaires was amended by the Academic Advisor and the two Research Assistants, in order to suit the web-enabled online synchronous eLearning environment and also to suit its research sample, part-time mature evening students. Additional qualitative questions were added to both questionnaires again to capture the uniqueness of this experiment. However, due to time constraints the questionnaires reliability and validity were in effect only tested on the members of the GENIUS team and should have been tested on wider greater sample.

The 27 quantitative questions used a nine-point scale, which in hindsight the project would have been better served by a five point scale to give more defined results due to the resulting small sample size perhaps.

Table 8 – The Nine point scale

		Strongly Disagree								Strongly Agree
1.	I expect ease of access to computing facilities for this project.	1 ____	2 ____	3____	4 ____	5 ___	6____	7 ____	8 ___	9 ___

Also, in hindsight, further questions should have been asked to enable more detailed analysis of, for example, the student background – education, marital status, nationality, location of home, of job. Again, this oversight came about because of time constraints and constraints of the GENIUS project.

Questionnaire Two was used to assess the students' expectations of the upcoming online eLearning experience before the experiment started. It contained the core 27 questions and the 10 qualitative questions. Questionnaire Three was used to assess the students opinions on the performance of the eLearning experience and was given after the experiment finished. It contained the 27 core questions, the 10 descriptive questions as in Questionnaire Two and an additional 21 questions focusing on the use of the facilities and functions of LearnLinc as used in the online lectures. These two questionnaires were used to assess the effectiveness of the use of Internet technology to create a virtual classroom to support or enhance the learning experience within the course 'IT and the Enterprise'. This was in line with the project objectives as outlined earlier in Chapter One.

5.5.3 Questionnaire Two (Appendix E – Questionnaire 2)

Questionnaire Two was used to assess the students' expectations, and the expectations of all involved in the project (Lecturer and Support Team) of using the new technology. The questionnaire had two sections.

Section 1 contained 27 statements about the respondent's perceptions of the use of the technology. An example of one of the statements shows the 'expectation' emphasis – 'I expect ease of access to computing facilities for this project'. The questionnaires came with a nine-point scale, which the project team continued to use. However, as mentioned above, a five-point scale would have been more appropriate and would have given more defined results.

The respondents were invited to express the strength of their opinion on a nine-point scale where 1 means Strongly Disagree and 9 means Strongly Agree. Respondents were to circle one number that corresponded to their level of agreement. The response to these 27 questions was to be collated and analysed as quantitative data.

Section B contained 10 descriptive questions one of which included an opportunity for the respondent to provide open-ended comment on their expectation concerning the forthcoming project. 5 of these were to be collated and analysed qualitatively and the other 5 quantitatively. These were additional questions added to the original format of the questionnaire.

Questionnaire Two was handed out in the Lecture Hall on the second night of term, the night of the induction, and also collected on that night. The number in attendance was 49. The number of students registered for the course was 57.

Not only did the students complete Questionnaire Two, but also the Lecturer, the project management team, the faculty director and technical support team also completed it. This was because as outlined earlier, this project had an impact on all those in the extended project team and this needed to be recorded. All participants were informed that on the completion of the series of online lectures they would be asked to complete another questionnaire, Questionnaire Three, to capture their opinions on the performance of the technology.

5.5.4 Questionnaire Three (Appendix F – Questionnaire 3)

Questionnaire Three was used to assess the students' opinions on the performance of the new technology. Again, anyone involved in the project also completed the questionnaire. Questionnaire Three was given after the project had been completed.

Like Questionnaire Two, Questionnaire Three had two sections. Section 1 contained the same 27 questions as Questionnaire Two, but the focus and wording was changed to capture the respondent's opinions on the use of the new technology. An example of one of statements shows the 'performance' emphasis – 'I found ease of access to computing facilities for this project'. Again this questionnaire had the nine-point scale.

The respondents were invited to express the strength of their opinion using the same nine-point scale as Questionnaire Two, where 1 means Strongly Disagree and 9 means Strongly Agree. Respondents were to circle one number that corresponded to their level of agreement. The response to these 27 questions was to be collated and analysed as quantitative data.

Section B contained 31 questions. The original 10 descriptive questions were asked as on Questionnaire Two plus an additional 21 questions. The additional 21 questions focused on the use of the LearnLinc technology and its facilities and utilities during the online lectures. The focus of the questions was both technical and pedagogical.

Questionnaire Three was issued and collected in the Lecture Hall on the last night of lectures from the Michaelmas term, which was the lecture after the online experiment. 42 students completed this questionnaire. The other seven students were contacted on several occasions, by email, mail and telephone, to submit their questionnaires but to no avail.

The Lecturer, the project management team, the faculty director and technical support team also completed Questionnaire Three.

5.5.5 Documentary Analysis

As outlined earlier, documentary analysis is also useful. Capturing people's comments and reflections after an experience can produce useful data and provide management with a real view of the subject. The LearnLinc environment and the Assignment (Appendix H) provided this.

5.5.5.1 LearnLinc environment

The LearnLinc environment offered other means of capturing data about the project. The LearnLinc server has a log file analyzer, which captures all logins to the Virtual Campus and shows what facility they used in the Virtual Campus, e.g. join a classroom, play a recording. This was useful for seeing who connected to the system after the project official date was over, either to listen to recordings or download material. It was also useful to see if students were disconnected during the online lecture session.

In the Virtual Classroom, recordings were made of all the lectures and also the pilot session. These recordings could be played back to check on student interaction and participation during the virtual class. Text chat can also be saved and again can be scanned for interactivity and relevance of text chat to course material. Finally attendance lists can be checked to see if people were consistent in their attendance.

Analysis of the text chat, the Listserv, email and use of recordings gave an indication of the students comfort factor in using these facilities. The content helped identify any problems that students were having. Also conversations that took place after the lecture sessions with the Lecturer, Support people and students were very relevant.

5.5.5.2 The Listserv

As part of the support infrastructure for the project a Listserv was set up to enable students to collaborate with each other and learn from each other's problems and issues. It was constantly monitored and responded to by the Genius support team. It can be seen from the assignment material that this was recognized and acknowledged for what it was set up for – to enable a community for the participants so they could to work together. The contents of the Listserv were available for analysis also. (See Appendix G – Listserv)

5.5.6 The Assignment

As part of the course module, IT and the Enterprise, students are given an assignment (Appendix H) that forms part of their course work. On the final lecture of term, as is normal every year of the course module, the students were given the assignment by their lecturer to be completed over the Christmas holiday period. For this particular year the assignment focused on the eLearning experience. It was felt that this was an appropriate assignment given the course material and the module 'IT and the

Enterprise'. Marks of ten percent of the overall course were to be awarded for the assignment.

Originally it was not intended to use the Assignment as part of the research material, however, when the lecturer reported back to the team having read and marked the assignments, the researcher decided to incorporate the material into her research.

The Assignment (Appendix H – IS2 Assignment) gave the researcher detailed data outlining each student's critical analysis of the experiment. I feel that it can be said that students gave an open analysis of the experience. This was driven by their sense of being totally involved in the project from start to finish, apart from the four students that did not do the assignment. This reasoning will be identified in the data analysis and in the conclusions of this thesis. 45 students completed the assignment.

5.5.7 Informal Discussion

Also, on the evening of the completion of the 'performance' questionnaire an informal question and answer/discussion session took place in the lecture hall. This also gave good feedback, which is shown in Chapter 6 TCD Results.

5.5.7.1 'Third Place' Discussion!!

As it was the last night of lectures of Michaelmas term which concludes before the Christmas Holiday, the students, Lecturer and other members of the Genius team retired to a local hostelry, where some open minded and useful discussion took place between the students and the team. This gave a valuable insight into the students' perception of the project. Notes were recorded the next day on the comments and insights gained.

5.5.8 Observation

Observation is used to gather accurate information about how a programme actually operates, particularly about processes. (McNamara, 1999)

Observation was also useful in leading to a deeper understanding of what went on in the experiment, it helped capture moments and reactions that no other means can. However, the data can be difficult to analyse.

In this experiment the lectures were observed. Student interactions with text chat, hands-up and feedback facilities were also observed. The recordings provided a means to record and review observations.

At the end of each online session, some students stayed online and discussed with the lecturer how the session went. Discussion also took place, face-to-face, between the lecturer and the other members of the GENIUS team, and a gut feeling reaction as to how the session went was captured. Notes were made and prior to each online session the GENIUS team's weekly face-to-face meeting took place to discuss and reflect on

the last session and to discuss what was to happen in the next session based on the observation notes and comments from students and observers.

5.5.9 Interviews

Interviews are used by researchers in situations where they want to get an insight into someone's experience or they want to expand on data collected in a questionnaire (McNamara, 1999).

In this experiment interviews, were unstructured and informal to give a sense of freedom to the interviewees. This was discussed under Informal Discussion above.

The following table summarises the methods used to evaluate the GENIUS project at Trinity College and to feed into this thesis.

Table 9 - Evaluation Methods used for GENIUS Project at Trinity College, Dublin

Techniques	Type	Source of Sample
Questionnaires	Quantitative (27 questions) + Qualitative Questions	Students Lecturers Administrative Support Technical Support Other Observers
Assignment	Qualitative	Students' Assignments
Observations	Qualitative	Online Lecture Recordings Server Log
Documentary Analysis	Qualitative	Textchat ListServ Email Lecturer's reflections Recordings

5.5.10 External Evaluation

As part of the GENIUS project requirement an External Evaluator, Ms. Christine Ward, was appointed to oversee and evaluate the activities of all the participating parties to the GENIUS consortium. Again the requirement was to evaluate from Student, Lecturer and Faculty perspective. The evaluator was given access to all the recordings and course materials of our lectures in the LearnLinc environment. A focus group of students was formed with whom the evaluator met. Ms. Ward also met the Lecturer and Administrative members in the Faculty responsible for the GENIUS project. Her report is available in Appendix I - External GENIUS Evaluation.

5.6 The Sample

5.6.1 The Students

The identification of the sample was driven by the purpose of the GENIUS project; to introduce synchronous online eLearning techniques and technologies into a traditional

third level institution. The niche focus at Trinity College was that of non-traditional learners, as defined in Chapter Two, participating in a first cycle degree. It was therefore going to focus on part-time mature evening Students. Students participating in evening programmes have to pay fees and therefore generally have higher motivation and expectations than full-time day students. These higher expectations are also driven by the fact that they are mature students, working full-time and they are putting a great effort as regards time and perhaps money into attending an Evening degree programme. Fifty-seven students had initially registered for the course identified for the project. However, some had dropped out leaving 49 that participated in the experiment. The students had an average age of 29.

5.6.2 The Course Module

Because of the nature of the project – eLearning, it was decided that it was most suitable for the B.Sc degree in Information Systems. This is a five year degree programme for which students pay fees. In Year two of this programme, the course module, IT and the Enterprise, was deemed a suitable fit for a practical eLearning experience, both from an educational and business point of view.

5.6.3 The Lecturer

One of the deciding factors in selecting the course module to be used for this project, was the availability of the Lecturer who was responsible for taking this module. His approach to traditional face-to-face lecturing is that of a highly interactive lecture where he invites students to contribute with their own experiences. Because of the nature of the students, (part-time mature evening students, working full-time in large organizations with comprehensive Information technology reliance) they could 'share and learn' from each other. The Lecturer was also very interested in using the new technology to enable synchronous online delivery of lectures.

5.6.4 The Technology

The Technology used was influenced by the technologies being supplied by the Industry partners in the GENIUS Project. However, Support-IT's LearnLinc product with its Virtual Campus and Virtual Classroom, as outlined in Chapter Two, was a good fit for what we what we wanted to implement.

5.7 Data Collation

5.7.1 Quantitative Collation

All three questionnaires provided quantitative information. This was collated, categorized and tabulated in Microsoft Excel spreadsheets.

5.7.2 Qualitative Collation

Again, all three questionnaires provided qualitative information. This was collated and input into Word documents. The data was read, key words were identified and ranked and from that themes emerged. This was an iterative process.

The Assignments, having been marked by the Lecturer, were given to the Researcher without prejudice. They were read through to get a gut feeling before they were analysed. The limitation of using the assignments was that the majority of them had been submitted with just a student number and therefore could not be identified and matched with the questionnaires. This is an examination requirement to ensure anonymity in the examination process. In hindsight permission could have been sought from the students to the assignments could have been traced back which would have given a greater possibility of triangulation between the questionnaires quantitative data and the assignments qualitative data. However, one has to respect the students integrity.

Informal discussion notes were also assembled.

5.8 Data Analysis

5.8.1 Quantitative Analysis

Quantitative research techniques generate a mass of numbers that need to be summarised, described and analysed. The first challenge was to organize the data and set out a method for doing the analysis. The first step was to tabulate all the responses to each question for each respondent in a data sheet using the coded values. This was done on a spreadsheet using Excel. Secondly a summary sheet was created for each question. Graphs and charts were produced, minimum, maximum, range, average and standard deviations were calculated for each question and each student responses. As a result of this analysis patterns and groupings in the data began to emerge. Summaries of all this analysis are available in Appendices N – R. Chapter Six reports the results.

5.8.2 How the Quantitative data was analysed

As outlined above Questionnaires Two and Three were the sources of the quantitative data. While collating the data from these questionnaires and considering the analysis of the data it became obvious that certain groupings, factors, existed within the data and that a number of questions were focussed on the same factor. On examining the core 27 questions, four key factors were identified – Operational, Pedagogical, Support and Social. A meeting was arranged which included the researcher, the members of the GENIUS team and the statistician to discuss the identification of the four factors and their relevance and application within the evaluation process. It was decided that use of the factors would give more meaning to the evaluation process. The following table identifies the questions and their factor fit. One question, question 26, did not fit within any of the factors.

Table 10 – Factor Identification – Questionnaires Two and Three.

Q.	Question	Factor Identification			
		Operational	Pedagogical	Support	Social
1.	I expect ease of access to computing facilities for this project.	X			
2.	I expect the internet technology to be easy to use.	X			
3.	I expect to access a quiet space in which to use this technology at home/work/TCD.	X			
4.	I expect the internet service I use to be able to support the use of this technology.	X			
5.	I expect a high degree of technical competence from college systems support staff.	X			
6.	I expect to have a high level of confidence in the systems I use	X			
7.	I expect a provision for disaster recovery/fall-back position.	X			
8.	I expect excellent system's response time.	X		X	
9.	I expect excellent technical training.	X		X	
10.	I expect fast response time from support staff to remedy problems	X		X	
11.	I expect to be in touch with my peers through the use of the e-mail support facility.			X	
12.	I expect the use of this technology to reduce the interactive experience of the classroom.				X
13.	I expect this learning experience to be positive		X		
14.	I expect that I will like the idea of working on my own away from my fellow students				X
15.	I expect to be comfortable communicating with others using this technology during live sessions.				X
16.	I expect the use of this technology to reduce my commuting time.		X		
17.	I expect I will need to find the time to learn the systems I use.				X
18.	I expect a high standard of presentation of course material		X		
19.	I expect these sessions to be intellectually stimulating.		X		
20.	I expect this learning environment to be more conducive to learning than the traditional		X		

	classroom.				
21.	I expect excellent documentation to support technical training.			X	
22.	I expect the use of this technology to enhance my ability to learn.		X		
23.	I expect that participating in the online sessions on my own will allow me to concentrate better.		X		
24.	I expect to participate in discussion more freely in the virtual classroom than in the traditional lecture theatre.		X		
25.	I expect the use of this technology to enrich my learning experience.		X		
26.	I expect the benefits derived by myself from the systems I use to be measured.				
27.	I expect the use of internet technology to improve my productivity.		X		

NOTE: The questions as read above use the words 'I expect…' as in Questionnaire Two 'Expectations. In Questionnaire Three 'Performance' the phrasing would be 'I found….' Questionnaires Two and Three are found in Appendices E and F respectively.

Again as part of the GENIUS project the services of a professional statistician were available. This approach of identifying the factors was endorsed by the statistician, as was the fit of the questions identified within each factor. The identification of the factor names - Operational, Pedagogical, Support and Social seemed a suitable fit for the online synchronous eLearning environment and for a match to the terminology as used in the questions.

5.8.2.1 Statistics used

Basic statistical calculations were carried out on the 'expectations' and 'performance' data, including maximum, minimum, average, range and standard deviations. As 'before' and 'after' type data (expectations and performance) were available it was possible to do a paired t-test, where the mean of 'expectations' and the mean of 'performance' could be tested for statistical significant difference. For this test the totals for each student for each of the questions in the factor were calculated for 'expectations' and 'performance' and then input into the paired t-test. The results of which will be outlined in Chapter Six. Again, in hindsight this t-test could have been done on each question not just on the Factor group, this would have given better and more detailed results. However, because the sample population is small and the number of questions in each factor is small, it is possible to identify the questions that may have had the

greater influence in influencing the result. The underlying data behind these results will be shown in appendices and these will be detailed in Chapter Six.

5.8.3 Qualitative Analysis

Unlike quantitative researchers, qualitative researchers use inductive analysis, which means that critical themes emerge from the data. Thomas (2003) puts forward the following in his article "*A general inductive approach for qualitative data analysis*". Taken from his abstract - "*The purposes for using an inductive approach are to (1) to condense extensive and varied raw text data into a brief, summary format; (2) to establish clear links between the research objectives and the summary findings derived from the raw data and (3) to develop of model or theory about the underlying structure of experiences or processes which are evident in the raw data. The inductive approach reflects frequently reported patterns used in qualitative data analysis. Most inductive studies report a model that has between three and eight main categories in the findings. The general inductive approach provides a convenient and efficient way of analyzing qualitative data for many research purposes. The outcomes of analysis may be indistinguishable from those derived from a grounded theory approach. Many researchers are likely to find using a general inductive approach more straightforward than some of the other traditional approaches to qualitative data analysis".*

Thomas's article also includes the following table:

Table 11 - The coding process in inductive analysis

Initial read through text data	Identify specific segments of information	Label the segments of information to create categories	Reduce overlap and redundancy among the categories	Create a model incorporating most important categories
Many pages of text	Many segments of text	30–40 categories	15-20 categories	3-8 categories

Note: Adapted from Creswell, 2002, Figure 9.4, p.266

5.8.3.1 How the Qualitative data was analysed

Table 11 above outlines the coding process in inductive analysis of qualitative data. This was the method used in analysing the qualitative data from Section B of Questionnaires Two (10 questions) and Questionnaire Three (31 questions). It was also the method used for analysing the assignment.

5.8.3.2 The background to the Assignment

As part of the traditionally delivered course module, students were given an assignment as part of their coursework. This year the assignment focused on the synchronous online eLearning experience the students had just participated in. The following is a copy of the assignment:

IS2 Assignment December 2002

The use of Technology in the Enterprise is evolving. In this context write a critical analysis of your experience of participating in Technology Assisted Learning with particular reference to its potential use in Business and Education.

Your submission should relate to your recent experience with LearnLinc and include the following:

- Your initial thoughts on the approach
- The preparation and management process
- The practical use of the technology
- The learning experience and its value in comparison with the traditional approach
- Your opinions following the experience
- The potential role of this technology in Education and Business
- Explore the political, economic, social and technological implications

Submission Instructions:

- Submit your assignment by e-mail as a word document
- Document should be 5 to 7 pages
- Spacing 1.5
- Subject of email: IS2 Assignment
- Send to dudley.dolan@cs.tcd.ie
- Submit by Monday 20th January 2003
- Access to recordings will be limited after 31st December

While it may be felt that the Assignment should not play any part in contributing to the analysis of the project because it was part of the course assessment. I can only say that on reading and analyzing the assignments I am of the opinion that they were not influenced in anyway by the fact that marks were being awarded. I felt that students were very forthcoming in their opinions and were in no way trying to make the lecturer, the faculty or Trinity College feel good by saying the 'right things. 45 students completed the assignment. The students submitted the assignment under the examination process, which is without identification. This limited the analysis in that I was unable to have the gender breakdown of students and also could not relate the assignments to the Questionnaires.

5.8.3.3 The Analysis of the Assignment

The analysis of the assignments was carried out as outlined above. The assignment put forward questions that the lecturer wanted the students to focus on in their submission. The lecturer had marked the assignments and then made them available to the researcher, without information as to the marks attained by the student for their work.

The approach taken in analyzing the assignments was to first of all read them through to get a feel as to how relevant they were to this research. It was obvious that they were a rich source of data. The focus of the second reading was to examine how they answered the relevant questions in the assignment, which were as follows:

- Your initial thoughts on the approach
- The preparation and management process
- The practical use of the technology
- The learning experience and its value in comparison with the traditional approach
- Your opinions following the experience
- The potential role of this technology in Education and Business
- Explore the **p**olitical, **e**conomic, **s**ocial and **t**echnological implications

The researcher identified common themes in the responses to the above questions. These key themes were recorded and the different findings and issues under each theme ranked. The results of which are discussed in Chapter Six.

5.8.3.4 Triangulation

From a research point of view the assignments give an element of triangulation, to the main questionnaire data, as the opinions expressed in the assignments endorse the output from the questionnaire analysis. However, as expressed earlier, it was unfortunate that a one-to-one relationship between a student's response to the questionnaire and their assignment submission could not be maintained.

Triangulation is a key tenet of the anthropological approach to data gathering (and therefore, teacher research). One should gather a wide variety of evidence for the purposes of triangulation.

As opposed to relying on one single form of evidence or perspective as the basis for findings, multiple forms of diverse and redundant types of evidence are used to check the validity and reliability of the findings (Jacob, 1990; O'Malley & Valdez Pierce, 1996; Maxwell, 1996; Wiggins, 1998).

By using multiple forms of evidence and perspectives, a truer portrait of the student can be developed (Wiggins, 1998). While the same biases in evidence collection still come into play, because more types of evidence are being used to form one's opinion about the student, there are more cross checks on the accuracy of the decision.

5.8.4 Stakeholder checks

Thomas (2003) outlines the importance of Stakeholder checks. "*Stakeholder checks enhance the credibility of findings by allowing research participants and other people who may have a specific interest in the research to comment on or assess the research findings, interpretations, and conclusions. Such checks may be important in establishing credibility for the research findings. For example, participants in the settings studied are given a chance to comment on whether the constructions of the researcher relate to their personal experiences. Stakeholder checks may be carried out on the initial*

documents (e.g., interview transcriptions and summaries) and on the data interpretations and findings. Stakeholder checking may be conducted progressively during a research project both formally and informally."

During this project the findings as they arose during the data analysis phase were discussed at the project meetings. The core team of four had experienced everything that happened during the project and were very interested to hear the findings and to discuss and comment on them. Within the GENIUS project overall, the EU partners held regular meetings where each partner reported on their progress within their particular niche focus in the project. As the project progressed the partners reported and shared their preliminary findings.

5.9 Summary

This chapter has outlined the approach to the methodology applied to data collection, data collation and the analysis approach. The next chapter, Chapter Six, will outline the project implementation in detail.

Chapter Seven will focus on the quantitative analysis results and Chapter Eight will focus on the qualitative results.

6 CHAPTER SIX: THE IMPLEMENTATION OF THE GENIUS PROJECT AT TRINITY COLLEGE

6.1 Introduction

Chapter Six will outline the response of AISG at the Computer Science Department at Trinity College to the GENIUS project requirement. It will outline the design and implementation of the project, the evaluation of the project, the administration requirements of such a project and the impact on different areas within an university environment such as Academic Management – Technical and Operational, Teaching and Students.

In Chapter Two the background to the GENIUS project was outlined. The focus then turned to Trinity College and its particular niche focus in this project. This chapter will outline how the reality of implementing a solution to satisfy the requirement evolved, it will identify the fit of the implementation to the requirement and the fulfillment of the work plan for the GENIUS project.

This implementation process is a key source for the evaluation and analysis for this research thesis.

6.2 The Problem Addressed at Trinity

First of all, the initial core team who would manage, implement, administer and research the project was identified and consolidated. Secondly, the cohort of students that would participate in the project was identified and the course module most suitable for delivery in this new form was identified along with a suitable lecturer. Thirdly, the technology to be used was sourced and relevant training available in the technology for the administration team was identified. Fourthly, the whole area of evaluation of the project had to be identified, including the framework for evaluation and the type of analysis best suited to the project.

At this early stage it could be seen that this project would have an impact across many areas: Academic Management - Technical and Operational, Teaching and Students. Even at the project initiation stage a team was required to set the project in motion, and even with the core team other resources had to be called upon to support the project.

6.2.1 The Core Team

The team consisted of a Project Leader, Academic Advisor, the Lecturer and two Research Assistants. From the beginning it was agreed that weekly meetings should take place during the project where roles and responsibilities were assigned. These

meetings proved vital and were useful in taking on board issues learned from the previous week and acting upon them. It became apparent from an early stage that specialist skills would be required in the area of Technical Support and in providing a Help Desk scenario. These were resourced from within the Computer Science department and were an additional cost to the project.

6.2.2 The Cohort of Students

The Computer Science department of TCD has had great success in the area of part-time mature students participating in evening programmes. It is the largest computer science department in Ireland with approximately 2000 students at both First cycle Degree and Second cycle degree level. An estimated 750 students are part-time mature evening students, i.e. students in full-time employment attending college by night to attain a First Cycle Degree, the average age is 29 years.

Because of its strategic positioning in this marketplace, a risk was attached to this experiment. While only reaching out to 49 students, these would work in organisations that, in the past supplied and in the future would supply, students for the courses at TCD. It was important that this experiment would be a success.

It was felt that the nature of the experiment – eLearning Technology - would best fit in with the course module, 'Information Technology and the Enterprise', which is a module on Year 2 of the B.Sc. in Information Systems, a five year part-time degree programme. All modules in this Year 2 are delivered in a face-to-face lecture hall environment.

The module 'IT and the Enterprise' runs over 22 weeks, where delivery is over 2 hour lecture sessions. It was felt that it was quite feasible to take 4 weeks out of the term for the GENIUS project as there was scope to accommodate any loss of material coverage that would normally be covered, if the need arose.

The online lectures were to last for an hour as it was felt that an hour wearing headsets was a long enough spell for anyone to stay attentive in that environment. The number of students involved was 49, the complete class. The module is normally assessed by an assignment worth 10 percent and an end of year exam worth 90 percent. This was to stay the same. However, the assignment was to focus on the eLearning experiment.

These students when enrolling for their degree programme had not been advised that some of the course would be delivered using eLearning Technology as it was not known at the time. The experiment therefore had to be 'sold' to them to encourage them to partake. With that in mind, the strategic importance of the Project Management was recognized. The Students would not be returning to college until October 2002 and at that stage most of the administration and technical infrastructure required to support an

eLearning experiment would be in place. It was vital to bring the students on board, to involve them from the start.

6.2.3 Course Description - Information Technology and the Enterprise

This module provides an overview of the evolution of computing environments and technologies. It traces some major milestones in the past, examines present day systems and outlines future trends in computing environments. The course addresses the fundamental knowledge, methods and skills needed to analyse, design and implement computer-based systems. It discusses the role of the systems analyst, the techniques employed and relationships that need to be maintained. Utilising the classical system life cycle approach, the development process is comprehensively discussed and reviewed. This provides a foundation for subsequent modules.

6.2.4 The Lecturer

The lecturer, Mr. Dudley Dolan, presents a highly interactive lecture stimulated by the use of Power-point slides in his normal face-to-face environment. Taking into account the subject nature and the nature of the students – part-time mature evening students - it could be a valuable learning experience for both students and lecturer. It was going to be interesting to see how this interactivity would transfer into an eLearning environment. As mentioned in Chapter two, the personality of the lecturer is a key component in the success of online delivery of lectures. We had the ideal candidate based on his confident approach to lecturing, his long experience of working with mature students and his interest in working with technology in learning and education.

6.2.5 The Technology

As outlined in Chapter One, various organizations in the IT sector are partners in the GENIUS project, making their technology solutions available to the Academic partners. With that in mind we focused on synchronous eLearning technology and the product LearnLinc supplied by Support IT was identified as being able to fulfill our requirements.

'LearnLinc is a live virtual classroom environment that enables corporations to deliver live e-Learning courseware to employees or students via the Internet, corporate intranet, or wide area network. Traditional instructor led classrooms have been fundamental to effective learning for thousands of years. LearnLinc combines all the instructor control and student interaction of the traditional classroom with the latest eLearning technology'. (http://www.ilinc.com/pdf/LearnLinc_Datasheet.pdf)

In Chapter Two, the Literature Review, the LearnLinc environment, virtual campus and virtual classroom, was fully described. (See also Appendix B LearnLinc)

Support IT, were the suppliers (VAR) of LearnLinc to the members of the GENIUS consortium. They were also in a position to offer training in both the technical administration of the product and in the Instructional use of the product.

6.3 The Challenges

Taking into account the experiment objectives, the course material, the Learning environment that the LearnLinc Technology made available and the student body, different challenges arose. These included firstly, and most importantly, the willingness of the students to participate, secondly, the evaluation of the experiment and thirdly, the design of the experiment.

The LearnLinc Technology was a new initiative in eLearning within Trinity College. While Trinity College has a Centre for Learning and Technology, this project had no connection with that group.

6.3.1 Challenge 1 – The willingness of the students to participate

The first contact with students was October 5th, 2002, the first night back for students in the Michaelmas Term, for Year 2, IS2. As outlined earlier, the students were unaware that they were to participate in this experiment. The Lecturer for the module, 'IT and the Enterprise', Mr. Dudley Dolan attended, as did the two Research Assistants of the GENIUS Team.

The lecturer introduced the structure of the course module for the students, highlighting that in the middle of this term an experiment with eLearning technologies would take place. He explained that the module 'IT and the Enterprise' was a suitable candidate for a practical experiment in eLearning. He also outlined that eLearning technologies were not only useful in the Education field but also in Business. He asked if any of the students had already used such types of technology. Some replied that they had used video conferencing, Microsoft NetMeeting and some were tele-working. The initial reaction was quietness, one of taking it in. One student said that if he wanted to enroll in an eLearning course he would have done so, he had come to Trinity College for the traditional experience. The response to this was that his opinions were acknowledged and accepted. It was felt that there was some reluctance, but in the main a willingness to explore further.

The students were then advised that an induction evening would take place the following week. This would introduce the students to the technology and the virtual environment. The induction session was to be presented the following week by the two GENIUS team members present at the introduction evening.

6.3.2 Challenge 2 - The Evaluation Framework

As part of the GENIUS project requirements, the experiment had to be reported on. The AISG in Trinity College also wished to gather and learn from the experiment. It was not an exercise that was going to be taken lightly. Concrete results and feedback were going to be important for further possible use of eLearning technologies within the Computer Science Department.

As mentioned earlier it became apparent that this project would have an impact in different areas of delivering a course – Academic management (both Technical and Operational), teaching and students. With that in mind the evaluation framework evolved. The Academic Advisor to the project played a key role in identifying evaluation methods, as did this researcher, with her focus on this research thesis.

Also as mentioned earlier the students had not 'bought into' this way of learning, so we also had to get them 'onside' for evaluation purposes. It was felt that questionnaires given to the students physically would be the least invasive means of getting the students to provide their evaluation. The questionnaires would be completed in 'college time' rather than in their personal time and we could ensure distribution and collection of as many questionnaires as possible. This was proved when we tried to administer Questionnaire Three to the seven students who had not completed them, but to no avail. In an eLearning environment the possibility of using online questionnaires and surveys was discussed, but the option of physically administering the questionnaires meant we had greater control.

The questionnaires were to be used to get their 'expectations' before the experiment started and at the end of the experiment their view of the 'performance'. All of the team involved in the project completed the questionnaires also. The questionnaires were presented and collected during lecture time to ensure completion and return. The questionnaires were to be the source of all quantitative analysis. Where a student's questionnaire was missing they were pursued by email to try and recover the questionnaire. 49 students submitted the 'expectations' questionnaire and 42 students submitted the 'performance' questionnaire. For the seven students missing no values were entered into the Excel spreadsheets and the calculations were based on 42 responses.

Also as part of the course work students had to complete an assignment. For this year students were asked to do an appraisal of the eLearning experiment.

Chapter Five, The Methodology, outlined in detail the evaluation framework. Chapters Seven and Eight will propose the results.

6.3.3 Challenge 3 – Design of the experiment

The experiment design was driven by the specific requirements of the GENIUS EU project, the technologies available, the course module and the Lecturer willing to give the Lectures.

As outlined earlier a project team was put together – the GENIUS Team. This brought a cohesiveness and seriousness to the project. This turned out to be its mainstay.

The following table outlines the schedule and activities for the project.

6.4 The Implementation Schedule

The implementation schedule had to encompass the resources and requirements of the project - the core team, the cohort of students, the technology and the evaluation framework. It also had to work within the work plan and time frame of the overall GENIUS project.

With all of that in mind, a timeframe for the TCD project was drawn up, and the activities were identified and defined to fulfill Phase 1 of the GENIUS project. The following table sets out the flow of activities during the project lifetime.

Table 12 - Implementation Schedule for GENIUS Project at Trinity College

Date	Time	Participants
July 2002	Team Formation	
July 2002	Technology Identification	LearnLinc
July 2002	Student Identification	Year 2, B.Sc. in Information Systems, Course module – IT and the Enterprise, Term 1
August 2002	Technical Training	LearnLinc Server Administration – Technical Administrator
August 2002	LearnLinc Training	Instructor Course – RA x 2
September 2002	Internal TCD LearnLinc Workshops	Instructor Sessions – RA x 2, Lecturer and team members
October 2002	Server Upgrade	Technical Administrator (TA)
	Install Licences	Technical Administrator
	Set up Student Registration	Research Assistant (RA)
	Student Photographs	Research Assistant
	Set up of ListServ	RA + TA
September/October 2002	Course material preparation	Research Assistant + Lecturer
September/October 2002	Design of Questionnaires/surveys	Academic Advisor, RA x 2
September/October 2002	Set up of Helpdesk/support	RA x 2, Technical Administrator x 2
September/October 2002	Set up of Problem Database	RA x 2
September/October 2002	Nurture of changing relationship between Technical Support and Project team	RA x 2, Technical Administrator x 2
October 2002	Course material upload	Research Assistant
October 2002 –	Course Introduction and	Lecturer and Students, 2 x RA

Week 1	advised students of upcoming 'experiment'. Questionnaire 1 issued and collected	
October 2002 – Week 2	Induction and training of students Completion of Questionnaire 2 – Expectations	Research Assistants x 2, Technical Administrator
October 2002 - Weeks 1-4	Cultivate Student participation in F2F class, nurture students to partake online	Lecturer
October 2002/November 2002	Collating of Expectations Questionnaire 2 –Quantitative and Qualitative data	RA x 2
November 2002 – Week 5	Reading week, online tests	Lecturer, RA x 2, TA x 2, students
November 2002 – December 2002 Week 6-8	Online synchronous delivery of course material Support of Students in Lab Help Desk Support	Lecturer, students, RA x 2, TA x 2, Programme secretary, Observers, All Team members.
November 2002 – December 2002	Capturing of Text Chat, Attendance Sheets, Recordings, Server Log Analysis	RA
December 2002 – Week 9	Completion of Questionnaire 3 – Performance. Informal Q&A/discussion session	Lecturer, students, RA x 2, All team members. Third Place[44]
December 2002 – Week 9	Students given Assignment based on the experiment	Lecturer
January 2003	Collating of Questionnaire 3 – Performance	RA x 2
January 2003	Collection of Assignments	Lecturer
February 2003	Interview with Students	External Evaluator

6.4.1 The first meeting

At the first meeting, in July 2002, the team came to the table having studied the GENIUS project document as provided by the Coordinator of the overall GENIUS project, (Appendix A - GENIUS), and had a clear view of what they wanted to implement. But at this point they had not seen the enabling technology, a web-based platform, LearnLinc. This was the eLearning product made available to us through the GENIUS consortium, to use in this project.

From the first meeting it was apparent that the team were committed to this project, visualizing the future benefits that might accrue within the Department, the faculty and the university, but also within the greater business community where the students came from and played significant roles. The project was also an opportunity to be a strategic player in a strategic EU project and also to be at the forefront of synchronous eLearning delivery in Ireland. But what if things weren't as successful as hoped? There were also

[44] Third place - "The social scientist Ray Oldenburg talks about how humans need a third place, besides work and home, to meet with friends, have a beer, discuss the events of the day, and enjoy some human interaction."

other major risks. All of these factors created a pervasive commitment to manage and support this project totally.

The cohort of students, as outlined above, was also identified at this meeting. However, the final number of students registering wasn't confirmed until beginning of term. This was important from the point of view of arranging licenses for LearnLinc. Not only did we need a license for every student and the lecturer, but also for the technical support personnel so that they could monitor the online lecturer, for assistant lecturer roles to assist the lecturer during the lecture, recorders and for other guests attending the lecture.

6.4.2 Training

The LearnLinc software was hosted on its own server. It was recognized that a technical person should attend the week long LearnLinc Administrator's course in order to have the knowledge to install and administer the LearnLinc software. When this had taken place LearnLinc was installed on a server within the department. The LearnLinc server was now administered by Technical Support. Technical support proceeded to set up user names for the members of the core team and once these accounts were in place the team could connect to the LearnLinc server over the Internet, log on and download the LearnLinc client software to their PC and then access the LearnLinc virtual environment. The above training and server were an additional cost to the project.

At that point, the two Research Assistants went on a two day LearnLinc Instructor's course with Support IT, the LearnLinc supplier. This proved invaluable as Team members developed a strong working knowledge of the web-based platform by self-training and peer-to-peer training. It also provided the knowledge for training the lecturer and students later on. Whilst the initial cost of training two research assistants was high, at least it enabled in-house training for the lecturer and the students.

Several internal workshops took place with members of the GENIUS team and also other staff in the department who were interested in seeing the product and its environment. Again, there was a cost outlay of time and commitment to the project. These sessions were of utmost importance to the Lecturer. He in turn spent some time self training, using different sources of materials and generally getting familiar with the virtual classroom environment. The major concern for the Lecturer was the lack of feedback and interaction that exists in a face-to-face lecture.

Emerging from this training, it was evident that this new pedagogical approach required a departure from the conventional and traditional role of the lecturer to a collaborative working relationship with team members and technical staff associated with this project. This change had to be managed. Communication was initiated with technical support management and the GENIUS team to ensure that this would be in place, and the necessary recognition would be forthcoming.

The training also gave an insight into possible problems that might arise during delivery of online lectures, issues with sound quality mainly, getting used to checking sound with the Audio wizard, getting used to a headset, the settings on the LearnLinc environment, downloading of slides, launching applications, watching an active screen for hand-raises and text-chat.

6.4.3 Support

Two technical support staff were identified to support this project for the duration. One had completed the LearnLinc Administrator's training course. His main function was to ensure the server remained online. However, he also attended the face-to-face induction evening in the lecture hall where he fielded technical related questions, such as network issues, bandwidth, firewall, etc. He also attended the computer lab where some students, who were unable to take the lectures at home or at work, took the lecture series and he helped out the students there. During the lecture series one of the Research Assistants in the Team also supported the students in the computer lab. The other Research Assistant assisted the Lecturer and recorded the lecture sessions and uploaded the recordings on completion of the lecture.

6.4.4 HelpDesk

The second technical support person was available in the college. His role was to support the Lecturer as he delivered the lecture, and other academic staff as they were connected to the LearnLinc sessions.

He was also on hand to support the Administrative staff as they administered phones during the lectures to ensure no student was left without assistance.

All of these activities were an additional cost to the department. Staff had to work in excess of their normal hours and had to be remunerated.

6.4.5 Changing Relationship between Support and Lecture

This was a departure from the normal and traditional workload of technical staff. Who had never before been asked to support an online lecture, or to be available in a computer lab to support students or take telephone calls from students. As in all organizations every department has its 'little empire' attitude and this can create barriers between groupings. The barrier had to be broken down between technical support and academia. This was a change barrier that had to be carefully nurtured as outlined above.

6.4.6 The virtual classroom environment

A decision had to be made as to what features of LearnLinc the lecturer would use in his online delivery. Bandwidth was a key factor in making this decision. The whole purpose of the project was to encourage students to connect from their workplace or

their home, as this was one of the main benefits for online delivery of lectures, i.e. students didn't have to battle into the City Centre after work. The questionnaire (see Appendix D – Questionnaire1) students were given on the first night of attendance in the lecture hall requested them to outline the technical specifications of their PC in work or home, wherever they intended taking the online lectures. For those who didn't have access to a suitable PC, PCs were made available in a computer lab in the TCD campus. From this questionnaire the team could see that most of the students had a dial-up connection to the Internet, one or two had a high-speed connection. Therefore the lecture implementation had to be consistent with the lowest bandwidth specification in mind.

It was decided to use the audio facility of LearnLinc for the lecture delivery but not video since the bandwidth requirement being less for audio. Photographs of the lecturer, students and other members of the team who would be observers, assistants to the lecturer, recorders and guest attendees were input into the system during the registration process. These photographs would be displayed on the virtual classroom screen when an individual had the floor, i.e. speaking to the class.

6.4.7 Course material content preparation

The Lecturer worked on his course materials. Taking his slides from the previous year's traditional delivery method as a base, these were amended to remove animations and any detailed colour backgrounds that would slow down downloading of the material during the online lecture because of bandwidth considerations. This impoverised the material to in order to enhance the lack of animations and enrich the online learning experience the other tools and utilities within LearnLinc were fully used.

6.4.8 LearnLinc tools and utilities

The synchronized web browser was used to supplement course materials with references to, and navigation through, relevant websites. These resources were shared across the network.

The Question and Answer facility was used to monitor students' understanding of the lecture content.

The Feedback facility was used again to ensure that students were able to keep up with the pace, as online lectures seem to go faster.

The text-chat facility was used by the students when they wanted to ask questions of the Lecturer or to comment. Text-chat could be sent publicly, so that everyone in the virtual classroom at the time could see it, or privately, where only the lecturer and the student sending the text could see. The Lecturer could either use the text chat to reply to

the student publicly or privately, or if the question was geared at the material being covered and had been sent publicly, the reply was discussed online.

The Whiteboard facility was used if a diagram was used to explain a particular topic or if people were suggesting answers it could be used like a whiteboard in the traditional classroom. The Whiteboard could also be shared with the students. For example, if a student didn't agree with the lecturer's diagram, the lecturer could pass the floor to the student who could then write or draw on the whiteboard and pass it back. This was visible to all the students in the virtual classroom.

The 'hand raise' facility was used by the students whenever they wanted to take the floor to ask a question or contribute to the lecture.

The recording facility was used to record every aspect of the lecture: audio, material presented, text chat including student interaction.

While the lecturer made every effort to prepare his course materials ahead of the lecture series, it has to be said that the delivery of the online lectures was also a learning process and an evolutionary experience. This manifested itself in the changes in the lectures from week to week. The growing confidence of the lecturer in using the virtual classroom was also evident and a factor in the evolutionary process. Guest attendees with knowledge of the lecture subject matter were invited to attend and encouraged to participate in stimulating further online discussion in the class.

6.4.9 Lecturer Support

The Lecturer's main focus was the virtual classroom environment. His primary role was to deliver online lectures to the students. He had to be confident about his lecture content, the potential for interaction and the virtual classroom environment. But before he could do any of this several tasks had to be completed by the Research Assistants with some input from technical support.

6.4.9.1 Setup of Server

It was decided to use a new machine (server) to host the LearnLinc software. Once this was commissioned, licenses for the LearnLinc software had to be procured and installed. All in all, 60 licenses were made available. Once the licences were installed, the students had to be registered as users on the server along with all the team members, technical support people, recorders and observers. Technical Support and a Research Assistant had responsibility for licenses and registration.

6.4.9.2 Photographs

Photographs had to be uploaded for all being registered so that when they used the hands-up facility and were given the floor, it could be seen who they were. This proved

to be a very important in fostering a sense of community for students and lecturer. The photographs were sourced from TCD registration.

6.4.9.3 Setting up of the Classroom

This role was the responsibility of a Research Assistant who took on the role of Administrator of the virtual campus and the virtual classroom. The students had been registered on the LearnLinc server. They now had to be registered for a particular course, IT and the Enterprise. This course had four classes set up, one for the Pilot Session on the 7th November and three for the series of online lectures on the 14th, 21st and 28th of November. Once the students were registered for the course they were then able to 'join' the classes. The Lecturer also had to be assigned to be the Instructor for his course, IT and the Enterprise. Any guest attendees, support team people also had to be registered for the course in order to attend. This is an additional workload, in effect it is duplication of the work carried out when a student registers with the college as a student for a particular course and there is also duplication in setting up the lecturer's lecture hall environment.

6.4.9.4 Uploading of Course Material

Once the Lecturer had prepared all of the course materials and resources he planned to use in his lectures, this material had to be uploaded onto the LearnLinc server. This responsibility fell to the Research Assistant who was the Virtual Campus/Classroom Administrator. Once the material was uploaded it appeared in Course Materials in the Virtual Campus view and in the Agenda in the Virtual Classroom view.

6.4.9.5 Availability of Course Material

Course material once loaded up into the virtual campus environment under the particular course it belonged to, in this case IT and the Enterprise, is available for students to view or download.

6.4.9.6 Recordings

Recordings were taken of every session. The recording facility records everything that happens in the lecture and whatever happens on the recorder's PC during that time. It captures voice, PowerPoint slides, white board use, synchronized web browser activities, and shared applications, text chat, attendance and also the still image (photo), of the lecturer or student when they have the floor. Once the recording is stopped the recorder is prompted if they wish to upload the recording then or later. In the case of this project recordings were uploaded straight away. The recordings are also listed under Course materials in the virtual campus and students can download or play them.

6.4.10 Listserv

Again in order to encourage the development of a sense of community and to encourage the students to help each other a Listserv (email discussion group) was put in place. All

the students, GENIUS Team and technical support people were made members. The Listserv was monitored regularly by the Research Assistants. It was set up as a self-support environment, where students could submit any queries or problems they were having and all members on the list could see what was happening and respond. This worked well. If a problem or query had not been responded to by another student within 2-3 hours a Research Assistant responded with a solution either from their own knowledge or in consultation with technical support. All members of the Listserv received the communications. The Listserv also served as a Problem Database. The contents of the Listserv are attached in Appendix G – Listserv.

It was also used as a tool for communicating to the students and the GENIUS team. Email reminders were sent to students reminding them of the time and dates of the online sessions, any password requirements and also details of the Help Desk numbers and support available to them during the project. (See Appendix J – Instructions for Online Lecture, Appendix K – Online Lecture Sessions, Appendix L – Online Lecture Series, Appendix M – IT and the Enterprise, last lecture notification).

6.4.11 How the term progressed

This section will trace the weeks of the term during which the project was implemented. As can be seen from the above sections, a lot of background work had to carried out before any online lecture could take place.

6.4.11.1 Week 1 – Lecture Hall

On week 1 of term the first part of the lecture was given over to an introduction to the course 'IT and the Enterprise'. The lecturer was in attendance along with two Research Assistants. Having outlined the Course content the Lecturer advised the students of the upcoming online lecture series. He outlined how this course module was a perfect fit for such an experiment, as eLearning had a place in Business as well as Education. The GENIUS team had decided it was important to involve students from the very start, since in any situation where there is change it is best to inform the people involved. The students were advised of the timeframe of the experiment. As outlined in the section – "The willingness of students to participate", there was a quietness, of weighing up the pros and cons, but there was just one dissenter who voiced his opinion, all the others seemed to be positive about participating, but quietly sceptical.

The students were issued with Questionnaire 1 (Appendix D). This questionnaire confirmed the schedule for the series of online lectures, the required specification for the PC they might use and asked students to evaluate the equipment available to them at home or work to participate in the lectures. If no suitable PC was available to a student they would have to participate at a computer lab at Trinity College.
Students were also asked to furnish some personal details, contact details, their Internet access details, operating system, whether the intended to use a headset or speakers and

microphone and if they had tested their sound system. They took this questionnaire away with them to check the specification of their potential PC.

6.4.11.2 Week 2 – Lecture Hall

Since the Lecturer could not be present for this lecture, it proved an ideal opportunity to hold an induction and training session with the Students. This took place in the lecture hall which had a PC connected to the Internet and an overhead beam projector. Two Research Assistants and the Technical Support Server Administrator attended this session.

Students were given an instruction booklet for setting up the LearnLinc client on the PC they were going to use to connect to the LearnLinc server. They were shown where the download files resided on the server. They were also shown the LearnLinc environment – the virtual campus and the virtual classroom. The environment was likened to a physical/traditional university. They were given a demo of the system. They were shown how to access the built-in tutorial and play it and they were also shown how to access course materials, to download them and play a recording. The students seem well pleased with this. Two students had questions about Firewall issues at their place of employment. The Technical support Administrator took care of these issues.

The students were advised that they would receive an email telling them how and when they could access the server once their logins and photographs were uploaded. They could then access the server over the Internet and logon, when they would try and join a class they would be asked to download the LearnLinc client software on to their own PC. This activity would take seconds, as a key feature of LearnLinc is that of a thin client.

The information from Questionnaire 1 was collected at the beginning of this lecture. It was collated the next day. The information gathered proved very important in assessing the requirements for the computer lab and for identifying support issues.

Students were also issued with Questionnaire 2 (Appendix E – Questionnaire 2), the first of a pair of questionnaires. This questionnaire was to capture the students' expectations of the upcoming synchronous online learning experience. As outlined in Chapter 4, it contained 27 questions based on a 1 - 9 point scale, where 1 meant strongly disagree and 9 meant strongly agree. It also contained 6 qualitative questions. Questionnaire 2 was completed and collected on that night.

6.4.11.3 Weeks 3-4 – Lecture Hall

Normal face-to-face lectures took place during these two weeks. The Lecturer used the opportunity to cultivate student participation in his lectures, which he hoped would encourage students to take part in a similar fashion online when the time came. Because

the students are mature students, working fulltime while part-time evening students, they were in a position to contribute and enrich the course content in the module 'IT and the Enterprise'.

The students also used that time to access the LearnLinc server and download the client software on the PCs that they intended using during the sessions. Some had problems for which they used the Listserv to find a solution. Students helped each other where possible and shared experiences, and where the problem was not solved the Research Assistants stepped in with a solution.

The Research Assistants started the collating process for Questionnaire Two.

6.4.11.4 Week 5 – Online Pilot Session

Week 5 of Michaelmas term is Reading week in Trinity College for this course. Students do not have to attend lectures but take the time to 'catch up' with course material. For this week, which was the week before the online lectures were to start, and for this project, we asked the students if they would try and log on at the normal lecture time. This was to enable them to test that they could connect to the server and join a class, hear and speak to the lecturer, and in general familiarize themselves with the environment. All in all 49 people were logged on that evening including 39 students, the lecturer, two research assistants, one of whom was acting as recorder, the Academic Director, two support technicians and four observers from within the Computer Science Department.

This session proved invaluable as many small problems, mainly to do with sound, were solved. Students became aware of the Audio Wizard as being of key importance in testing their sound environment.

6.4.11.5 Weeks 6-8 – Online Lectures

During these three weeks the online lectures took place.

6.4.11.5.1 Week 6 – 1st Online Lecture

The night of the first lecture was one of unprecedented torrential rain in Dublin. Those that were at home or in the work place were well pleased that they did not have to make their way into the City Centre. Many students logged on early to the server and so joined the class early. Again, they wanted to test their sound. The lecture started on time. All in all 47 people logged in to this session including 37 students (from 49), the lecturer, two research assistants, one of whom was acting as recorder, two support technicians, the Academic Director, the Academic Advisor and three observers from the Computer Science Department.

The lecturer felt that he covered the material faster than he anticipated, but that was probably due to much less interaction than there would normally be in a face-to-face environment. The lecturer had decided to make the lecture shorter than the face-to-face environment, and this was the correct decision. An hour seems to be long enough for to hold people's attention but also for the lecturer to continue to concentrate and deliver. On the first night students found the environment a novelty, in fact the text chat seemed to be much abused with non-college chat. Two students had logged in from the United States of America where they were for work reasons.

6.4.11.5.2 Week 7 – 2nd Online Lecture

Students logged on early again for this lecture, checking their sound yet again and chatting to the Lecturer. The lecture started on time. For this session the lecturer tried harder to get students to interact. The content of the lecture was of a more interactive nature. Also another lecturer in the college, who had logged on as an observer the week before and who had also been involved in the training workshops, started to comment on the material during the lecture. This prompted much greater discussion online. Again the lecture lasted for just an hour. Some students stayed on line after the lecture to chat. Again, 44 people logged into this lecture including 36 students (from 49), the lecturer, the two research assistants, one of whom was acting as recorder, the Academic Director, two support technicians and two observers from the Computer Science Department.

6.4.11.5.3 Week 8 – 3rd Online Lecture

The students logged on early again. The lecture started on time. The lecturer felt that he was much more comfortable and confident then on the first night. The lecture again was fairly interactive, with some interaction being stimulated by the observer lecturer. However, the lecturer himself felt very happy with how the lecture evolved. Again, some students stayed on line and were willing to discuss the lecture series. They were quite positive about the experience. Again, 44 people logged into this lecture including 37 students (from 49), the lecturer, two research assistants, one of whom was acting as recorder, the Academic Director, the Academic Advisor and two support technicians.

During all the online lectures text chat and attendance sheets were captured. Recordings were made of the lecture and uploaded after each lecture. The Server logs were also on the LearnLinc Server. The uploading of recordings was the responsibility of the Research Assistant who maintained the virtual classroom.

6.4.11.6 Week 9

Week 9 was the last week of Michaelmas term. Students were back in the physical lecture hall. The lecture was attended by the Lecturer and the two Research Assistants involved in the project. Questionnaire 3 (see Appendix F – Questionnaire 3) was given to the students at the beginning of the lecture and collected. It was completed by 42 students. This questionnaire was to capture the students' view of the 'performance' of

the recent synchronous online learning experience. As outlined in Chapter 5, it contained 27 questions based on a 1 - 9 point scale, where 1 meant strongly disagree and 9 meant strongly agree, it also contained the 6 qualitative questions, but it had additional questions to do with the functionality of the LearnLinc virtual classroom and the online experience as the students were now in a position to comment on the functionality. Questionnaire 3 was completed and collected on that night.

An informal discussion took place consisting mainly of the lecturer prompting the students as to how they felt being back in the classroom. The atmosphere was cordial amongst the students and also between the students and the lecturer. The Research Assistants left the lecture and a normal lecture took place.

6.4.11.6.1 The Assignment

The course 'IT and the Enterprise' is assessed by examination and by assignment, 10% of overall marks going to the assignment. The assignment is normally given out at the end of Michaelmas term, which was week 9, and students are to submit their work at the beginning of the next term, about four weeks later. This year the assignment (See Appendix H - IS2 Assignment) was to critically analyse the experience the students had with the synchronous online series of lectures. The assignments proved to a very rich and useful source of information, and contributed greatly to the qualitative analysis as outlined in Chapter 4.

In the weeks that followed the collating of all of the questionnaires was completed. The Lecturer collected the assignments and proceeded to assess them. It was his comments on the assignments that prompted the in-depth and further analysis. The method for this research was outlined in Chapter Five. The results will be proposed in Chapter Eight.

6.5 Summary

This chapter has outlined the implementation of the project both technically and operationally. It has also outlined the process of administering questionnaires and gathering them for evaluation purposes. The next chapter, Chapter Seven, will outline the quantitative results from this implementation and evaluation process and Chapter Eight will outline the qualitative results.

7 CHAPTER SEVEN: QUANTITATIVE RESULTS AT TRINITY COLLEGE, DUBLIN.

7.1 Introduction

This Chapter will present the quantitative results for this Research thesis as based on the implementation of the GENIUS project at Trinity College. It will refer to the research instruments, data collection, data collation and analysis methods as outlined in Chapter Five and it will present the quantitative results. Chapter Eight will present the qualitative results.

As indicated in Chapter Five while collating and evaluating the analysis methods it became obvious that certain groupings existed within sets of data, especially with respect to Questionnaires two and three and the core set of 27 questions in Section 1 of those questionnaires which were to be quantitatively analysed. Four key factors were identified for reporting on – Operational, Pedagogical, Support and Social.

The structure of this chapter will be determined by reporting on those four factors, the quantitative 'expectations' results and the 'performance' results within those factors, the statistical results and any relevant supporting comments from the questionnaires and the assignment.

7.2 The Players

Before looking at the results of the analysis it is important to understand the background of the participants and the scheduling of the questionnaires. The following table details the questionnaire, time of issuing, purpose and population sample.

Table 13 – The scheduling of the questionnaires and number of students participating

Evaluation Instrument	Date Issued	Main Purpose	Male	Female	Total Sample
Questionnaire 1	Week 1	Support issues	34	12	46
Questionnaire 2	Week 2	Evaluation	37	12	49
Project Implementation	Weeks 5 - 8				
Questionnaire 3	Week 9	Evaluation	33	9	42
Assignment	Week 9	Examinable, Evaluation	N/A	N/A	45

As mentioned earlier the Assignment was submitted on student identity number to maintain anonymity in the examination process. The assignment was worth 10% of the overall marks for the course module.

7.2.1 The Students

Before looking at the detailed Analysis it is of interest to see who the students were, their background as regards work experience and also computer experience.

Table 14 – The Student Population

	Students
Male	37
Female	12
Total	49

The maximum number of part-time mature evening students participating at any one time throughout this project is 49, 37 males and 12 females.

The **average age** of the group of students was **29 years**.

Table 15 – The Computer Access Location (Harasim, 1990)

Questionnaire 2 – Q.B 1. -Where students intended to take the online lecture.

Location	**Count**	**%**
Home	26	53
Work	7	14
TCD	15	31
All Locations	1	2
Total	49	100

49 respondents completed Questionnaire 2, 37 male and 12 female.

Questionnaire 3 – Q.B.1 – Where students took the online lectures.

Location	**Count**	**%**
Home	85	59
Work	19	13
TCD	36	25
All Locations	0	0
USA	4	3
Total	144	100

42 respondents completed Questionnaire 3, 33 male and 9 female.
They were asked where they took each online session. This gives an average attendance of 3.4 sessions out of 4 sessions. (144/42)

Before the project took place, students were asked to identify where they thought they would take the online lecture. (Harasim, 1990) This was after they had time to consider the PC specification required to participate in the online sessions. After the project students were asked to identify where they actually attended the sessions. On this occasion they were asked to identify each session and where they actually took it.

Two students took two of the online sessions logged in from the USA. They heard and were received loudly and clearly.

Table 16 –Questionnaire 2 – Q.B 26 In which Industry Sector do you work?

Industry Sector	Count	%
IT	25	51
Service Industry	10	21
Financial Services	6	12
Public Service	3	6
Other	5	10
	49	100

Table 17 – Questionnaire 2 – Q.B 27 What is your current job category?

Type of Job	Count	%
IT Development	18	37
IT Support	13	27
Administration	10	20
Other	8	16
	49	100

As can be seen from the above tables over 51% of students work in the IT sector, however, 64% of students are employed in IT development or Support within their organizations. It can be assumed that a high percent are computer literate.

Table 18 –Questionnaire 3 – Q.B28 – How many employees work in your organization?

No. of employees in organisation	Count	%
0-9	3	8
10-19	2	5
20-49	7	18
50-99	2	5
100+	24	64
Total	38	100

64% of the students work in large organizations with more than 100+ employees.

Table 19 - Questionnaire 3 - Q.B29 - How many years experience have you had working with computers?

Years of Experience	Count	%
0-5	27	55
6-10	17	35
11-15	5	10
Total	49	100

Table 19 shows the number of years of computer experience that the students had, with almost 45% falling in the greater than 5 years group. Table 20, below, shows that over 76% of the class use computers for more than 30 hours per week indicating very high computer usage. However, it must be accepted that although some students use a computer for their work, they may have a routine point and click role and may not be exposed to the potential of a computer. (White, 2000, p.68)

Table 20 Questionnaire 3 - Q.B.30 - How many hours per week do you use a computer?

Hours per Week using a computer	Count	%
0-10	3	6
11-20	4	8
21-30	5	10
31-40	16	33
41-50	11	23
51-60	9	18
61-70	1	2
Total	49	100

7.2.2 The Lecturer

The Lecturer has a long background in Information Technology and Computer Science. He is proficient in the topic to be delivered in the course material. Having delivered the course in previous years and also the supporting practical experience to support the material. He also has an outgoing confident personality, which is important in taking on the role of online synchronous delivery. (Noble, 1998)

7.2.3 The Team

The other core members of the team are also proficient in using Information Technology. The Academic Director has many years of corporate IT experience and the other two members were from an Educational Management background and Information Technology background respectively. Other staff called upon to support the project had the relevant experience, technical support and administrative (Ragan, 1999). As part of our team we had the services of an Academic Advisor – Professor Dan Remenyi, who is a visiting professor at the Department of Statistics at Trinity College. As outlined in chapter four, he was very involved in the devising of the questionnaires.

7.3 Quantitative Results

7.3.1 Questionnaire 1 – (Appendix D)

46 Students completed this Questionnaire, 34 male and 12 female. This questionnaire was given to students on the first night they attended lectures and were advised of the upcoming experiment. As outlined in Chapter four this questionnaire was used mainly for information for administrative and support purposes.

7.3.2 Questionnaire 2 – (Appendix E)

In all 49 students completed Questionnaire Two, 37 males and 12 females. As outlined in Chapter 5, an outline questionnaire was made available to the project by the Academic Advisor to the GENIUS team, Professor Dan Remenyi. The questionnaire had been used in other IS/IT type research projects. The questionnaire served as the base model for this project's Questionnaire Two 'expectations' and Questionnaire Three 'performance'. The Questionnaires were enhanced and tailored for the particular niche focus of this project and research: synchronous eLearning for part-time mature evening students.

7.3.3 Questionnaire 3 – (Appendix F)

In all 42 students completed this questionnaire, 33 male and 9 female. 42 students completed both questionnaires 2 and 3. Efforts were made to track down the missing 7 student responses, but to no avail.

7.4 Presentation of the Results

As outlined in Chapter Five, four factors were identified in the 27 core questions on Questionnaires Two and Three – Operational, Pedagogical, Support and Social. The

results will be presented and reported upon based on these factors. For each factor, results will be presented for 'expectations' and then 'performance' and comparisons will be made between these results. In order to summarise the nine-point scale I have identified range 5 – 9 indicating a positive response to the question, i.e. Agree to Strongly Agree. The results from the paired t-test will then be presented.

Where appropriate, representative quotations from the student's Assignments will be included to support findings.

Graphical output and relevant data to support the results are available in appendices and will be referred to below.

7.5 Factor: Operational

The 10 questions that are grouped under 'Operational' focus on the following areas –

- Ease of access to computing facilities
- Ease of use of the Internet technology and the role of the Internet Service Provider
- Technical competence of and confidence in training and support

The source data that were collated for each of these 10 questions are in Appendix N.

7.5.1 Questionnaire 2 – Expectations

Table 21– Questionnaire 2 Summary of Questions 1 – 10, as grouped in Factor Operational

Questionnaire 2 - Factor: Operational - 'Expectations' (n = 49)												
9-point Scale	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Total	%
Strongly Disagree 1	0	0	0	0	0	0	0	0	0	0	0	0.00
2	0	0	0	0	0	0	0	1	0	0	1	0.20
3	0	0	2	0	0	1	1	4	3	1	12	2.45
4	4	1	1	0	2	0	2	5	5	4	24	4.90
5	10	6	4	3	2	5	9	5	11	10	65	13.27
6	5	8	3	9	7	5	3	14	8	6	68	13.88
7	5	10	12	11	5	11	5	12	11	13	95	19.39
8	9	11	8	9	15	15	13	4	6	6	96	19.59
Strongly Agree 9	16	13	19	17	18	12	16	4	5	9	129	26.33
Total of scale 5 - 9	45	48	46	49	47	48	46	39	41	44	453	92.45
(5 - 9) as % of Pop.	92	98	93.9	100	95.9	97.96	93.9	79.6	83.67	89.8	92.45	
Total Respondents	49	49	49	49	49	49	49	49	49	49	490	100

The above table is a summary for all the student responses for the 10 questions in Factor Operational. It totals the selection on the scale 1 - 9 of the 49 students who responded to Questionnaire 2. It also totals all the results for Agree – Strongly Agree, scale 5 – 9, which are all positive responses, and presents this as a percentage of the population.

Table 22 – Questionnaire 2 summary of Questions 1-10, as grouped in Factor Operational

Questions – Factor: Operational - Expectations										
	Q1	**Q2**	**Q3**	**Q4**	**Q5**	**Q6**	**Q7**	**Q8**	**Q9**	**Q10**
Min.	4	4	3	5	4	3	3	2	3	3
Max.	9	9	9	9	9	9	9	9	9	9
Range	5	5	6	4	5	6	6	7	6	6
Avg.	7.1	7.3	7.5	7.6	7.7	7.4	7.3	6	6.2	6.6
S.D.	1.8	1.4	1.7	1.3	1.4	1.4	1.7	1.7	1.7	1.7

The above table is a summary of the basic statistics on the 10 questions in the Factor: Operational category.

These tables indicate that the expectations of the students at an operational level were very high. The questions about ease of access (Q1), ease of use (Q2), access to a quiet space (Q3), the expectations of the internet service (Q4) and technical support from TCD (Q5) are all very high. As with all people involved with IT systems there is a high awareness of disaster recovery and fall-back procedures, which is evident in question 7. Question 8, concerns system response time and has the lowest value for the 10 questions at 80%. Overall 92% of students had high expectations, agreed or strongly agreed (scale 5 – 9). This is not surprising.

7.5.2 Questionnaire 3 – Performance

Table 23 – Questionnaire 3 Summary of Questions 1 – 10, as grouped in Factor Operational

Questionnaire 3 - Factor: Operational - 'Performance' (n = 42)												
9-point Scale	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**	**Q6**	**Q7**	**Q8**	**Q9**	**Q10**	**Total**	**%**
Strongly Disagree 1	0	0	0	0	0	0	0	1	1	0	2	0.48
2	0	0	0	0	0	0	2	0	2	0	4	0.95
3	1	0	1	0	0	2	8	4	3	0	19	4.52
4	0	1	1	2	2	2	5	2	5	4	24	5.71
5	5	1	2	3	3	3	10	8	9	7	51	12.14
6	7	5	6	7	10	6	5	8	7	4	65	15.48
7	6	12	7	5	5	8	5	7	5	10	70	16.67
8	8	4	6	6	7	9	3	6	4	8	61	14.52
Strongly Agree 9	15	19	19	19	15	12	4	6	6	9	124	29.52
Total of Scale 5 - 9	41	41	40	40	40	38	27	35	31	38	371	88.33
(5 - 9) as % of Pop.	97.6	97.6	95.2	95.2	95.2	90.5	64.3	83.3	73.8	90.5	88.33	
Total Respondents	42	42	42	42	42	42	42	42	42	42	420	100

The above table is a summary for all the student responses for the 10 questions in Factor Operational. It totals the selection on the scale 1 - 9 of the 49 students who responded to questionnaire 3. It also totals all the results for Agree – Strongly Agree, scale 5 – 9 and presents this as a percentage of the population.

Table 24 - Questionnaire 3 summary of Questions 1-10, as grouped in Factor Operational

Questions - Factor: Operational - 'Performance'										
	Q1	**Q2**	**Q3**	**Q4**	**Q5**	**Q6**	**Q7**	**Q8**	**Q9**	**Q10**
Min.	3	4	3	4	4	3	2	1	1	4
Max.	9	9	9	9	9	9	9	9	9	9
Range	6	5	6	5	5	6	7	8	8	5
Avg.	7.4	7.8	7.6	7.6	7.4	7.2	5.31	6.2	5.8	6.9
S.D.	1.6	1.3	1.6	1.6	1.6	1.7	2.02	2	2.1	1.6
P - E (mean)	0.3	0.5	0.1	0	-0.3	-0.2	-2.0	0.2	-0.4	0.3

The above table shows the 10 questions and the range of scores for each question. The questions are given in full on pages 95 – 96. P – E is the performance mean minus the expectation's mean.

These tables indicate that the students found ease of access to computing facilities (Q1), found the technology easy to use (Q2), they also found access to a quiet space (Q3). They were happy with the ISP that they used (Q4), but had higher expectations of it. They were happy with the technical competence (Q5) and fast response time from support and they had a high level of confidence in the systems being used even though their expectations were higher than performance (Q6). Q7, which concerns disaster recovery, wasn't put to the test during the experiment, so perhaps that is why the score is low, 94% expectations versus 64% performance. The difference between the performance mean minus the expectation mean is –2, perhaps students understanding of what was meant by disaster recovery was different. Q8 concerns system's response time and indicates that the performance exceeded expectation. Q9 concerns technical training and students seem disappointed with the level of training, 84% expectations versus 74% performance. Disaster recovery (Q7) and training (Q9) account for the difference in the over all percentage of students expectations, 92%, for the Agree-Strongly Agree scale 5 - 9, and the percentage of students performance, 88%.

7.5.3 Paired Sample t-test – Factor Operational

The totals for the 49 expectation results and 42 performance results for the 10 questions in 'Operational' were tested using a paired t-test to identify if there was any statistically significant difference in the statistics being compared, where p >.05 = not statistically significant and p <=.05 = is significant.

Table 25 – Significant difference test – Factor Operational

Multivariate Summaries - Operational
No Selector
49 total cases of which 7 are missing

Variable	Count	Mean	StdDev	t-test	Probability
Operational - Expectations	42	71.357	9.476		
Operational - Performance	42	69.095	11.838		
Difference Operational	42	2.262	16.023	0.915	0.366

Therefore in analysing the above table, p >.05, there is no significant statistical difference between 'expectations' and 'performance' for the factor Operational.

7.5.4 A Student comment –

"*It was the first time that I used technology for education purposes so maybe that was the reason why I felt anxious and a bit unsure what to expect from the project. Also my class were the first to use the software so I expected LearnLinc to be troublesome and felt the class were the "guinea pigs" in trying to find bugs etc., in the program. Even though I had negative thoughts I was excited in using the software for the first time. It*

was something new and it was going to be a break from the traditional classroom lectures."

7.6 Factor: Pedagogical

The 10 questions that are grouped under Pedagogical focus on the following areas –

- The Learning experience, the ability to learn, that the environment would be more conducive to learning v face-to-face traditional environment, the enrichment (Ligorio, 2001) of the learning experience, level of concentration and participation, standard of presentation
- Improvement in personal productivity, reduced commuting

The source data that were collated for each of these 10 questions are in Appendix O.

7.6.1 Questionnaire 2 – Expectations

Table 26 – Questionnaire 2 – Summary of Questions 13,16,18-20, 22-25, 27 as grouped in Factor Pedagogical

Questionnaire 2 - Factor: Pedagogical - 'Expectations' (n = 49)												
9-point Scale	Q13	Q16	Q18	Q19	Q20	Q22	Q23	Q24	Q25	Q27	Total	%
Strongly Disagree 1	0	6	0	0	3	2	2	4	1	2	20	4.08
2	0	2	0	0	2	2	3	6	2	1	18	3.67
3	1	2	0	1	4	3	2	2	1	3	19	3.88
4	2	1	1	3	7	5	6	4	3	3	35	7.14
5	4	4	3	2	14	9	13	10	8	8	75	15.31
6	6	1	7	6	6	5	6	5	5	6	53	10.82
7	12	3	13	12	5	10	6	9	15	13	98	20.00
8	11	11	15	11	6	7	5	4	8	6	84	17.14
Strongly Agree 9	13	19	10	14	2	6	6	5	6	7	88	17.96
Total of scale 5 - 9	46	38	48	45	33	37	36	33	42	40	398	81.22
(5 - 9) as % of Pop.	94	77.6	98	91.8	67.3	75.5	73.5	67.3	85.7	81.6	81.22	
Total Respondents	49	49	49	49	49	49	49	49	49	49	490	100.00

The above table is a summary for all the student responses for the 10 questions in Factor Pedagogical. It totals the selection on the scale 1 - 9 of the 49 students who responded to questionnaire 2. It also totals all the results for Agree – Strongly Agree, scale 5 – 9 and presents this as a percentage of the population.

Table 27 - Questionnaire 2 – Summary of Questions 13,16,18-20, 22-25, 27 as grouped in Factor Pedagogical

Questions - Factor: Pedagogical - 'Expectations'										
	Q13	Q16	Q18	Q19	Q20	Q22	Q23	Q24	Q25	Q27
Min.	3	1	4	3	1	1	1	1	1	1
Max.	9	9	9	9	9	9	9	9	9	9
Range	6	8	5	6	8	8	8	8	8	8
Avg.	7.3	6.7	7.4	7.3	5.2	5.9	5.6	5.3	6.4	6.2
S.D.	1.6	2.9	1.3	1.6	2	2.2	2.2	2.4	1.9	2.1

The above tables shows the 10 questions and the range of scores for each question.

These tables indicate that the expectations of the students at a pedagogical level were uncertain. They expected a positive learning experience (Q13), the majority expected a reduction in commuting time (Q16), they expected a high standard of presentation of course material (Q18) and they expected the sessions to be intellectually stimulating (Q19). However, they were not so sure that they would learn more (Q20), but they expected the technology to enhance the ability to learn. Q23, Q24, Q25 and Q27 were concerned with the new eLearning environment and the students were somewhat uncertain how they would concentrate and participate in that environment. Students were more familiar with the underlying base Internet technologies, and were not familiar with an eLearning environment enabled by these technologies.

7.6.2 Questionnaire 3 – Performance

Table 28 - Questionnaire 3 – Summary of Questions 13,16,18-20, 22-25, 27 as grouped in Factor Pedagogical

Questionnaire 3 - Factor: Pedagogical - 'Performance' (n = 42)												
9-point Scale	Q13	Q16	Q18	Q19	Q20	Q22	Q23	Q24	Q25	Q27	Total	%
Strongly Disagree 1	0	5	0	1	1	1	0	3	0	0	11	2.62
2	1	0	0	1	6	1	6	6	1	1	23	5.48
3	1	1	0	4	8	7	10	10	7	9	57	13.57
4	0	4	4	3	7	7	6	6	2	7	46	10.95
5	2	8	8	6	11	10	8	5	13	9	80	19.05
6	13	1	9	11	3	5	3	4	4	5	58	13.81
7	8	3	12	8	4	3	4	7	4	4	57	13.57
8	10	5	6	5	1	6	3	0	5	4	45	10.71
Strongly Agree 9	7	15	3	3	1	2	2	1	6	3	43	10.24
Total of Scale 5 - 9	40	32	38	33	20	26	20	17	32	25	283	67.38
(5 - 9) as % of Pop.	95.2	76.2	90.5	78.6	47.6	61.9	47.6	40.5	76.2	59.5	67.38	
Total Respondents	42	42	42	42	42	42	42	42	42	42	420	100.00

The above table is a summary for all the student responses for the 10 questions in Factor Pedagogical. It totals the selection on the scale 1 - 9 of the 49 students who responded to questionnaire 3. It also totals all the results for Agree – Strongly Agree, scale 5 – 9 and presents this as a percentage of the population.

Table 29 - Questionnaire 3 – Summary of Questions 13,16,18-20, 22-25, 27 as grouped in Factor Pedagogical

Questions - Factor: Pedagogical - 'Performance'										
	Q13	Q16	Q18	Q19	Q20	Q22	Q23	Q24	Q25	Q27
Min.	2	1	4	1	1	1	2	1	2	2
Max.	9	9	9	9	9	9	9	9	9	9
Range	7	8	5	8	8	8	7	8	7	7
Avg.	7	6.3	6.4	5.9	4.4	5.2	4.6	4.2	5.8	5.2
S.D.	1.6	2.8	1.4	1.9	1.8	2	2	2	2.1	1.9
P - E (mean)	-0.3	-0.4	-1	-1.4	-0.8	-0.7	-1	-1.1	-0.6	-1

The above table shows the 10 questions and the range of scores for each question. The questions are given in full on pages 95 – 96. P – E is the performance mean minus the expectation mean.

These tables indicate that in the main the students found it to be a positive learning experience. Their commuting time was reduced (Q16), the standard of presentation was not as high as expected (Q18), or the session was not as stimulating as expected (Q19), harder to concentrate (Q23), 73% down to 48%, and they participated less than in a face-to-face lecture (Q24), 67% down to 40%. There was no great difference in enriching the learning experience (Q25). The expectations in the use of technology improving productivity (Q27) dropped from 82% to 60% after performance. When examining P – E (mean) figures they are all negative. Q18 - the standard of presentation – can be linked back to the removal of animation and colour images from the PowerPoint slides, obviously the use of the synchronised Web Browser, Q & A facility didn't enhance the learning environment. Q19 – not more conducive to learning – can be related back to the newness of the virtual classroom environment and the short length of the experiment. Q23 – harder to concentrate – can be linked to the abuse of the text chat facility in the virtual classroom. Q24 – participated less than in face-to-face lecture – can be related back again to being comfortable with the environment and the newness of the technology. Q27 – improving productivity – the lecture was shorter, only an hour long, so perhaps students felt they had lost out, even though the lecturer was of the opinion that he covered material faster.

7.6.3 Paired Sample t-test – Factor Pedagogical

The totals for the 49 expectation results and 42 performance results for the 10 questions in 'Pedagogical' were tested using a paired t-test to identify if there was any statistical significant difference in the statistics being compared. With $p > .05$ = not statistically significant and $p < .05$ = is significant.

Table 30 – Significant difference test – Factor Pedagogical

Multivariate Summaries - Pedagogical					
No Selector					
49 total cases of which 7 are missing					
No Selector					
Variable	**Count**	**Mean**	**StdDev**	**t-test**	**Probability**
Pedagogical - Expectations	42	63.762	12.647		
Pedagogical - Performance	42	54.905	14.364		
Difference Pedagogical	42	8.857	15.501	3.703	0.001

Therefore in analysing the above table, $p < .05$, there is a statistical significant difference between 'expectations' and 'performance' for the factor Pedagogical, with more positive results for the expectation items. The main issues being that the session was not as stimulating as expected or as conducive to learning as expected for these 10 categories. Students found it harder to concentrate and they felt that they participated less than in a face-to-face environment. They were also disappointed that the Internet technology did not improve productivity.

7.6.4 Student comments –

"*It was obvious also that it is necessary to develop a degree of comfort with using the learning tool, and that this comfort must be acquired by both the lecturer and student. The first lecture was delivered at a speed which far exceeded what was usual, but by the final lecture the delivery was much more attuned to an appropriate pace for the particular learning environment."*

"I was surprised to observe that I didn't recall the content of the lectures as well as those which had been delivered in the traditional manner. I think my recall is partly tied up with visual cues received from the lecturer and in absence of more experience with remote learning this is difficult to assess. I also didn't take any notes to which I could refer later. This wasn't a conscious decision, as I came prepared for taking notes. I believe it was a consequence of engaging with this particular medium. At least temporarily, engaging in a cyber-space environment altered my behaviour."

"*….students might seem engaged but understand little because their response reflects more an attraction to the medium rather than an understanding…."*Veneema and Gardner (1996).

7.7 Factor: Support

The 5 questions that are grouped under Support focus on the following areas –

- Response time to problems
- Support from TCD
- Use of email support, peer to peer support
- Technical training and documentation

The source data that were collated for each of these 5 questions are in Appendix P.

7.7.1 Questionnaire 2 – Expectations

Table 31 - Questionnaire 2 - Summary of Questions 8 – 11 and 21, as grouped in Factor Support

Questionnaire 2 - Factor: Support - 'Expectations' (n = 49)							
9-point Scale	Q8	Q9	Q10	Q11	Q21	Total	%
Strongly Disagree 1	0	0	0	0	0	0	0
2	1	0	0	2	1	4	1.63
3	4	3	1	1	0	9	3.67
4	5	5	4	2	4	20	8.16
5	5	11	10	10	6	42	17.1
6	14	8	6	8	11	47	19.2
7	12	11	13	15	12	63	25.7
8	4	6	6	4	8	28	11.4
Strongly Agree 9	4	5	9	7	7	32	13.1
Total of Scale 5 - 9	39	41	44	44	44	212	86.5
(5 - 9) as % of Pop.	80	83.7	90	89.8	89.8	86.5	
Total Respondents	49	49	49	49	49	245	100

The above table is a summary for all the student responses for the 5 questions in Factor Support. It totals the selection on the scale 1-9 of the 49 students who responded to questionnaire 2. It also totals all the results for Agree – Strongly Agree, scale 5 – 9 and presents this as a percentage of the population.

Table 32 - Questionnaire 2 - Summary of Questions 8 – 11 and 21, as grouped in Factor Support

Questions – Factor: Support - Expectations					
	Q8	**Q9**	**Q10**	**Q11**	**Q21**
Min.	2	3	3	2	2
Max.	9	9	9	9	9
Range	7	6	6	7	7
Avg.	6	6.2	6.6	6.4	6.6
S.D.	1.7	1.7	1.7	1.7	1.6

The above table shows the 5 questions and the range of scores for each question.

Students had high expectations of TCD to support the experience fully, with training, technical support, and documentation. They also expected to use the mail support facility, the Listserv. Remember that these were part-time mature students and they were fee-paying.

7.7.2 Questionnaire 3 – Performance

Table 33 - Questionnaire 3 - Summary of Questions 8 – 11 and 21, as grouped in Factor Support

Questionnaire 3 - Factor: Support - 'Performance' (n = 42)							
9-point Scale	**Q8**	**Q9**	**Q10**	**Q11**	**Q21**	**Total**	**%**
Strongly Disagree 1	1	1	0	4	1	7	3.33
2	0	2	0	1	1	4	1.9
3	4	3	0	1	6	14	6.67
4	2	5	4	4	5	20	9.52
5	8	9	7	5	13	42	20
6	8	7	4	7	1	27	12.9
7	7	5	10	8	5	35	16.7
8	6	4	8	5	6	29	13.8
Strongly Agree 9	6	6	9	7	4	32	15.2
Total of Scale 5 - 9	35	31	38	32	29	165	78.6
(5 - 9) as % of Pop.	83.3	73.8	90.5	76.2	69	78.6	
Total Respondents	42	42	42	42	42	210	100

The above table is a summary for all the student responses for the 5 questions in Factor Support. It totals the selection on the scale 1 - 9 of the 49 students who responded to questionnaire 3. It also totals all the results for Agree – Strongly Agree, scale 5 – 9 and presents this as a percentage of the population.

Table 34 - Questionnaire 3 - Summary of Questions 8 – 11 and 21, as grouped in Factor Support

Questions - Factor: Support - 'Performance	Q8	Q9	Q10	Q11	Q21
Min.	1	1	4	1	1
Max.	9	9	9	9	9
Range	8	8	5	8	8
Avg.	6.2	5.8	6.9	6	5.5
S.D.	2	2.1	1.6	2.4	2.1
P - E (mean)	0.2	-0.4	0.3	-0.4	-1.1

The above table shows the 5 questions and the range of scores for each question. P – E indicates that for three questions the performance did not meet expectations, Q9 – Technical training, Q11 – use of the email support facility and Q21 – documentation to support technical training.

As can be seen from the summary tables students were more negative about the actual support experience compared to their expectations. When analysed further, the students were happy with the training (Q9) , response time of the system (Q8) and response time from support staff (Q10). The students were not so happy with the level of documentation to support training (Q21), expectations 90% down to performance of 69%. While the LearnLinc environment does not require a great deal of training, it does depend on the level of computer literacy and comfort with working with computers.

7.7.3 Paired Sample t-test – Factor Support

The totals for the 49 expectation results and 42 performance results for the 5 questions in 'Support' were tested using a paired t-test to identify if there was any significant difference in the statistics being compared. Where $p > .05$ = not statistically significant and $p < .05$ = is significant.

Table 35 – Significant difference test – Factor Support

Multivariate Summaries - Support
No Selector
49 total cases of which 7 are missing

Variable	Count	Mean	StdDev	t-test	Probability
Support - Expectations	42	32.3095	6.28389		
Support - Performance	42	30.3333	7.96231		
Difference Support	42	1.97619	10.9176	1.173	0.248

Therefore in analysing for factor support using the above table, $p > .05$, there is no statistical significant difference overall between 'expectations' and 'performance' for the factor Support. This is in contradiction to some individual question area results above, especially Q21 concerning excellence of documentation.

7.7.4 A Student comment -

In commenting on support and the role of the ListServ one student commented –

"*This forum allowed students the opportunity to ask questions regarding their technical difficulties. It was apparent to me that a lot of the technical advice came from fellow students, thus promoting a sense of ownership and involvement by the students*."

In commenting on the management of the project –

"*The LearnLinc experiment fell very appropriately into our Information systems and the Enterprise course because we could see first hand the approach, the planning and the implementation methods adopted by the Trinity LearnLinc management team to ensure the smooth installation of the process. The value of seeing our own team in action, understanding the planning, test issues and people's reluctance to change was a worthwhile experience, as someday it will be us implementing a similar concept within our own organizations."*

This comment could also fit in under Pedagogical, as an enrichment of the learning experience, a practical example in action.

7.8 Factor: Social

The 4 questions that are grouped under Social focus on the following areas –

- Reduced Interaction
- Working on one's own
- Communicating using the new media
- Time to learn the new environment

The source data that were collated for each of these 4 questions are in Appendix Q.

7.8.1 Questionnaire 2 - Expectations

Table 36 - Questionnaire 2 - Summary of Questions 12 – 15 and 17, as grouped in Factor Social

Questionnaire 2 -Factor: Social - 'Expectations' (n = 49)						
9-point Scale	Q12	Q14	Q15	Q17	Total	%
Strongly Disagree 1	2	2	0	2	6	3.06
2	6	2	1	4	13	6.63
3	2	4	0	7	13	6.63
4	9	6	7	2	24	12.24
5	8	13	4	10	35	17.86
6	5	9	12	7	33	16.84
7	9	6	9	8	32	16.33
8	5	2	10	5	22	11.22
Strongly Agree 9	3	5	6	4	18	9.18
Total of Scale 5 - 9	30	35	41	34	140	71.4
(5 - 9) as % of Pop.	61	71.4	84	69.4	71.4	
Total Respondents	49	49	49	49	196	100

The above table is a summary for all the student responses for the 4 questions in Factor Social. It totals the selection on the scale 1-9 of the 49 students who responded to

questionnaire 3. It also totals all the results for Agree – Strongly Agree, scale 5 – 9 and presents this as a percentage of the population.

Table 37 - Questionnaire 2 - Summary of Questions 12 – 15 and 17, as grouped in Factor Social

Questions – Factor: Social – 'Expectations'				
	Q12	Q14	Q15	Q17
Min.	1	1	2	1
Max.	9	9	9	9
Range	8	8	7	8
Avg.	5.22	5.4	6.5	5.4
S.D.	2.21	2	1.7	2.2

The above table shows the 5 questions and the range of scores for each question.

As can be seen students recognized the social implications of using the new media. The students recognized the need to learn the technology. They felt it would reduce interaction (Q12), even though they felt comfortable about using the new technology during the live sessions to communicate (Q15). So within the group there was a mix in the level of confidence of communicating. 28% expressed doubts about working on their own, Q14, those people that Strongly Disagree –Disagree, scale 1 - 4. 70% of students felt that they would have to make time to learn the system, (Q17).

7.8.2 Questionnaire 3 – Performance

Table 38 - Questionnaire 3 - Summary of Questions 12 – 15 and 17, as grouped in Factor Social

Questionnaire 3 - Factor: Social - 'Performance' (n = 42)						
9-point Scale	Q12	Q14	Q15	Q17	Total	%
Strongly Disagree 1	3	1	0	13	17	10.1
2	4	2	2	8	16	9.52
3	7	6	2	6	21	12.5
4	6	2	3	8	19	11.3
5	5	13	7	4	29	17.3
6	5	8	10	1	24	14.3
7	6	4	5	1	16	9.52
8	3	2	4	0	9	5.36
Strongly Agree 9	3	4	9	1	17	10.1
Total of Scale 5 - 9	22	31	35	7	95	56.5
(5 - 9) as % of Pop.	52.4	73.8	83.3	16.7	56.5	
Total Respondents	42	42	42	42	168	100

The above table is a summary for all the student responses for the 4 questions in Factor Social. It totals the selection on the scale 1-9 of the 49 students who responded to questionnaire 3. It also totals all the results for Agree – Strongly Agree, scale 5 – 9 and presents this as a percentage of the population.

Table 39 - Questionnaire 3 - Summary of Questions 12 – 15 and 17, as grouped in Factor Social

Questions - Factor: Social - 'Performance'

	Q12	Q14	Q15	Q17
Min.	1	1	2	1
Max.	9	9	9	9
Range	8	8	7	8
Avg.	4.9	5.3	6.31	2.9
S.D.	2.3	2	2.02	1.9
P - E (mean)	-0.3	-0.1	-0.2	-2.5

The above table shows the 4 questions and the range of scores for each question. The P – E indicates that performance fell below expectations in all categories.

As can be seen the students felt that the technology reduced the interactive experience (Q12), but less than was expected, 61% down to 52%, just over half the participants. Some people changed their mind with regard to working on their own (Q14), and were comfortable with using the technology to communicate (Q15). They also felt that after using the technology they didn't need time to learn the environment that they thought initially they would, Q17, 69% down to 17%, which gives a very low average score.

7.8.3 Paired Sample t-test – Factor Social

The totals for the 49 expectation results and 42 performance results for the 4 questions in 'Social' were tested using a paired t-test to identify if there was any significant difference in the statistics being compared. Where $p > .05$ = not statistically significant and $p < .05$ = is significant.

Table 40 – Significant difference test – Factor Social

Multivariate Summaries - Social
No Selector
49 total cases of which 7 are missing

Variable	Count	Mean	StdDev	t-test	Probability
Social - Expectations	42	22.2381	3.29678		
Social - Performance	42	19.381	3.59507		
Difference Social	42	2.85714	4.29731	4.309	0.0001

Therefore in analysing the above table, $p < .05$, there is a statistical significant difference between 'expectations' and 'performance' for the factor Social. Again this is influenced by Q.17, the realisation by students that the system didn't require a lot of time to get used to.

In all the Multivariate summaries for the four factors, the means for 'Expectations' were higher than the means for the 'Performance', i.e. for the 4 factors, the performance did not live up to the prior expectations. In other words, the outcome from the LearnLinc environment is somewhat disappointing. We can't say whether the students learned less or more than they would have done in a traditional environment. This might have been measured by a split-half experiment, i.e. 2 lectures traditional and 2 lectures online for 2 halves of the class.

7.8.4 A Student comment -

One student commented negatively –

"*I found the stifled silence of the computer labs distracting as I forced myself in vain to find a point of interest whilst I digested the information being fed to me. Personally I felt that I was not taking part in the chat area through out each class. That said, I do not regret my participation in such an experiment, I found it to be of some value."*

Perhaps if the student had been in a position to benefit by accessing the lectures at home or at work, this isolated feeling would be eroded by that benefit (Hara and Kling).

Another student comment on the experience –

"*Watching a match on television can't compare to "being there" in terms of experience, but it's warmer, you can watch replays and you don't have to leave your house. In some ways eLearning is the very same."*

Another student comment on the social impact –

"There are also social implications; the traditional evening course generates enormous pressure on families, while the mother or father attends a lecture for a few hours the other partner stays at home to look after the children. This can lead to marriage problems…."

7.8.5 Summary of the results of the above Factor analysis

The key issues found under the four factors are as follows:

Operational

There was **no** significant statistical difference between 'expectations' and 'performance' for the factor Operational, but there were significant differences in the individual components.

Students seemed disappointed with the level of training. The performance was lower than expectation for Q9.

Pedagogical

- Standard of presentation was worse than the expected, Q18
- Students found the sessions less stimulating than expected, Q19.
- Students found the experience less conducive to learning than expected, Q20.
- It was harder to concentrate, Q23.
- Students participated less than in the face-to-face lecture, Q24.
- The students didn't think the use of this internet technology improved productivity, Q27.
- Performance did not live up to prior expectations in all question categories.

There **is** a statistical significant difference between 'expectations' and 'performance' for the factor Pedagogical.

Support

- Students would have liked better documentation to support technical training, Q21.

There is **no** statistical significant difference overall between 'expectations' and 'performance' for the factor Support, but for three out of the five question categories performance was worse than expectation. The Q21 category (excellence of documentation) was particularly low.

Social

- Students felt that the technology reduced the interactive experience, Q12.
- Students felt that they didn't like the idea of working on their own away from from fellow students, Q14.
- Students also felt that they didn't need as much time to learn the technology environment as they thought they would, Q17.

There is a statistical significant difference between 'expectations' and 'performance' for the factor Social.

7.8.6 Relationship between the factors and various characteristics of the student

In addition, as part of the analysis for the GENIUS project report, further analysis was carried out by the statistician. This analysis examined the relationship between each of the factor scores and the following characteristics –

- Gender;
- Number of years experience with computers;
- Type of job;
- Where they viewed the class.

No relationship was found between any of the above characteristics and the scores on each of the factors.

The size of the sample is also an inhibitor in the use of more complex statistics, as the sample is not big enough to give valid comparisons.

7.9 Question 26

Questionnaire 2 – Question 26 - I expect the benefits derived by myself from the systems I use to be measured.

Questionnaire 3 – Question 26 - I understand the benefits derived by myself from the systems I use are being measured.

Of the 27 qualitative questions on Questionnaires 2 and 3, question 26 did not have a fit in any of the four factors identified. It did, however, indicate that the students were aware that the use of eLearning technology and its impact was being measured. As can be seen from some of the comments made by the students there was a feedback mechanism underlying the project through the issuing of questionnaires and also the focus of the assignment.

For questionnaire 2 – 'Expectations' the Average for Q.26 was 6.49, and the Standard Deviation was 1.59.

For questionnaire 3 – 'Performance, the Average for Q.26 was 6.95 and the Standard Deviation was 1.91.

7.10 Summary

This chapter has presented the quantitative results from this research project. The following chapter, Chapter Eight, will present the qualitative results.

8 QUALITATIVE RESULTS AT TRINITY COLLEGE, DUBLIN

8.1 Introduction

This Chapter will present the qualitative results for this Research thesis as based on the implementation of the GENIUS project at Trinity College. It will refer to the qualitative research instruments, data collection, data collation and analysis methods as outlined in Chapter Five and it will present the qualitative results. The sources for the qualitative analysis and results are in the main additional questions that were open-ended text questions on the Questionnaires 2 and 3, the assignment and other observations. Chapter Seven presented the quantitative results.

8.2 Qualitative Analysis

The following data were collected qualitatively and analysed using qualitative methods (Thomas, 2003), but can be summarised in a numerical format. The source for gathering this data was the additional questions on questionnaires 2 and 3.

For some of the questions representative appropriate quotations taken from the assignments are introduced to support the statistics.

Graphical depiction (Pie charts) supporting the tables is given in Appendix R - Qualitative Analysis.

Table 41 – Questionnaire 2 – Question B.19 - What did you expect you will like most about the online learning experience? Questionnaire 3 – Question B.19 - What did you like most about the online learning experience?

	Questionnaire 2 -Expectation %	Questionnaire 3 - Performance %	Outcome P – E %
The experience of it/New Technology	51	26	-25
Less Commuting	18	15	-3
Home Comfort	14	14	0
More interaction/communication with the class	11	8	-3
Recording of class	4	1	-3
Different Access Locations	1	15	14
Fewer Distractions	1	1	0
Feedback of experience		3	n.a.
Saving Time		5	n.a.
Lectures were shorter		3	n.a.
Use of Text facility		5	n.a
Q & A facility		3	n.a.
Discussion Session		1	n.a.
Total	100	100	n.a.

Following the experience, students preferred more practical aspects of the delivery mechanism rather than just the idea of the technology. Table 41 summarises this. The realisation of the usefulness of "Different Access Locations", "Saving Time, and being able to "Communicate Using Text appealed to students. The novelty of trying out something new became a reality, and its benefits were recognised.

Table 42 – Questionnaire 2 – Question 20 - What do you expect you will like least about the online learning experience? Questionnaire 3 – Question 20 – What did you like least about the online learning experience?

	Questionnaire 2 - Expectation %	Questionnaire 3 - Performance %	Outcome P – E %
Technology Failure/difficulty	27	8	-19
Impersonal nature of it	27	7	-20
Lack of communication as a group	13	5	-8
Network Service Speed	10	8	-2
Sound/Audio problems	7	11	4
First time experience	5		n.a.
Poor Attention Span	5	10	5
Slower pace of class	2	2	0
Losing College experience	2	2	0
Unable to avail of benefits technology affords	2	2	0
Less conducive to Learning		14	n.a.
Text facility caused distraction		22	n.a.
Too many distractions		5	n.a.
Eye Strain		2	n.a.
Photo Appearing		2	n.a.
Total	100	100	

What is of interest in this table is the change in the expectations for "Technology Failure" and the performance. The "Poor Attention Span" and "Less Conducive to Learning" are probably influenced by the text facility causing distraction.

Table 43 – Questionnaire 2 – Question 21 - Do you envisage you will find any other benefits for you in the use of the virtual classroom which have not been mentioned in Section A of this questionnaire? Questionnaire 3 – Question 21 - Did you find any other benefits for you in the use of the virtual classroom which have not been mentioned in Section A of this questionnaire?

	Questionnaire 2 - Expectation %	Questionnaire 3 - Performance %	Outcome P – E %
No other benefits	25	58	33
New type of learning experience	20	9	-11
New Technology	13	6	-7
Greater Productivity/Time	9		n.a.
Access to Recording of Lecture	7	6	-1
Improved Concentration	7		n.a.
Directly relevant to job in the future	7	3	-4
More Interaction	4	3	-1
More beneficial to business & training	4	6	2
Less Stress	4		n.a
Directly relevant to subject taught		6	n.a.
Being able to have a cigarette during class		3	n.a.
Total	100	100	

Having gone through the experience students recognised the fit of online eLearning with the course material, IT and the Enterprise. Some of them also felt that it would be of benefit to business and training. However, there was in increase of 33% in students not being able to identify any other benefits of the virtual classroom.

Table 44 – Questionnaire 2 – Question 22 - Do you envisage any other specific costs in your use of the virtual classroom? Questionnaire 2 – Question 22 - Did you incur any other specific costs in your use of the virtual classroom?

	Questionnaire 2 - Expectation %	Questionnaire 3 - Performance %	Outcome P – E %
No greater costs	48	51	3
Internet Costs	27	33	6
Headset/Microphone	19	12	-7
Time	6	2	-4
Phone Cable		2	n.a.
Total	100	100	

Students recognised the additional costs of online eLearning, Internet access costs being the main cost.

Table 45 – Questionnaire 3 – Question B23 - Would you like to experience a blend of this type of learning and traditional learning in your future years at TCD? (Question after experiment)

Comment	%
If there is a good reason for it	2
Lecture time to be extended to cover material adequately	2
Only if technology/internet connection runs smoothly	6
Only in certain subjects	11
No, I prefer to attend college. Traditional method	13
Only to same extent. A few lectures a year. In moderation.	15
Yes, I would like to experience a blend of this type of learning and traditional learning in the future	51
	100

If we look at the table, 51% said yes, that they would like to have a blended approach again, 6% imply yes if technology and internet connection is in place and 11% yes if the virtual classroom is a good fit for a subject. So in effect 68% + 15% yes, in moderation = 83% are in favour of blended approach, where there is a mix of traditional lectures in the physical classroom and online lectures in the virtual classroom.

8.2.1 A Student comment –

"*My final thoughts of the project and in using LearnLinc are very different to my initial thoughts; I would like to use it again but only as a supplement to the traditional classroom lectures.*"

Table 46 – Questionnaire 3 – Question B24 - What do you believe to be the strengths and weaknesses of this form of learning compared to the traditional lecture? (Question after the experiment)

	Strengths	Weaknesses

Lecture	Lecturer more focused (2)	More distraction, less likely to take notes (4)
	Quicker lectures (3)	Subject not covered in depth as in lecture theatre (3)
	Easier to communicate, more interactive (7)	Impersonal contact, prefer classroom environment (10)
	More relaxed, easier to respond to lecturer (5)	Lacks natural interaction (2)
	Discussion resembled class environment (1)	Unsatisfactory learning style (5)
		Less likely to attend (1)
		Less conducive to learning (1)
		Less likely to have discussion than in lecture theatre (2)
		Not for use for evening students as it erodes sense of university community (1)
Access	Easy to join lectures (9)	
	Time Saving (16)	
	More comfortable environment (home) (7)	
	Variety of Access Locations (16)	
LearnLinc	Access recordings (5)	
	Hand up facility (2)	
	Build class community (1)	
	Suitable for training and industry (3)	
		Web browser failure (3)
		Text chat too distracting and hard to follow (3)
Technology		Technology benefits not available to all (2)
		Quality of sound from students (4)
		Technology/internet service failure Bandwidth (10)
		Bandwidth connection (2)
		Software difficult to use (1)
		Perception that technology is going to replace the traditional method (1)

This question was an open ended qualitative question on the 'Performance' Questionnaire 3. All the answers were read through and themes identified and under those themes the key issues that arose were identified. The main strength is the variety of access locations, 16 students identified this. The main weakness is the technology/internet service failure and the issue of bandwidth, 10 students identified this. The impersonal contact was an issued for 10 students, preferring the classroom environment.

8.3 Expectations of Trinity

Table 47 – Questionnaire 3 – Question B31 - On Oct. 24t.h you completed a questionnaire outlining your expectations of the performance of the technology. Were these expectations based on: (a) Your expectations of Technology, (b) Your expectations of TCD, (c) Your expectations of both or (d) Other

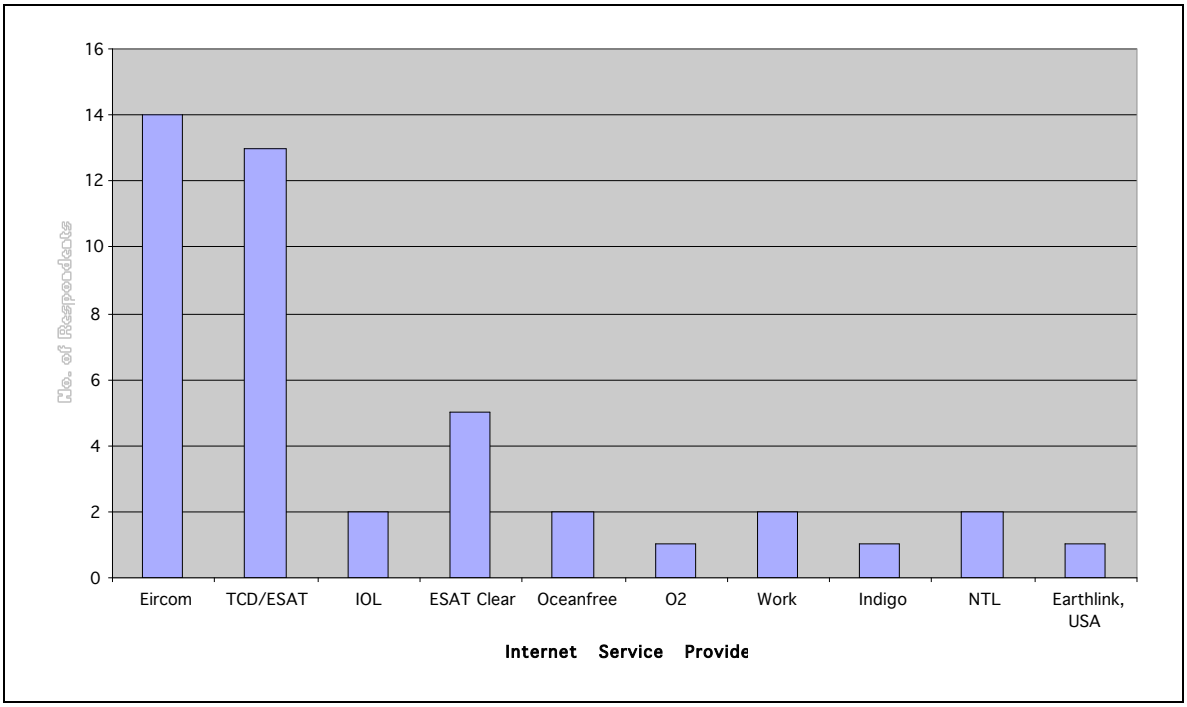
Comment	%
Your expectations of Technology	32
Your expectations of TCD	12
Expectations of both – Technology and TCD	56

Other	0
	100

As recognized early in the project there were risks attached to the project, mainly driven by the fact that the students were fee paying and mature. They wanted quality and expected a high standard. The outcome for this question points to high expectations from both the technology and AISG in the Computer Science department, because the students would not accept anything else. They were fee-paying and expected quality in the delivery of their course, whether traditional or online.

8.4 The Technology – Connectivity

Table 48 –Questionnaire 3 – Question B4 - Please state the name of your Internet Service Provider?

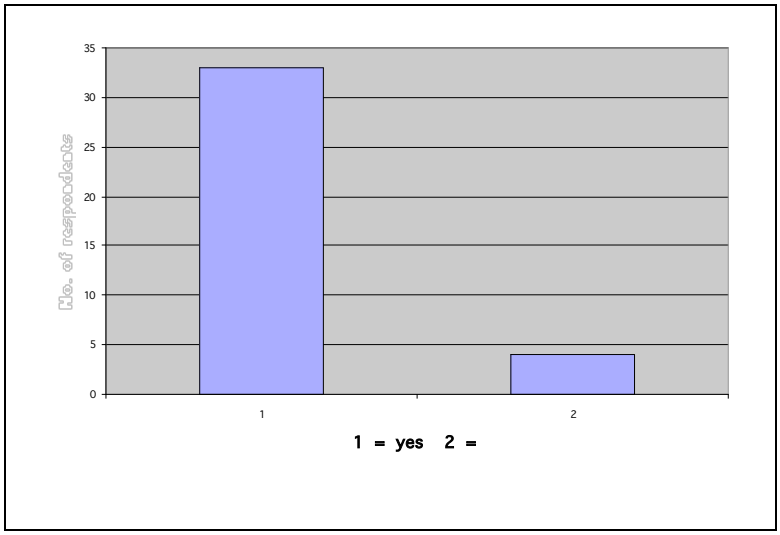


All were a subscription service except where students were connected through work and their company was paying. There are 43 respondents in this question as one student completed the question by showing that they connected from home and also used TCD.

8.5 The Technology – LearnLinc

8.5.1 Sound

Table 49 – Questionnaire 3 – Question B3 - Did you test your sound/audio quality before each session?



The testing of LearnLinc audio before a lecture session was vital to the smooth running of a student's connectivity. Students were advised in email reminders about the timings of the lectures to ensure that they ran the Audio Wizard facility within LearnLinc before the start of the lecture session. This built-in function enabled them to check their earphones and microphone.

Table 50 – Questionnaire 3 – Question B6 - How would you rate the sound quality from the perspective of how you heard the lecturer?

Quality of Sound - Lecturer	Count	%
Poor	1	2
Fair	6	14
Good	13	31
Very Good	12	29
Excellent	10	24
Total	42	100%

In the main students were satisfied with the quality of sound from the Lecturer.

8.5.2 Student comments - Lecturer

Some of the additional comments made by the students on the sound of the Lecturer with the location of where they took the lecture in brackets –

"*Excellent – I could hear Dudley perfectly" (TCD).*

"No problems with it when using ADSL line (Work), but it was quite poor with a 56k connection"(Home).

"Very good, no issues with sound" (USA).

"Very good, the quality of the lecturer's presentation was always good and clear" (USA).

"Very good, sound was much better at home than in the college".

"Very good, I could generally hear Dudley, problems with speed now and again" (Home).

"Good, a couple of times per lecture the sound would stop for a few seconds due to the poor bandwidth used (56k.)" (Home).

"Good, most of the time the sound quality was excellent, but sometimes there was a delay or feedback" (TCD).

"Good, quality of sound was good when there was no network congestion but I experienced quite a lot of congestion" (Home).

"Poor to fair, mostly it was OK but every once in a while it would become distorted for say 20 seconds or so" (Home).

So, the key issues in the comments were bandwidth, network congestion, some feedback and buffering, where the sound would stop for a few seconds, and then pick up again, no data was lost. This would be caused by network congestion.

From an observer's point of view and having observed from a PC within the college, the sound of the lecturer was excellent. 84% of students indicated that the sound was good to excellent.

Table 51 – Questionnaire 3 – Question B7 - How would you rate the sound quality from the perspective of how you heard other students/participants at the lecture?

Quality of Sound – Other students	Count	%
Poor	2	5
Fair	17	40.5
Good	17	40.5
Very Good	6	14
Excellent	0	0
Total	42	100

Some students did have difficulties being heard. This was due to some students using speakers and microphone instead of an incorporated headset, as audio volumes had to be reduced due to feedback.

8.5.3 Student comments - Students

Some comments from the students on how they heard other students –

"Very good, some students had not optimized their particular settings – relative to technology used and experience in most cases" (Home).

"Good, with some of them there was a problem probably because of problems with their equipment at home or at work" (TCD).

"Good, some of the participants sound quality was good but on others it was difficult to hear. This was overcome by texting" (TCD).

"Good, some were very faint, but most were normal sound" (TCD).

"Good, sometimes a bit difficult to hear because of background noise" (USA).

"Fair, there were some problems with feedback and distorted sound from the students when talking to lecturer" (Work).

"Fair, could hear some students OK, but most of the time I had to raise the volume considerably more when listening to a student, than when I was listening to Dudley" (Home).

"Fair to good, this seemed to vary each night and with each student, not very consistent (though maybe we can't blame the technology for this)" (Home).

From an observer's point of view and having observed from a PC within the college, the sound from some students was poor. This was due to the equipment they were using and also the fact that they had not used the Audio Wizard utility of LearnLinc to help them adjust the settings for sound.

8.5.4 Recordings

Table 52 – Questionnaire 3 – Question B8 - How often did you access LearnLinc to view recordings/documentation? Please circle appropriate response.

Access to View Recordings	Count	%
Never	0	0
1-3 times	14	33
4-8 times	20	48
More than 8 times	8	19
Total	42	100%

This question was asked at the last lecture of term, only a week after the online series of lectures. During the sessions 20 students accessed the site between 1-3 times, and 8 students accessed the site 4-8 times. 14 didn't access the site at all to review materials. During the Christmas holiday period when the students had to do their assignment, seven students accessed the recordings and downloaded the course material. Again during the remainder of the term when students were still attending lectures and were coming up to exam time, several students downloaded the lecture material.

8.5.5 A student comment - Recordings

"*In my opinion the most important aspect of LearnLinc was the facility to record live classes which can be played back anytime as self-paced content".*

8.5.6 Text Chat

Table 53 – Quesitonnaire 3 – Question B9 - Did the text chat activity interfere with your concentration at the lecture?

Level of Interference	Count	%
Not at All	1	2
A Little	23	55
A Lot	18	43
Total	42	100

All in all during the lectures the same 8 people continually used the text chat. The content of the texts were in the main to do with a sporting/social nature. Other students only participated if they had a technical problem or a relevant question to do with the course material.

8.5.7 Student comments - Concentration

"*At times I found it hard to concentrate, in my opinion there was too much text on non-course related subjects and this made it difficult to concentrate on the lecture".*

"Yes, it did interfere with concentration to a certain extent. I found there was no need for it during the lecture unless you wanted to ask the lecturer a question".

"Texting was fun but a bit distracting. I think during lecture time it should be limited to the subject matter".

"There was some diagnosis of technical problems with chat and 3 or 2 good points but for the most part people used it to talk rubbish!!!"

"Students were talking about virtual tea. Do I have to say more?"

"I felt I was getting distracted by the 'non-lecture' conversations. Should be more disciplined".

I feel that the text chat (Pincas) should be restricted during the lecture time to the topic being discussed. If someone is having a technical difficulty they can use it to advise technical support who were also monitoring the text chat.

Table 54 - Questionnaire 3 – Question B10 - Did the text chat activity support a sense of class community?

Text Chat & Community	Count	%
Not at All	2	5
A Little	23	55
A Lot	17	40
Total	42	100

The students felt that the text chat in the main did support a sense of class community. It broke down barriers and had students communicating with each other who would not normally do so in the traditional lecture hall environment. Again, like email, text chat gives a freedom to express oneself without speaking out loud.

8.5.8 Student comments - Community

"*People seemed more relaxed and would give comments more readily*".

"It was used as a form of interaction between parties with the class".

"*For the third lecture there did seem to be more of a class community. Also from watching the other students I feel that (as a whole) it has brought us closer in communicating with each other".*

"I think it removed some barriers that are the results of shyness".

"*It caused more disruption than anything else because a lot of the chat was completely unrelated to the lecture*".

"Interfered with the learning aspect of lecture".

The majority of students felt that it did enable more communication and enabled students to recognize each other. Even though it was also obvious that there were some sub-communities within the class.

8.5.9 Photographs

Table 55 – Questionnaire 3 – Question B11 - Were the photographs useful to you?

Usefulness of Photographs	Count	%
Yes	36	86
No	6	14
Total	42	100

The students felt that the photographs did contribute to the environment. Every time a student raised their hand and wished to talk, the floor was handed over to them. When a student had the floor his/her photograph was displayed. When the lecturer took back the floor his photograph appeared again. The photographs enabled the students to put names to faces, and after the online experience this broke down barriers.

One difficulty highlighted as regards the photographs, was, that for some people they did not like the photograph being used and therefore would not participate in the class for fear of their photograph being displayed. The photographs were uploaded from the student registration system, and, at registration time, are taken in a controlled but hurried environment. In the future students should be able to upload their own photographs.

Table 56 – Questionnaire 3 – Question B12 - Did the photographs support a sense of class community?

Photographs & a sense of community	Count	%
Not at all	9	21
A Little	17	41
A Lot	16	38
Total	42	100%

It was felt that photographs were useful in identifying other students and breaking down barriers.

8.5.10 Student comments - Photographs

"*Good to be able to put a name to a face, more personal than in the lectures".*

"*In some ways yes but in others no. It does single out an individual but this does happen in the class too. It could be mind-set".*

"Useful, but I wouldn't show mine".

"The photos let you know who the people were but most of the photos were awful".

"Didn't know them at start so a photo isn't going to help".

"I don't think they made any real difference apart from being able to put a name to face".

8.5.11 Questions and Answers

Table 57 – Questionnaire 3 – Question B13(a) - Do you think the Questions and Answer facility as demonstrated during the virtual lectures is a useful tool for enhancing the learning environment? For the Student?

Q&A enhancing to the learning environment	Count	%
Not at all	1	2
A Little	15	36
A Lot	26	62
Total	42	100%

The Question and Answer facility was used intermittently throughout the online session to ask the students if they understood the topic/concept of what was being discussed. Students felt that this gave them an opportunity to express their level of understanding, more so than they could do or would do in a face-to-face class. As many students would not interrupt a class or have the courage to say 'I don't understand', even if they are mature and fee paying. However, some students would have liked if the facility had been used to ask more challenging questions.

8.5.12 Student comments – For the Student

"I think from both sides it gives an indication to how much has been learned during a lecture."

"It keeps people's mind on the lecture other than the text".

"I feel it is more accurate than a show of hands, and gives honest feedback".

"*During the sessions the whole thing was quite simplified. Something more advanced could be more useful".*

" I would have liked to see more Q&A's especially related to the topic in the course".

Table 58 – Questionnaire 3 – Question B13(b) - Do you think the Questions and Answer facility as demonstrated during the virtual lectures is a useful tool for enhancing the learning environment? For the Lecturer? (as a feedback mechanism)

Q&A facility – A useful tool for Enhancing the learning environment?	Count	%
Not at All	0	0
A Little	11	26
A Lot	31	74
Total	42	100%

The students felt that the feedback (Salmon, 2000) received by the lecturer as regards their level of understanding of a topic guided the lecturer in his expanding an particular explanation or encouraging further discussion of a topic. This was of value to all. They also felt that it encouraged a sense of community.

8.5.13 Student comments – For the Lecturer

As can be seen above the comments are relevant to both. Some additional ones –

"*It allowed us give our opinions honestly to the lecturer and the lecturer could get a detailed and accurate response*".

"*For both the student and lecturer it gives a clear line as to where the class is".*

"Gives a real sense of positive interaction, reduces the feeling of 'drone's syndrome'".

As interaction is hard to stimulate in an online situation, the Q&A facility plays a useful role as a tool to encourage interaction.

8.5.14 PowerPoint

Table 59 – Questionnaire 3 – Question B14 - Was the use of PowerPoint slides as effective in the virtual classroom compared to the traditional lecture theatre?

Use of PowerPoint – Virtual classroom vs Traditional class	Count	%
Worse	4	10
No Difference	35	83
Better	3	7
Total	42	100%

PowerPoint slides are a support mechanism for a lecturer. Some lectures feel they are more a hindrance than a help. Because of the restrictions of bandwidth the slides used in the online lecture series had to have reduced graphical content. All animations, timings and background colours were removed. The students had attended traditional face-to-face lectures where they had been used to seeing the enhanced slides, so the 'naked'

slides were not as impressive. In any lecture environment, lecture slides are only as impressive as the level of the lecturer's interpretation and interaction.
One comment from a student, suggested it would be ideal if they could make notes on the slides as the lecture was been given, perhaps in the slide notes facility in PowerPoint. This requires an enhancement to LearnLinc.

8.5.15 Interaction

Table 60 Questionnaire 3 – Question B15 - How did the online discussions compare to live discussions in the lecture theatre?

Online discussions vs live discussions	Count	%
Favourably	12	29
Unfavourably	16	38
No Difference	14	33
Total	42	100%

The style of the lecturer was to have as interactive a lecture as possible. In the three weeks of lecturer contact before the experiment he had encouraged and nurtured the students to contribute in the face-to-face environment. The nature of the subject material and the background of the students and lecturer are key facilitators to encourage interaction. This was harder to 'get going' in the online environment. In the first lecture there was very little interaction, and fewer unstructured comments by the lecturer. This problem was recognized by the lecturer and also by the members of the Genius Team. For the second lecture, the Academic Director, who is well qualified in the subject area, both theoretically and with practical experience, began to interject into the lecture. This worked well and stimulated greater interaction by the students. In the third online lecture a more natural interaction took place, as people became more comfortable with the environment. (Berge, 1995) Perhaps, we can learn from this that the role of an assistant lecturer would be to observe and monitor the level of interaction in a lecture, and to encourage and increase the interaction by interjecting. This would be an additional cost in having a 'second' lecturer knowledgeable in the subject area. It would also make the experience more relaxed for the primary lecturer.

Table 61 – Questionnaire 3 – Question B16 - Did you become more relaxed with the technology by the end of the series of the online lectures?

Increase in relaxation level with the technology by the end of the series of lectures	Count	%
Not at All	3	7
A Little	18	43
A Lot	21	50
Total	42	100%

It was obvious by the level of participation in all aspects of the environment – text chat, hand up facility, Q & A, less checking of sound before a lecture, that people were

becoming more comfortable with the environment. The fear factor and the novelty factor were receding.

Table 62 Questionnaire 3 – Question B17 - Did you feel that your learning experience improved as you became more familiar with the technology?

Learning experience increased with familiarity of technology	Count	%
Not at All	4	10
A Little	24	57
A Lot	14	33
Total	42	100%

The novelty of the environment and the strangeness of the technology wore off. Students were not so distracted with the text chat and there was a realization that this was real course material that was examinable at the end of the course. Regardless of the means of delivery, the material was relevant. I feel that if the series of online lectures had been more than four, students would have been more settled in the environment.

Table 63 –Questionnaire 3 – Question B18 - Would you be more likely to ask a question using: (a) Text Chat (b) hand up facility or (c) face to face lecture theatre?

More likely to ask a question by	Count	%
Text Chat	17	40
Hand up facility	10	24
Face to Face	13	31
None of the above	2	5
Total	42	100%

From the analysis, text chat is the more popular means of asking a question. In the main, people will choose the least stressful means to communicate. This, in a way, is surprising for mature students, as you expect people to grow out of this reluctance to participate (Berge), especially if they have taken the initiative to join a class. However, maybe the abuse of the text chat discouraged some students from using it. Some students commented that if the project had gone for longer, they might have been more confident in communicating online.

8.5.16 Student comments - Interaction

"*If we used it a little more I think everyone would have more confidence using hand-up".*

"*I found it easier to make a comment than in class".*

"Due to the lack of feedback from other students it was very hard to feel comfortable when using the hand-up facility".

"I feel more comfortable asking a question in a lecture theatre face to face".

"I like to see the response to my question or answer on the lecturer's face. I like to know I can be heard, I don't like the distraction of the "walkie talkie" button".

"*Text chat, so my photo wouldn't appear".*

A varied response came from the students. In the main the nature of the response is probably not to do with the technology, but to do with the personalities of the students.

8.6 Additional Comments made by the Students

On questionnaires 2 and 3 in Section B, the Question 25 – 'Please supply any further comments you wish to make concerning this online learning experience' - has also given some valuable feedback. I include it here because of its relevance.

8.6.1 Questionnaire 2 Question B25 -Any further comments? – 'Expectations'

The following are some of the comments from before the experience – 'Expectations'

"I am anxiously awaiting the trial period of this technology. I am interested to measure at first hand its effectiveness".

"I am looking forward to it but I would prefer classroom lecturing".

"I feel that is a good idea to carry out online lectures on a regular basis, (if it works), but not as a complete replacement for lectures".

"*Would like to do this from home (less traveling) but too many distractions – curious 3 year old!"*

"I would like to think that there is an outlined success criteria (sic) and if this experience meets my/your expectations that this will follow on to next year. I would love to see this come in for all subjects, at least for a while. I don't think it affects the college experience in a bad way".

"It is not that I am opposed to new technology infiltrating our lives – but I imagine that this type of study should be an elective. I am happy to participate and help you gain some research on this method of learning – but it would not be something I would like to participate in, in the long term".

"I would have wished this experience to be linked with a more technical subject i.e. C programming and/or HTML, where I believe the course could be done with more practical use".

"*I think the idea is good and the experience should be interesting, but I think 3 to 4 weeks is as long as it would hold my attention*".

"I think the preliminary preparation took up too much time".

"Will we be consulted nightly as to how it went. If it doesn't work well 1st or 2nd night can we opt out?"

"How much is Trinity getting from LearnLinc for conducting this trial. And do you think its right for a college to ask its students who have paid 2,417 euro to test a product that Trinity are already getting paid for?"

"It could be fun and exciting but like I said it will also be kind of impersonal".

"I feel if this form of online learning is a success, I would get involved in it again. Otherwise if it is not successful, I would loose (sic) all confidence in this form of learning".

"I am looking forward to this experience and I hope I will be putting it into practice in work within the near future".

"*I think what we are going to do is very fitting for the particular part of the course we are studying. I feel it will bring a certain reality to our studies".*

"Trying to take extra notes may be a little more difficult as you will be at a computer in a lab".

"Do you have a contingency plan if plan A doesn't work. Is there extra time if it doesn't go to plan?"

"I hope the experience will not cause too much interruption to the course we will be examined on".

8.6.2 Questionnaire 3 Question B25 – Any further comments? – 'Performance'

The following are some of the comments after the project – 'Performance'

"I did my classes in TCD where the facilities were excellent, however, I did notice that some people at home were having trouble with sound, the class crashing out, which I would find frustrating".

"The benefits for us were limited because we just used a technology which in any case was too easy to use. We should learn more about prices, cost of installation, comparison of software packages of this kind etc…No one will give us a job just because we know how to use LearnLinc. We could do something a little bit deeper with the whole thing".

"I feel that it is a very useful tool for lecturing certain subjects although I do believe that the text facility needs to be restricted somewhat during the lecture".

"Due to shift work I'm unable to attend all lectures. With this technology I could access lectures I missed".

"I would love to see more lectures given over the web".

"I would like to see it applied to a very technical course i.e. programming, where tutorial and exercises could be done individually or by a group simultaneously".

"I'm not sure I actually remember the material as well from the online lecture as I did from a traditional session. I think I rely on visual cues for remembering more than realised".

"The one thing I noted was that every week I had a lecture at home I forgot to print off the notes. I would like to see a facility where you could take notes on screen and not loose info".

"The experience has been positive. The length of time reasonable,. I wouldn't have liked to continue taking my lectures using the method the whole academic year".

"Felt we were at the cutting edge of things really enjoyed the experience".

"I found in the labs in TCD, that there were distractions ie. the noise of other people, other students going in and out of the labs. In most homes the student should have less distractions".

"I think that each class was an improvement on the previous one ie in the first class. I thought that Dudley went too fast, in the second I thought that there was too much text chat whereas the third seemed to get the mix much better. Text chat should be more limited".

"My suggestion is to have a mixture of virtual classes and attended lectures. Experimentation in using of webcams highly encouraged".

"Once you get rid of the teething problems and fixed the sound, it could be a very good experience. At the moment it is a pilot experiment so there are going to be some problems. Once you get rid of the problems it should be a good experience".

"It was surprising the amount of people in the class who where against this technology. Also a large number unable to cope with any problems on their own. Alarming!! Lack of basic technical experience by fellow students".

"The LearnLinc lectures got better as I got used to the technology. In the future I can see them being as comfortable to be involved in as ordinary lectures. My concentration level should improve as well".

"*I enjoyed the experience, found I prefer traditional style lectures, and glad I had the experience".*

8.7 The Assignment

As part of the traditionally delivered course module, students are given an assignment as part of their coursework. This year the assignment focused on the synchronous online eLearning experience the students had just participated in. The following is a copy of the assignment:

IS2 Assignment December 2002

The use of Technology in the Enterprise is evolving. In this context write a critical analysis of your experience of participating in Technology Assisted Learning with particular reference to its potential use in Business and Education.

Your submission should relate to your recent experience with LearnLinc and include the following:

- Your initial thoughts on the approach
- The preparation and management process
- The practical use of the technology
- The learning experience and its value in comparison with the traditional approach
- Your opinions following the experience
- The potential role of this technology in Education and Business
- Explore the political, economic, social and technological implications

Submission Instructions:

- Submit your assignment by e-mail as a word document
- Document should be 5 to 7 pages
- Spacing 1.5
- Subject of email: IS2 Assignment
- Send to dudley.dolan@cs.tcd.ie
- Submit by Monday 20th January 2003
- Access to recordings will be limited after 31st December

While it may be felt that the Assignment should not play any part in contributing to the analysis of the project because it was part of the course assessment, I can only say that on reading and analyzing the assignments I am of the opinion that they were not

influenced in anyway by the fact that marks were being awarded. I felt that students were very forthcoming in their opinions and were in no way trying to make the lecturer, the faculty or the AISG in Trinity College feel good by saying the 'right things. 45 students completed the assignment. I do not have the gender breakdown as most students submitted under their student number.

8.7.1 Triangulation

From a research point of view the assignments give an element of triangulation, as outlined in Chapter 5: The Methodology, to the main questionnaire data, as the opinions expressed in the assignments endorse the output from the questionnaire analysis.

Triangulation is a key tenet of the anthropological approach to data gathering (and therefore, teacher research). One should gather a wide variety of evidence for the purposes of triangulation (Jacob, 1990; O'Malley & Valdez Pierce, 1996, Wiggins, 1998)

As opposed to relying on one single form of evidence or perspective as the basis for findings, multiple forms of diverse and redundant types of evidence are used to check the validity and reliability of the findings (Jacob, 1990; O'Malley & Valdez Pierce, 1996; Maxwell, 1996; Wiggins, 1998)

By using multiple forms of evidence and perspectives, a truer portrait of the student can be developed (Wiggins, 1998). While the same biases in evidence collection still come into play but because more types of evidence are being used to form one's opinion about the student, there are more cross checks on the accuracy of the decision.

8.7.2 Analysis

The analysis of the assignments was carried out as outlined in Chapter Five: The Methodology. The assignment put forward questions that the lecturer wanted the students to focus on in their submission. The lecturer had marked the assignments and then made them available to the researcher, with no information as to the marks attained by the student for their work.

The approach taken in analyzing the assignments was to first of all read them through to get a feel as to how relevant they were to this research. It was obvious that they were a rich source of data. The focus of the second reading was to examine how they answered the relevant questions in the assignment, which were as follows:

- Your initial thoughts on the approach
- The preparation and management process
- The practical use of the technology

- The learning experience and its value in comparison with the traditional approach
- Your opinions following the experience
- The potential role of this technology in Education and Business
- Explore the **p**olitical, **e**conomic, **s**ocial and **t**echnological implications

The researcher identified common themes in the responses to the above questions. These key themes were recorded and the different findings and issues under each theme ranked.

The following table outlines the key themes and in parentheses the number of times the different findings and issues were mentioned in the assignments. I will set out the last question – PEST in a separate table.

Table 64 – Analysis of Assignment

Initial Thoughts	**Preparation & Management**	**Practical Use**	**Online Learning experience versus Traditional Approach**	**Opinions**	**Potential role of this Technology in Education & Business**
New Technology (22)	Preparation (37)	User friendly (26)	Interactivity (+20) (-1)	Blended (24)	Reduce costs (35)
Positive (20)	Support (34)	Time effective (26)	Q& A (20)	Non-traditional learners (18)	Reduce travel (32)
Excited (20)	Management (32)	Use of text (26)	Social impact (16)	Better for family (12)	Demonstration tool/Virtual meeting tool (28)
Bandwidth Reservations (19)	Pilot Session (21)	Accessibility (24)	Human element missing (12)	Opportunity for Adult learners (11)	Lifelong training and education (20)
Anxious (13)	Listserv (14)	Recording (23)	Convenience (11)	Equality of access (8)	Students with disabilities (17)
Sound (13)	Experience – made as easy as possible (12)	Cost effective (20)	Mature attitude technology/learning (8)	New technology (7)	International students (17)
Negative (12)	Tutorial (11)	Convenient (17)	Enrichment of material (7)	Face-to-face more conducive to learning (6)	Knowledge Management (14)
Guinea Pigs (11)	Evaluation (8)	Home Comfort (17)	More intimate (6)	Prefer Face-to-Face (6)	International Research (10)
Suitability of subject (7)		Photos (+13) (-1)	Collaboration (4)	No note taking (3)	Guest Lecturing (10)
Future use in TCD (5)		Practical (11)	Preparation for lecture – notes (1)		Project groups (9)
Faith in Management		Visual Layout (9)			Pedagogical change (1)

(2)					
		Text – community, social (8)			
		Feedback (5)			
		Snapshot facility (3)			

The above findings were ranked according to the number of times they were discussed in the assignments.

8.7.3 Ranking of Findings

The following were the top issues to be recognized.

8.7.3.1 Preparation and Management

This grouping had the first three of the top ten ranked findings overall. The students were highly impressed with the preparation, management and support of the project. All but four of the assignments highlighted these as being of great importance and of instilling confidence into students before the experiment. They felt that the induction evening, pilot session and the tutorial were important. The presence of the technician and the ability of the GENIUS team to answer all questions gave a sense of a supportive community. This community wanted to succeed which nurtured the students to participate positively. The role of the Listserv contributed to high ranking of support. They felt that the experience had been made as easy as possible.

There were no negative findings under this grouping.

8.7.3.2 Potential role of this technology in Education and Business

This grouping had the second three of the top ten ranked findings overall. The students identified the reduction in costs, reduction in travel and the potential of the tool for demonstration purposes and virtual meetings. They also recognized its role in lifelong learning and education; the enabling factor of access - to students with disabilities, international students, and guest lecturers. Finally the potential of the technology in knowledge management was identified.

There were no negative findings under this grouping, but a realisation that pedagogical change was required.

8.7.3.3 Practical Use

This grouping had the third three of the top ten ranked. The students identified time effectiveness and accessibility, user friendliness, and the recordings as important. The text chat was a contradiction, with some students expressing the social impact of the tool in creating a sense of community along with the photographs, but in the main the

opinion on text was that it was a distraction. Convenience and home comfort were supporting themes as regards time effectiveness and accessibility.
Some students, 13, were negative about the sound quality

8.7.3.4 Initial thoughts

The majority of students were very positive and excited at being exposed to a new technology, they appreciated the opportunity to use experience such a technology. They also felt that TCD were ahead of other educational organizations in trying out this technology. But they had reservations about bandwidth supporting the project and also sound. A smaller number of students were negative and were worried that they were 'guinea pigs'. However, some of the people that were positive also expressed their concern as being used as a 'lab rat'. The students also recognized the suitability of the subject to this project.

8.7.3.5 Learning Experience v Traditional approach

Students were concerned with the level of interactivity and the social impact and the missing human element. They did however, recognize the role of the Q&A facility in enabling and encouraging interaction. They also identified the potential of the tool for collaboration and the enrichment of course material.
Again, they recognized the convenience factor of the technology.

8.7.3.6 Opinions

Highly ranked in opinions was that of blended learning. Students in general wouldn't mind a blended approach to use of this technology. A smaller group preferred the traditional face-to-face environment and found face-to-face more conducive to learning. They recognized the benefits and potential for the use of this technology for non-traditional learners and lifelong learning, and it was less disruptive for family life.

8.7.4 Political, Economic, Social and Technological

The following table outlines the findings under the PEST focus in the Assignment. The first column shows how many students highlighted a particular issue. Where a topic fits under two headings it is placed in both.

Table 65 - PEST findings ranked

No.	Political	Economic	Social	Technological
28	Bandwidth/Government issue			Bandwidth
22			Social implications	
15		Collaboration	Collaboration	Virtual teams
11		Organisational Change	Organisational Change	
10			Human Interaction	
8	Remove barriers to education		Remove barriers to education	PC Compatibility

6	PC Literacy		PC Literacy	PC Literacy
5				Licensing issues
4		Qualifications online	Qualifications online	
3		Intellectual Property	Prejudice	
2	Loss of jobs in training/education sector	Loss of jobs in training/education sector		
1	Education revolution	Fewer campus companies	Can still interact with lecturer	ECDL
1			Self reliant/motivation	Longer trial period
1			Need for communication	

8.7.4.1 Bandwidth

From the table it can be seen that bandwidth is the major issue both technically and politically. What is interesting is that students recognized it to be a political issue, and not just at Irish Government level, but also at a European level. They recognized that it was not something that Trinity College had responsibility for. In the main students were surprised that the project had gone so well technically and would be prepared to do it again at current bandwidth levels. The restriction being that it would still have to be audio, that video was out of the question due to the lack of availability of broadband.

Student comment – *"I had faith in the technical liaisons in charge of the project but I knew these people could not solve problems like bandwidth. I realized bandwidth would be the main problem area as many people in the class were going to use analog modems".*

8.7.4.2 Social Implications

Most of the students recognized the social implications of using such a tool and had concerns as regards the future. Would this type of learning become pervasive?

8.7.4.3 Collaboration

The potential for collaboration was obvious from an educational point of view but also from a business aspect. As many of the students' organizations have teams across the world the role of such a tool for virtual teams and virtual meetings was recognized.

Student comment – *"Synchronous learning in Education would bring together highly diverse collections of students and would open up other markets (e.g. other countries) to universities".*

8.7.4.4 Organisational Change

eLearning can be a source of organizational change. It can change the way an organization works. As mentioned above with virtual teams, this may highlight cultural

issues and break down the hierarchy of organization structures. It may change the way an organization trains people or hands down information to new employees. Again, there are social implications, cost savings and time savings, e.g. not as much travel for a student or for someone working in industry for example. However, with a product like LearnLinc which gives a particular environment, the virtual campus and virtual classroom, there is a cost to the Educational institution in buying the licences for the product, providing the technical support and help desk support as outlined earlier.

8.7.4.5 Access

Technology can enable the removal of barriers to education, time and distance, but also for people with disabilities. Potential students have greater choices when selecting educational opportunities. This could have an impact politically at government level and educational institutional level.

As part of access I will include PC literacy. This could be a barrier for many people to using eLearning sources. Prejudice was also mentioned, in particular with regard to access and availability of technology. One student mentioned the ECDL[45], as a minimum requirement for those availing of online courses.

8.7.4.6 Education Revolution

Under this heading, the issues of qualifications online and the loss of jobs in the training/education sector are all to do with the evolution and emergence of education and technology. It is going to happen, but there is a lot of work to be done, as outlined in the literature review - modularization, accreditation, standardization and dissemination. Cost and technical considerations will slow the adoption. Academics will be very busy getting these in place. Content evolves as well, so the area of content management will have to be addressed from the point of maintainability, reusability, portability and purpose.

8.8 Informal Discussion

The informal discussion took place in the main on the last night of lectures in the lecture hall just after the GENIUS team collected Questionnaire Three and following the lecture in the 'Third Place'.
The main issues that arose out of the discussion were:

8.8.1 Broadband

Broadband, again was recognized as a Government issue. It was suggested that the state should financially support the broadband infrastructure. The roles of COMReg, the Commission for Communications Regulation, Eircom and other Telcos were debated.

[45] ECDL – European Computer Driving Licence. A qualification in PC use covering the basics of managing files, using Word, Excel, Power point and Access and understanding information systems in general.

8.8.2 Interaction

The students would have liked more interaction. They would use text chat but there was a fear of being asked a question. Even though some students felt that people should have been 'pounced on', but others felt that that was very second level!

The Question and Answer facility was well appreciated.

8.8.3 Content – Material and Lecture

The students felt that the material as presented online was more structured in how it related to the textbook than it would normally be in a traditional lecture. They felt if they had been asked to read the relevant chapters before hand, they would have been in a better position to interact. They felt the lectures were faster and more material was covered.

They recognized the improvement in the second lecture as regards discussion and interaction, and felt the third lecture was the best.

8.8.4 The Technology - LearnLinc

On LearnLinc, they thought it was very good as a learning system and easy to use. The only problem, other than bandwidth, was that the synchronized web browser didn't work for everyone. This was not LearnLinc's fault since this was probably due to bandwidth.

As regards photographs, they appreciated the added value they gave, but wouldn't have minded a profile of the person.

When asked if they would have preferred video, they seemed to be happy enough using audio.

8.8.5 Future Use?

All in all, the atmosphere at both informal discussions was very positive and amicable, and there was definitely a willingness by the students and the lecturer to use the technology again and to be part of on online synchronous delivery of lectures.

Note that the text chat output and the attendance lists have not been included to retain student privacy.

8.9 Summary

This chapter has brought together all qualitative analysis that was carried out as part of this research and presented the results. The bulk of which focuses on the student perspective. The following chapter, Chapter Nine, will outline the conclusions from a

student, lecturer and faculty point of view. It will also outline recommendations for the implementation of a web-based collaborative synchronous online learning initiative.

9 CHAPTER NINE: SUMMARY AND CONCLUSIONS

9.1 Introduction

This research activity was an exploratory study on the use of an online synchronous eLearning application with a group of part-time mature evening students at tertiary level.

This chapter discusses the overall findings of this research and the lessons learned from both a faculty, lecturer and student perspective as set out at the start of this thesis: From the faculty viewpoint, in this case the Department of Computer Science, the focus is on the impact on management and administration to host this research initiative; From the viewpoint of the lecturer, who delivered both the online lectures and the traditional lectures, the focus is on the change in preparation, delivery and the additional support issues; and from the viewpoint of the student, who attended both the online lectures and the traditional lectures, the focus is on the level of acceptance of the online environment. General conclusions will be put forward first. The four key factors identified in the analysis will be used to present more detailed conclusions along with the Political, Economic, Social and Technological (PEST) conclusions. The results, as detailed in Chapters Seven and Eight, are:

- The quantitative results as identified under the four key factors - Operational, Pedagogical, Support and Social and the key findings within those (see Chapter Seven).
- The other sources of qualitative results, based on the Assignment, the qualitative questions on the questionnaires and feedback gathered during the lectures from students, lecturer and faculty. The results from this data analysis have been presented in Chapter Eight.
- The consideration of our experience of the practical implementation of an integrated web-based synchronous eLearning Collaboration Platform at Tertiary Level for Part-time Mature Evening Students.
- The PEST (political, economic, social and technological) analysis that arose from the assignment and that are issues for any organisation undertaking an online synchronous eLearning initiative.

The following conclusions were derived from the study.

9.2 General Conclusions

1. It is concluded that the use of online synchronous eLearning is operationally feasible within the learning niche of part-time mature evening students.

2. When comparing if online synchronous delivery is better than traditional delivery it appears that the answer is in the negative at this point in time. It would appear that students would prefer a blended eLearning experience together with more emphasis on the pedagogical aspect of synchronous eLearning.
3. In a full study of online synchronous delivery versus traditional delivery a split half study would be more appropriate with exams to measure learning outcomes so that traditional delivery versus online synchronous delivery can be properly compared.
4. The current limitations of telecommunications bandwidth remains a problem and in general gives rise to some impoverishment in the presentation of course material.
5. The relative costs of online synchronous delivery versus traditional delivery need to be assessed. The limited cost information in the study appears to suggest that synchronous online delivery is dramatically more expensive when funds, time, resources and manpower are taken into account. The study did not bear the full impact of the cost of the technology as it was made available through the GENIUS project.
6. It is clear that management must make available significant resources such as budgets, technology, technical and administrative manpower and adequate facilities etc., to support a synchronous eLearning initiative such as that studied.
7. The research project, which is the subject of this thesis, was constrained in a number of respects but particularly in regard to the design of an appropriate research questionnaire instrument.
8. Emerging technologies will make it possible to design and facilitate a more stable and thereby improved learning environment, e.g. Increased Bandwidth, High Definition Video, DVD, Blu-Ray[46], Wireless technology, Mobile technology, PDAs[47], Technology convergence, Webcasting[48], Podcasting[49] etc.

9.2.1 Issues identified within the project

As outlined in Chapter Five, The Methodology, the design of the research approach for this experiment was somewhat constrained by the requirements and schedule of the GENIUS project.

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[46] Blu-Ray – also known as Blu-ray Disc (BD) is the name of a next-generation optical disc format jointly developed by Blu-ray Disc Association, a group of leading consumer electronics and PC companies. The format was developed to enable recording, rewriting and playback of high-definition video (HD), as well as storing large amounts of data. A single-layer Blu-ray Disc can hold 25GB.

[47] PDA – Personal Digital Assistant, a handheld device that combines computing, telephone/fax, Internet and networking features.

[48] Webcasting – to use the Internet to broadcast live or delayed audio and/or video transmissions, much like traditional television and radio broadcasts. For example, a university may offer on-line courses in which the instructor Webcasts a pre-recorded or live lecture.

[49] Podcasting – is similar in nature to RSS (Rich Site Summary, an XML format for syndicating Web Content) which allows subscribers to subscribe to a set of feeds to view syndicated Web site content. With podcasting however, you have a set of subscriptions that are checked regularly for updates and instead of reading the feeds on your computer screen, you listen to the new content on your Ipod (or like device).

In particular the evaluation process and the questionnaires were constrained somewhat by the use of a nine-point scale for GENIUS as opposed to a preferred five-point scale. In a full, non-exploratory, study more detailed information on the students and their educational and domestic background should be captured for cross-analysis, e.g. level of education, prior academic qualifications, marital status, location of place of work, location of home, mode of transport, car owner.

In hindsight, recognising how valuable a source of information the reduced submission of the student assignment was, a further study should ask the students to identify themselves enabling more detailed triangulation and analysis between the questionnaires and the assignment.

More emphasis on evaluating the difference between the traditional experience and the online experience could have been useful, in particular the difference in academic performance between the two approaches.

As outlined in the general conclusions above, a split half study would have given greater insight into pedagogical issues. Thus learning outcomes could have been measured. It would also have been useful to compare how the students fared in their academic success in this particular year. Was the question on the exam paper that referred to the material that was covered in the online sessions answered as well as previous years?

Obviously the availability of higher bandwidth is a major issue. This would have enabled the use of video instead of audio and still image. It would have also increased the stability of some of the facilities of LearnLinc, e.g. the synchronised Web Browser.

The readings for the course material could have been made available to students before the online lectures. This would perhaps have enabled the students to participate and interact better with the lecturer.

The experiment should ideally have taken place over a longer period. This would have been better for all the involved parties. Everyone would be more familiar with the technology and the environment. The novelty value of text-chat would have worn off, for example.

The issues of support and collaboration between the lecturer, administrative support personnel and technical support personnel needed to enable an eLearning initiative have been highlighted earlier. In retrospect, the fact that these relationships were nurtured and the people involved were made feel very much part of the project was one of the successes of the project. The students were also involved and included in the project

from its initiation. This also contributed to a collaborative culture with the group working together for the common good.

It is interesting to note that the group of students indicated that they would be quite prepared to go through the experience again and would like to experience the benefits that blended learning gave to them.

9.3 Detailed Conclusions

The following sections detail the conclusions arising from the factor analysis.

9.3.1 Operational Conclusions

9.3.1.1 Faculty

1. It is concluded that Ragan's (1999) proposal to identify a core team to support the eLearning initiative is vital. The team should have a balanced range of skills – Management, Administrative, Academic and Educational.
2. It is important to identify a product that will give the lecturer all the features required to resemble a face-to-face environment, e.g. Hand-raising, text chat, Questions and Answers, Whiteboard, Synchronised Web Browser, Class Agenda, Application Sharing, the facility to display a still image or web-cam clip. This product should be easy to use for the Lecturer, Student and the administration and technical support people involved in the project.
3. White's (2000) assertion on relevant training is supported in the analysis. Training requirements should be identified for the relevant team members and they should participate in this training. Training should include technical administration of the product and also administration of the virtual campus and virtual classroom.
4. Where the intention is to use video or rich content material, students should ideally have broadband access.
5. Like any project it is important to involve all the players from the beginning. As a result of this project it was clear that the students appreciated the level of involvement and communication from the outset. This created a sense of ownership and relationship with the project and the project team members.
6. It is important to advise students from the outset of the PC requirements and offer an alternative location if their equipment is unsuitable. In some cases the level of PC literacy should be identified early on and supplemental training given if required. The Quantitative analysis (Ch.7) indicated that students would have liked more training.
7. Students would prefer to upload their own photographs, but these should be checked.
8. Project management has been identified as a crucial activity, see factor support

9.3.1.2 Lecturer

1. White's (2000) assertion on training is also important for the Lecturer and for any administrative and technical support people involved. It is clear that real situational practice of using the various functions and features of the eLearning product is essential.
2. The results indicated that the students did not find the synchronous online lectures as stimulating as expected. The bandwidth currently available in most homes in Ireland at present will only support audio/still image delivery of online synchronous material. PowerPoint presentation slides need to be simplified to avoid transmission delays. However enrichment can be added to the lecture using the other functions of the eLearning platform, e.g. Q & A, feedback, interactive use of the whiteboard. This can be further enhanced once students are in a position to connect using higher bandwidth.
3. It was found to be important for the lecturer to use as many of the eLearning technology's facilities as possible to engage the students.

9.3.1.3 Student

1. As a result of the project it was clear that students should have a minimum PC literacy level, perhaps to the level of ECDL[50].
2. It is important that students ensure their PC is compatible with the specifications required by the eLearning client technology.
3. Kerka's (1996) assertion on the importance of an ISP connection ideally over broadband was evident in the experiment.
4. It is important if a student is planning to participate from a work environment, that he/she needs to check with his/her organisation's technical support team as regards access. There may be firewall restrictions. A student should also obtain their employer's permission to participate using work equipment.
5. It is important that the student attend any training and pilot sessions to gain familiarity with the environment. The tutorial and the Pilot Session in this experiment made this clear.
6. Computer, communications and eLearning technologies generally have built in utilities to enable the student check the quality of sound before a lecture starts, e.g. Audio Wizard in LearnLinc. It is important that students do this as routine, as it saves interruptions during the lecture.
7. One of the issues in the experiment was that students would have liked to be in control of their photograph, failure to do this could inhibit a student from participating fully in 'taking the floor' on screen.

[50] ECDL – European Computer Driving Licence

9.3.2 Pedagogical Conclusions

9.3.2.1 Faculty

1. As a result of the experiment online sessions of about one hour appeared to be appropriate. This would need to be taken into account from a time-tabling point of view.
2. It is important to hold training or awareness sessions to advise lecturers of the pedagogical and delivery styles required to embark on a synchronous eLearning initiative.
3. It was found useful to employ Guest Lecturers to attend lectures and to participate in order to encourage interaction. There may also be a requirement to employ an Assistant lecturer for the duration of the online session, thus having two lecturers in attendance. Parallel situations which have evolved in other somewhat similar environments are dual news commentators or dual sports commentators which appear to work better than just one person alone.

9.3.2.2 Lecturer

1. Marjanovic (1999) endorses the importance in having some face-to-face sessions before starting the online delivery sessions. This was found to play an important role in nurturing interaction and for students to understand the style of lecturing that the lecturer uses. It also helped to open up dialogue when moving to the online mode. This was one of the benefits of the blended learning approach.
2. It is important to make readings available to students before the session, since this will enable the student to interact and partake in discussion during the online session. This became evident during the conduct of this experiment.
3. Because of bandwidth limitations, the lecturer had to change the medium and format used for some course material to suit the online environment. Simply transferring last year's PowerPoint presentation slides did not work since it imposed severe strain on transmission times. Lecturers need to be encouraged to introduce a selection of the many features of the eLearning technology in use, e.g. Question and Answer utility, feedback, synchronised web browser, text chat, whiteboard, in order to enrich and enhance the course material and the learning experience. This variety in regard to the online delivery helped stimulate interaction.
4. It is important that the lecturer have an assertive personality and good speaking voice to deliver the experience.
5. It was found useful to make recordings of all lectures and class materials available as soon as possible after the event. This enables the asynchronous 'anytime anywhere' access for the students, which is really an added bonus (Volery and Lord, 2000). All materials remained available until end of term exams.
6. It was found important that the Lecturer had an evolutionary approach to implementing synchronous eLearning. The Lecturer learned from each experience, in effect reflecting on each session, perhaps with the other team members, before

delivering the next session, especially in the early sessions. The use of feedback from the students is a good source of deeper learning about issues. Some students were willing to stay on and chat after the lectures and this generated good feedback and input for future sessions.

9.3.2.3 Student

1. Students expressed the view that fifty minutes was as long as an online synchronous session should be.
2. Students expressed the view that they would not like to have online delivery all the time, but rather a blended solution of traditional and online.
3. A conclusion from the study is that the availability of recordings was identified as a particularly valuable facility, as also was the availability of other course materials after the event. This highlights the benefits of the asynchronous capability of the eLearning environment. However, intellectual property rights issues arise in this regard.
4. The students found the experience less conducive to learning than a face-to-face environment. They found it harder to concentrate, found it less stimulating and participated less. This is also supported by Marjanovic (1999). Perhaps, this was due to the length of the project. If it had been longer, students would have been more used to the environment. Also, the over-use of the text chat facility by some students about non-lecture topics disturbed the learning experience.
5. The students didn't think the use of this Internet technology improved productivity. Again, this may due to the shortness of the course, in that there were just four online sessions, of which one was given over to familiarisation with the online environment.

9.3.3 Support Conclusions

9.3.3.1 Faculty

1. It is evident from student comments that good project management and preparation is vital. This type of project is clearly a team initiative. Therefore, members of the faculty should be chosen so as to form a balanced team with management and administrative skills, academic experience and educational knowledge (Paulson, 1992).
2. It is important that technical support should be in place to set up the eLearning environment initially and to support the environment throughout the duration of the initiative. The Listserv facility played an important role in supporting the initiative and encouraging peer-to-peer support and a sense of community.
3. It is important that administrative support be available to register the students, upload photographs, set up the classroom and upload course material. These activities are all additional activities associated with the use of an online environment .

4. It may be important to have an assistant for the lecturer when there is a large class. During the experiment it became obvious that the Lecturer needed an assistant to take the recordings but more importantly to monitor the text chat facility when it is particularly busy. An important message or comment may go unnoticed.

9.3.3.2 Lecturer

1. In the case of this project it was clear that the Lecturer needed to have support from a team. The online delivery of a lecture is not an individual effort as in the traditional lecture hall, where the lecturer attends on his/her own bringing his/her course material to deliver the lecture.
2. It was found that the Lecturer needed technical support throughout the online delivery sessions in case of server failure, network failure etc. This change in the availability of technical staff to support real-time delivery of lectures, and in particular in the evening time, changes the relationship between technical support and the faculty and this new relationship needs to be nurtured.
3. Administrative staff support was required to support the lecturer during the lecture series. Their responsibility was to monitor the Help Desk during lecture times, administer all communication with students during the length of the experiment and monitor the activities on the Listserv, all of which were recognised as key activities during the experiment.
4. It is important when an assistant or guest lecturer is required, that the lecturer be comfortable in having a peer attend the lecture.

9.3.3.3 Student

1. It proved important that the use of the Listserv by the student was promoted so as to enable the student become involved in the peer-to-peer support process.
2. The students would have preferred more documentation to support training. They would also have liked more training. However, in the analysis they also said they needed less time to become familiar with the system. These results suggest that the questionnaire should have been more specific. However, it can also be related to the range in the levels of computer literacy within the student population. Additional documentation and training may have helped people to become comfortable with the system.

9.3.4 Social Conclusions

9.3.4.1 Faculty

1. As the project progressed it became obvious that the introduction of an online synchronous eLearning technology initiative into a Faculty, e.g. Department of Computer Science, leads to organisational change within the faculty with regard to management and administration of the delivery of lectures and the necessary support structures. In the traditional face-to-face environment, a Lecturer attends at the lecture hall and takes the lecture with no additional support at the time other

than the availability of overhead projection and a power supply. With online synchronous eLearning it is different. Technical support and administrative support are involved from the set up phase onwards. Therefore if eLearning is to be introduced on a regular basis into a traditional university, the whole registration process in the College needs to be changed in order to supply a seamless registration solution and remove 'double work'. This may lead to a Business Process Reengineering initiative across the college, possibly leading to major organisational change. There may also be need for time tabling changes. If an organisation wishes to be seen as a lifelong learning organisation, it may need to look into the area of modularisation. If the institution wants to collaborate globally with other educational institutions then the areas of accreditation, the credit transfer system and standardisation may have to be attended to. In the present climate, it is unlikely that a college would fund the doubling up of lecture staff and the increase in workload of support staff.

9.3.4.2 Lecturer

1. The Lecturer recognised the possibility of being able to deliver online synchronous lectures from a location of his choosing, thereby providing more effective time management and cost effectiveness potential.
2. Mason's (1995) theory that the lecturer has to adapt to not seeing the students and interacting with them when using audio and a still image was borne out in the lecture series. The Lecturer missed the eye contact and body language which can give clues as to how students are receiving and understanding the information. Other facilities like the Q&A facility were used to try and substitute for this.
3. Casey (2004) highlights the issues in eLearning content development and the reuse of third party materials to create new resources with regard to Intellectual Property rights, especially copyright. This is more obvious in developing material for an online eLearning environment and in particular where that content is made available online asynchronously in recordings. This has also been recognised by various authorities, e.g. HEFCE (Higher Education Funding Council for England). It was an issue that was considered during the experiment and would need further attention.

9.3.4.3 Student

1. In general the students recognised the time saving benefits from a synchronous online learning environment. For many it removed the commute into the city centre. Accessibility was a key benefit. They recognised this benefit in consideration of people with disabilities, but also from a business point of view in terms of virtual meetings, collaboration and the need for less travel. This analysis was more strongly presented in the assignments than in the questionnaires (Table 64).

2. The students recognised that it was cost effective for them in terms of savings in petrol and parking fees, but there may have been extra expense for Internet connectivity.
3. As put forward by Hara and Kling (1999), the majority of students did not mind working on their own. The benefits of no commuting and being at home far outweighed any negatives.
4. Students recognised that online synchronous eLearning is better for family life, identifying "Home Comforts" (Table 64) and being able to be at home before their children went to bed.
5. Students felt that the technology reduced the interactive experience.
6. Students also felt that they didn't need as much time to learn the technology environment as they thought they would, even though they felt they didn't get enough training.

There are contradictions between the quantitative analysis of the questionnaires and the qualitative analysis of the assignment. The questionnaires, 'Expectations' and 'Performance', were given and completed at set points in time, while the assignment was to be completed over a more extended period. In the assignment students had more time for reflection and were able to give a more considered response as they faced into a term of traditional lectures. Perhaps this highlights further the limitations of the questionnaires.

9.4 Overall Observations

9.4.1 Faculty

From a Faculty management and administration perspective the following observations are drawn from conversations and interviews with the Director of the Course, BSc. in Information Systems, about the role of synchronous eLearning technologies –

1. Synchronous eLearning technologies appear to be appropriate for part-time mature evening students. This is also recognised by the students themselves in the assignment. However, they would prefer a blended approach.
2. Synchronous eLearning is a very useful approach – in the context of 'same time, different place' learning.
3. eLearning is very expensive (Bates (1995), Laurillard, (1993)) in an Educational Context; licensing and support are major costs amongst others. However, this could be balanced by reduced real estate costs.
4. Synchronous eLearning technologies are suitable for Problem-based learning and Case Studies. They have potential for group work, collaboration and virtual meetings.
5. The GENIUS project exposed academics, technical support and administrative staff to an online synchronous eLearning experience, which may not have happened as readily in Trinity College without GENIUS funding.

From a management and support perspective within the faculty the underlying ethos of Trinity College had to prevail. TCD is committed to producing high calibre graduates. It has a particular niche for part-time mature evening students in providing continuous professional development, second chance education and lifelong learning. With that in mind there is a strong commitment to the student body. This was obvious in the management and support provided for the GENIUS project and was recognised by the students.

The sources for the following observations are the discussions that took place at the weekly project meetings during the course of the online experiment and the experience of actually doing it:

6. Detailed planning is required – from a very early stage to ensure that all necessary events take place e.g. installation of software, setting up of licences, accounts etc.
7. A multidisciplinary team is required to execute plans e.g. technical skills, administrative skills, educational/pedagogical skills
8. A tight project management and support structure is required to assign roles and responsibilities and to ensure that actions are fulfilled.
9. A commitment to collaborative working relationships is necessary. Technical staff must now work with Academic staff. In the case of supporting non-traditional learners it will probably be outside normal working hours.
10. Scalability is important. A once off implementation of synchronous eLearning is expensive. It is clear even from the limited experience of this project that there must be economies of scale in order to make it a realistic economic solution.

Some of the reasons for economies of scale are

- Licensing is expensive,
- The technical set-up is costly,
- The preparation and training is costly,
- The support in real-time when the lecture is taking place is costly,
- As is the support of maintaining a help desk and a Listserv.

Again, there could be a balance against the reduced cost of lecture halls and a wider distribution of the course.

9.4.2 Lecturer

From a Lecturer perspective the following observations are drawn. The sources for these observations are the discussions that took place after each online session with the lecturer and at the weekly project meetings during the course of the online experiment:

11. The lecture series and its content have to be planned. It is like being on radio. The lecturer needs to be much better prepared than for a live lecture (Harasim et al, 1995). Each lecture needs an Agenda.
12. Synchronous eLearning requires a support infrastructure e.g. Training is vital for the lecturer in order that he be comfortable with the technology and its features and the lack of interaction.
13. Material needs to be adapted (this is part of planning and preparing the lecture), to ensure enrichment of the experience and to keep the students attention and encourage interaction.
14. The use of a still image (photo) was very successful. Ideally this should be a salient still to capture the 'temporal qualities of a scene' e.g. a lecture environment.
15. Provide a stable synchronous eLearning platform – like LearnLinc (www.ilinc.com), Centra (www.centra.com), Breeze (www.marcomedia.com).
16. The lecturer needs to be confident so as to provide a balanced use of facilities within the eLearning platform so as to vary the lecture tempo.
17. The lecturer found that concentration is vital, even more so than in a live lecture. Pauses in delivery can be significant. The lecturer also found the online experience much more tiring.

Hofmann's (2001) article "24 hours in the Life of a Synchronous Trainer" is an important read for any potential online synchronous Lecturer!

9.4.3 Student

The following observations are drawn from a student perspective. These are again taken from the assignment analysis, Table 64:

18. Overall the students felt it was a worthwhile experience. They appreciated the opportunity to experience a new technology.
19. They felt that the use of a technology like LearnLinc was more suited to some subjects than others. They recognised the fit of the technology with the course module 'IT and the Enterprise'. They identified the benefits for the non-traditional learner in education and the potential for the technology in a wider business setting. The students pointed out that the way that this project was managed from start to finish was a good practical example of how any IT project, or new technology when being introduced into an organisation, should be managed from a Change Management point of view.
20. Some students would like to try using this technology for learning programming, e.g. C++. They felt it could be useful for people to collaborate together on code, using the LearnLinc technology and the whiteboard facility for passing code amongst each other or between the lecturer and student. Another Academic partner in the GENIUS consortium did this quite successfully.
21. The students would like a blended approach to eLearning. They would not like synchronous eLearning all the time.

22. The technology worked, with limited bandwidth being a significant issue
23. Access (Harasim et al (1995)) is an issue. It was borne out by this project that a level playing field for all is important. Participants must have access to high quality bandwidth, a comparable level of PC literacy and the availability and access to a LearnLinc compatible PC.
24. It was found that text chat during the online lecture session needed to be restricted to the topic being discussed. (Netiquette is the term coined to refer to proper conduct, or etiquette, in a computer environment. Because there will be no face-to-face contact with your instructor and class participants, it is critical that certain basic netiquette guidelines are followed to avoid unnecessary conflict in the virtual classroom (http://training.cuna.org/elearning/eschool/experience.html)). In hindsight a set of guidelines should have been made available to students during the experiment, but as the process was of an exploratory nature, a set of netiquette guidelines might have stopped students participating further.
25. The availability of recordings (Table 64) and course materials after the lecture sessions was much valued. It highlights the asynchronous usability of the eLearning platform.

Bates (1995) sets out criteria for decision-making in the choice and use of technologies in education. These are based on an analysis of common questions each institution must answer for itself, to do with access, costs, teaching and learning, interactivity and user-friendliness, organisational issues, novelty, and speed. Bates proposes '12 golden rules' for using technology in education and training: good teaching matters; each medium has its own aesthetic; educational technologies are flexible; there is no 'super-technology'; all major media types should be available to teachers and learners; balance variety with economy; interaction is essential; student numbers are critical; new technologies are not necessarily better than old ones; teachers need training to use technologies effectively; teamwork is essential; and technology is not the issue but how and what do we want students to learn is.
From Choosing & Using Technologies in Education and Training, located at http://home.vicnet.net.au/~cute/bib7f.htm

This was written in 1995, but it is all still relevant today as seen from the results and conclusions of the GENIUS project under the AISG at the Computer Science Department at Trinity College, Dublin.

9.5 Political, Economic, Social and Technological (PEST) Conclusions

The following summarises the conclusions drawn from the PEST analysis as completed as part of the assignment.

9.5.1 Broadband

It is clear that the main issue that materialised from the PEST analysis effects all four domains – political, economic, social and technological - that of Bandwidth and the availability of Broadband here in Ireland. It was completely obvious to the students that this was not a Trinity College problem or a LearnLinc technology problem. Basically, sufficient investment has not yet occurred and promises by various telecom providers have not been fulfilled. The students also recognised the role of the Commission for Communication Regulation in ensuring that progress is made in this area. No doubt this will improve in time.

9.5.2 Travel and Time

The recognition of savings both in time and cost from a student perspective and lecturer perspective were key issues. The position of faculty as a provider of a synchronous eLearning solution though, becomes more contentious. Who is going to pay for the licenses to use an eLearning technology? Who is going to administer the site – registration of students, course registration, photographs, course materials, help desk support? Who is going to set up the server and provide technical support during the real-time delivery of lectures? What about the empty Lecture hall? Who is going to provide a supervised computer laboratory for those students who do not have suitable PC equipment? The economics of providing a synchronous eLearning solution must adhere to sound Business Case presentation and approval, like any project.

9.5.3 Social Interaction

The students are concerned about the lack of social interaction. For this project the students enrolled for a traditional face-to-face university course. Perhaps one of their reasons for joining such a course is social, to meet like-minded people, this can be upset for a few weeks. But there was also recognition that the text-chat facility and the hands-up facility enhanced student interaction. Again, the student preference, for a blended learning solution, would retain some face-to-face lectures. This coupled with the photographs in the eLearning environment should make college a better experience than either a totally online solution or a totally traditional solution.

9.5.4 Access

Technology can remove barriers to education and can open up global opportunities for students. An underlying concern is the availability to all. Access to PCs and basic skills in using a PC, these issues have to be prioritised at an educational institutional level and also at Governmental level. The benefits of online synchronous eLearning to students with disabilities must also be recognised.

"*If anybody asks me what the Internet means to me, I will tell him without hesitation: To me (a quadriplegic) the Internet occupies the most important part in my life. It is my*

feet that can take to any part of the world; it is hands which help me to accomplish my work; it is my best friend – it gives my life meaning."
Dr. Zhangxu (Zhangxu and Aldis, 2001)

9.6 General conclusions on the role of eLearning

9.6.1 Non-Traditional Learner, Adult Learner, Lifelong Learning

From this research the potential of synchronous web-based eLearning can be visualised. Even in a city the size of Dublin, the benefits abound. A student can avoid travelling into the city in the evening to attend college. Even for one night of a three nights a week course, a blended solution, this would be a major benefit. The student would either be able to stay on at work or take the lecture at their home. The other advantages have been outlined above.

As part of the research it was identified that universities and educational institutions in Europe (Luker, 1996) are some way behind their US counterparts as regards modularisation of courses and programmes. This is a major hindrance in preparing for the future, where the learner can learn anytime, anywhere, across time zones and borders. Educational institutions need to embark on major change in their structure and rigidity, not just in course design, but also in administration together with the whole process from registration to graduation. The graduating student may have taken many modules for his course in a variety of different universities.

9.6.2 Areas for Future Research

Several areas come to mind, one in particular –

A wider study to examine the impact of a synchronous eLearning initiative in a Traditional University with respect to costs, certification, academic performance, pedagogy and brand would be useful.

"*Unfortunately, most of the courses that we see online today are not unlike the first ATMs (which were situated inside the bank, an automated teller! Real innovation did not occur until ATMs were placed outside banks and in malls…available 24 hours a day).*
They are automated, but they still get delivered within the boundaries established by the instructor as the director of the learning experience. The traditional classroom model appears to be the norm for the majority of today's online classes. Automation is happening, but not innovation" Kilmurray, 2003.

9.6.3 eLearning – moving forward

New technologies are coming on stream, for example THOLOS. Tholos - 'in real time, through space', embodies the emergence of new technologies in the field of virtual communication and interaction. An Austrian company is set to revolutionize

communication between Europe's citizens with the launch of a large round screen which allows one-to-one, real-time, oral and visual communication with someone in another country. Linking major European cities, it will lay the foundation for an entirely new form of communication. Tholos enables virtual contact between individuals of various cultures. While the Tholos is initially envisaged as a tourist attraction, it is also expected to have educational and corporate applications. Discussions have already begun on using the technology in university hospitals. Doctors at one Tholos would be able to walk around the screen, viewing a patient from all angles. Maybe students can take their lectures from another country sitting in their own town square! http://www.tholos-systems.com/htm/hom_fe.htm

The role of standards in eLearning as outlined in the Literature Review is really what is going to underpin the technologies, but also the evolution of learning enhanced by technology. LearnLinc has some of both worlds, asynchronous and synchronous at this time. Students who attend a lecture can participate in 'same time, any place' synchronous eLearning. Students who are unable to attend, for whatever reason, have the benefit of being able to participate in 'anytime, anyplace' asynchronous eLearning. The course materials are available to them, but also the added bonus of a recording of the live lecture, which many asynchronous eLearning systems do not have. LearnLinc's content management could be improved, adding an underlying storage structure. However, eLearning platform providers are collaborating, forming strategic partnerships and alliances. The product offerings are evolving.

These advances will enable key issues like better content management, reusability of material, portability, interoperability and maintainability.

The industry providers need to work hand in hand with the educators and the learners. It really is a value chain system and the process follows the path as pointed out in the Literature Review, as that of the System Development Life Cycle.

"*The exciting discontinuity, the exciting opportunity and threat, the exciting confusion now thrust upon us is an explosion of new ways of organizing, communicating, delivering, finding, modifying, and creating information. We have barely begun to see how to use these new ways for teaching and learning. It will take many decades to invent and wring out the very best uses of these new tools – even as newer tools continue to arrive, divert our attention, and offer every greater possibilities."* (Gilbert, 2000)

Groups like Career Space as outlined in Chapters 1 and 2, supported by the European Commission, are an example of a successful Public-Private Partnership, involving a consortium of industry and universities in the development of ICT skills profiles. It was out of this initiative that the GENIUS project evolved.

The European Commission in its eLearning Action Plan for 2001-2004 identified four action lines:

- Infrastructures and equipment
    - Connectivity and broadband
- Training at all levels
    - New skills, basic skills, Training
- Quality contents and services
    - Conducive environment – quality, standards, intellectual property
- European co-operation and networking
    - Cross-sector co-operation

9.7 Finally

The researcher would like it to be noted that the GENIUS project was an extremely enjoyable project to have been involved with. In particular working with the GENIUS team in the AISG, Computer Science Department in Trinity College, but also meeting and working with the other members in Industry and Academia, who were members of the GENIUS consortium.

10 BIBLIOGRAPHY

Bates, A. W., 1995. - *Technology, Open Learning and Distance Education*. London, Routledge. Referenced in ICTs in Distance and Lifelong Learning. Gill Kirkup and Ann Jones, The Information Society in Europe: work and life in an age of globalization edited by Ken Ducatel, Juliet Webster, and Werner Herrmann, 2000.

Beard, R., 1998. - "Will the Twenty-First Century Need Universities?" Available at http://www.facstaff.bucknell.edu/rbeard/papers/universities.html

Berge, Z. - Facilitating computer conference: Recommendations from the field. Educational Technology, 35(6), 1995, 22-30.

Bonk, C. J., & Cummings, J. A. (1998). - *A dozen recommendations for placing the student at the center of web-based learning. Educational Media International*, 45 (2), 82-89. Referenced in Community College Students Taking Online Courses: The Student Point-of-View, Julia D. Harbeck

Burge, E. J., & Haughey, M. (1993). *Transformative learning in reflective practice*. In T. Evans & D. Nation (Eds.), Reforming Open and Distance Education (pp. 88-112). London: Kegan Paul. Referenced in Community College Students Taking Online Courses: The Student Point-of-View, Julia D. Harbeck

CALRG Report No. 199, Computers and Learning Research Group*, eTutorials with voice groupware: an investigation into real-time conferencing to support M206 students at a distance* by Lucia Rapanotti, Canan Tosunoglu Blake, Robert Griffiths (May 2003)

Casey, John (2004). Intellectual Property Rights (IPR) in Networked E-Learning, A Beginners Guide for Content Developers. Available at http://www.jisclegal.ac.uk/publications/johncasey_1.htm

Cronbach, L. J. 1982. *Designing evaluations of educational and social programs*. San Francisco: Jossey-Bass. As referenced in the User-Friendly Handbook for Mixed Method Evaluations, Edited by Joy Frechtling, Laure Sharp, August 1997

Differding, Gregory A. "Preparing Students to Join the Online Learning Community" available at http://coe.sdsu.eet/Articles/stuprep/index.htm

Ernest, P. (2003). "Factors which facilitate effective online learning. English courses at the UOC." Available at http://www.uoc.edu/dt/20202/index.html

Frechtling, Joy, Sharp, Laure, August 1997, User-Friendly Handbook for Mixed Method Evaluations, http://www.ehr.nsf.gov/EHR/REC/pubs/NSF97-153/CHAP_1.HTM

Garrison, D. R. and Henderson, T., *E-Learning in the 21st Century: A Framework for Research and Practice*, RoutledgeFalmer, 2003.

Gilbert, S. W. (2000), "A New Vision Worth Working Toward – Connected Education and Collaborative Change" as referenced in "Beyond Institutional Boundaries: reusable learning objects for multi-professional education" available at http://www.tltgroup.org/gilbert/NewVwwt2000--2-14-00.htm

Hanna, D.E.,1998. "Higher education in an era of digital competition: Emerging organizational methods," *Journal of Asynchronous Learning Networks*, volume 2, number 1, at http://www.aln.org/alnweb/journal/vol2_issue1/hanna.htm Referenced in http://www.firstmonday.dk/issues/issue4_12/hara/

Harasim, L., Hiltz, S. R., Teles, L., & Turoff, M. (1995) *Learning Networks*, Cambridge, Mass: The MIT Press. Referenced in Community College Students Taking Online Courses: The Student Point-of-View, Julia D. Harbeck

Harasim, L. (1990). *Teaching by computer conferencing*. Referenced in Community College Students Taking Online Courses: The Student Point-of-View, Julia D. Harbeck

Hara, Noriko and Kling, R. (1999), "Students frustrations with a web-based distance Education Course", http://www.firstmonday.dk/issues/issue4-12/hara/

Hick, Steven, R. 1997. "GIS Education in the Rockies for Traditional and Non-traditional students", Available at http://gis.eri.com/library/userconf/proc97/proc97/to300/pap251/p251.htm

Hoepfl. "Choosing qualitative research: A primer for technology education researchers." *Journal of Technology Education* 9, no. 1 - Fall (1997).

Hofmann, Jennifer, (2001). "24 Hours in the Life of a Synchronous Trainer." Available at http://www.learningcircuits.com/2001/mar2001/hofmann.html

Horn, L. (1996*). Nontraditional Undergraduates. Trends in Enrollment From 1986 to 1992 and Persistence and Attainment Among 1989-90 Beginning Postsecondary Students* (NCES 97-578). U. S. Department of Education, NCES, Washington, DC:US. Government Printing Office.

Hough, Professor Michael, Teachers of the Future, available at http://www.cybertext.net.au/tct2002/disc_papers/staffing/hough.htm

Jacob, E. (1990). Alternative approaches for studying naturally occurring human behavior and thought in special education research. *The Journal of Special Education,* 24,(2), 195-211. Referenced in http://gse.gmu.edu/research/tr/TRtriangulation.shtml

Johansen, R., Martin, A., Mittman, R., & Saffo, P. (1991). *Leading business teams: How teams can use technology and group process tools to enhance performance*. Reading, MA: Addison-Wesley Publishing Company.

Kane, E. *Doing your own research: Basic descriptive research in the social sciences and humanities*. 7th ed. London and New York: Marion Boyars, 1993.

Kerka, S. (1996). *Distance learning, the Internet, and the World Wide Web*. ERIC Clearinghouse on Adult, Career, and Vocational Education. Columbus, Ohio. (ERIC Document Reproduction Service ED 395 214). Referenced in Community College Students Taking Online Courses: The Student Point-of-View, Julia D. Harbeck

Kilmurray, James. 2003. e_Learning:It's more than Automation. Available at http://ts.mivu.org/default.asp?show=article&id=1014

Kirkup, Gill and Jones, Ann. *ICTs in Distance and Lifelong Learning*. The Information Society in Europe: work and life in an age of globalization edited by Ken Ducatel, Juliet Webster, and Werner Herrmann, 2000.

Kling, R. 1994. "Reading "All About" Computerization: How Genre Conventions Shape Non-Fiction Social Analysis". *The Information Society [*online article]. Vol. 10, 3:147-172. Available at Http://www-slis.lib.indiana.edu/kling/read94a.html

Laurillard, D. 1993. *Rethinking University Teaching: A Framework for the Effective Use of Educational Technology*. London: Routledge. Referenced in ICTs in Distance and Lifelong Learning. Gill Kirkup and Ann Jones, The Information Society in Europe: work and life in an age of globalization edited by Ken Ducatel, Juliet Webster, and Werner Herrmann, 2000.

Ligorio, M. B. Integrating communication formats: synchronous versus asynchronous and text-based versus visual. *Computers and Education*, 37 (2), 2001, 103-125

Luker, Paul. (1996) Lifelong Learning – Rising to the Challenge. Available at http:www.ccsr.cse.dmu.ac.uk/resources/equality/luker.html

Makin, Vi, 2000. Trends and needs in distance education research: the death of distance. Available at http://www.unisa.ac.za/Default.asp?Cmd=ViewContent&ContentID=13278&P-XSLFile=unisa/accessibility.xsl accessed on 28/09/04

Marjanovic, O., (1999), Learning and teaching in a synchronous collaborative environment. *Journal of Computer Assisted Learning*, Volume 15, Issue 2, Pages 129-138, June 1999.

Mason, R. 1995, "*Synchronous and Asynchronous Media for Distance Teaching." In One World, Many Voices*. Edited by D. Sewart. Selected papers from the Seventeenth World Conference of the International Council for Distance Education. Oslo: ICDE. Referenced in ICTs in Distance and Lifelong Learning. Gill Kirkup and Ann Jones, The Information Society in Europe: work and life in an age of globalization edited by Ken Ducatel, Juliet Webster, and Werner Herrmann, 2000.

Maxwell, J. (1996). Using qualitative research to develop causal explanations. Harvard University: Harvard Project on Schooling and Children. Referenced in http://gse.gmu.edu/research/tr/TRtriangulation.shtml

McConnell, D., *Implementing Computer Supported Cooperative Learning*, 2001. London: Kogan Page.

McIsaac, M. S. and Gunawardena, C. N. (1996). Distance Education [online]. Available: http://seamonkey.ed.asu/~mcisaac/dechapter/tech1/htm

McLuhan, Marshall, *Understanding Media*: The Extensions of Man. McGraw-Hill, 1964.

McNamara, C. (PhD) 1999. Basic Guide to Program Evaluation, referenced at http://www.mapnp.org/library/evaluatn/fnl_eval.htm

Moore, M.G.(1994). "*Trends and needs in distance education research – keyote address, in Distance Learning and new technologies in education: proceedings of the first international conference on distance education*. Moscow: Association for International Education: 220.

Murphy, John & Pathak, Pramod. (2003). Supporting E-Learning and Mobility in Higher Education: The Changing role of the Information Systems Services Department. Available at http://www.ncirl.ie/Research/working_index.htm. (NCIRL-029-2003)

Nipper, S. (1989). "Third generation distance learning and computer conferencing, " In R. Mason and A. Kaye (editors*). Mindweave: Communication, computers and distance education*. Oxford: Pergamon, (pp. 53-73). Referenced in Hara, Noriko and Kling, R., "*Students frustrations with a web-based distance Education Course*", http://www.firstmonday.dk/issues/issue4-12/hara/

Noble, D. F. (1988). "Digital diploma mills: the automation of higher education". First Monday [online article]. Vol 3, 1. Available: http://firstmonday.org/issues/issue3_1/noble/index.html

O'Malley, J.M. & Valdez Pierce, L. (1996). Authentic assessment for english language learners: Practical approaches for teachers. Reading, MA: Addison-Wesley Publishing Company. Referenced in http://gse.gmu.edu/research/tr/TRtriangulation.shtml

Paulson, M. 1992. *From Bulletin Boards to Electronic Universities: Distance Education, Computer-Mediated Communication, and Online Education*. Research Monograph no.7 of the American Center for the Study of Distance Education, College of Education, Pennysylvania State University. Referenced in ICTs in Distance and Lifelong Learning. Gill Kirkup and Ann Jones, The Information Society in Europe:

work and life in an age of globalization edited by Ken Ducatel, Juliet Webster, and Werner Herrmann, 2000.

Pincas, A. 1995. "Assuring Quality in Higher Education by Computer Conferencing." In One World, Many Voices. Edited by D. Sewart. Selected Papers from the Seventeenth World Conference of the International Council for Distance Education. Oslo: ICDE. Referenced in ICTs in Distance and Lifelong Learning. Gill Kirkup and Ann Jones, The Information Society in Europe: work and life in an age of globalization edited by Ken Ducatel, Juliet Webster, and Werner Herrmann, 2000.

Ragan, L. C. (1999). Good teaching is good teaching: An emerging set of guiding principles and practices for the design and development of distance education. CAUSE/EFFECT, 22 (1). [Online]. Available: http://www.educause.edu/ir/library/html/cem9915.html. Referenced in Community College Students Taking Online Courses: The Student Point-of-View, Julia D. Harbeck

Reid, Elizabeth M., Electropolis: Communication and Community On Internet Relay Chat, 1991, http://www.aluluei.com/electropolis.htm

Salmon, Gilly (2000). *"*E-moderating. The key to teaching and learning online."London: Kogan Page. As referenced in Ernest, P. (2003). "*Factors which facilitate effective online learning. English courses at the UOC.*" Available at http://www.uoc.edu/dt/20202/index.html

Steiner, Virginia. What is Distance Education" by Virginia Steiner, DLRN 1995

Thomas, David R., *"Qualitative evidence: The contribution of qualitative research to evidence-based medicine."* (Published in the HRC Newsletter, October 2000, No. 34, 18-19), http://www.health.auckland.ac.nx.hrmas.qual%20evidence.htm

Thomas, David R., "*A general inductive approach for qualitative data analysis"*, August 2003, posted at http://www.health.auckland.ac.nz/hrmas/Inductive2003.pdf

Toffler, Alvin, Future Shock, 1970

Toffler, Alvin, The Third Wave, 1980

Veenema, Shirley and Gardner, Howard. Multimedia and Multiple Intelligences. 1996. http://www.prospect.org/print/V7/29/veenema-s.html

Volery, T and Lord, D. (2000) Critical Success factors in online education. *The International Journal of Educational Management* 14/5 [2000] 216-223

White, C. (2000, April). Students and faculty respond to online distance courses at Grant MacEwan Community College. *T.H.E. Journal,* 68-70. Referenced in Community College Students Taking Online Courses: The Student Point-of-View, Julia D. Harbeck.

Wiggins, G. (1998). Educative Assessment. San Francisco, CA: Jossey-Bass. Referenced in http://gse.gmu.edu/research/tr/TRtriangulation.shtml

Windschitl, 1998. "*The WWW and classroom research: What path should we take?* In *Educational Researcher*, Volume 27, Number 1, January-February (pp.28-33). As referenced in http://www.firstmonday.dk/issues/issue4_12/hara/

Wylie M. 1995. "*No Place for Women: Internet is a flawed model for the Infobahn*." Digital Media 4, no.8:3. Referenced in ICTs in Distance and Lifelong Learning. Gill Kirkup and Ann Jones, The Information Society in Europe: work and life in an age of globalization edited by Ken Ducatel, Juliet Webster, and Werner Herrmann, 2000.

Zhangxu and Aldis, 2001, *"No disability in Digitalized Community*" located at http://www.icdri.irg/inspirational/no_disability_in_digitalized_com.htm

Zuboff. S. (1988). *In the age of the smart machine: The future of work and power.* Oxford. UK:Heinemann, as referenced in *Does Technology Impact on Teaching Styles or Do Teaching Styles Impact on Technology in the Delivery of Higher Education,* Jewels, T., de Pablos, C. Campbell, M., In *Issues in Informing Science and Information Technology* located at http://articles.iisit.org/021jewel.pdf on 13/12/04.

http://www.learningcircuits.org/glossary.html - for glossary type definitions.

http://www.edtlearning.com/pro_over_linclearn.html

11 APPENDIX A - GENIUS

ANNEX 3 - Detailed Description of the project
Amended by Jean-Marc Pierson, to make it as up to date as possible on June 27, 2002

GENERIC E_LEARNING ENVIRONMENTS AND PARADIGMS FOR THE NEW PAN EUROPEAN INFORMATION AND COMMUNICATION TECHNOLOGIES CURRICULA

Achronym: GENIUS

A. Bodies Participating in the Project

Vassil Alexandrov, Nia Alexandrov	University of Reading, UK	UOR
Tony Ward	University of York , UK	UOY
Dudley Dolan	Trinity College, Ireland	TCD
George Hassapis	University of Thessaloniki, Greece	AUT
Carlos Delgado Cloos, Abelardo Pardo	University Carlos III Madrid, Spain	UC3M
Pedro Guedes Oliveira	INESC Porto, Portugal	INESC
Michael Hoffmann	University of Ulm, Germany	UOU
Jean-Marc Pierson	INSA de Lyon, France	INS
Anders Haraldsson	University of Linkoping, Sweden	UOL
Peter Revill	*e*-Skills NTO	UK
Thomas Bourke	ICEL Belgium	
Dermot Honan	Intel, Ireland	
Alan Freeland, Gerry Lynas	IBM, UK and Europe	
Harvey Nash, Brad Pianta	BT, UK	
John Kinghorn	Philips Semiconductors, UK	

All the partners in the proposed consortium are members of Career Space consortium and worked together in Phase II and developed with the other members of Career Space the New ICT Curricula Guidelines. Career Space is a flagship public-private partnership, which was established with the objective of addressing the skills shortage through the identification of generic skill profiles to which the higher education curricula can be aligned and is a corner stone in the E-Learning action plan as identified by the European Commission.
The University of Reading has received a major Shared University Research grant from IBM which will focus in next five years in developing generic software environments facilitating collaboratories over the Web and focused on solving large scale problems.
Trinity College is a traditional University, which has the largest department of Computer Science in Ireland. In addition Trinity has focused on non-traditional learners (e.g. students in employment attending traditional (evening) and open-learning programmes) in the IT area since 1967.
The University of Reading has received a major Shared University Research grant from IBM which will focus in next five years in developing generic software environments facilitating collaboratories over the Web and focused on solving large scale problems.
University Carlos III Madrid was a project co-ordinator 1999/2000 of Intercontinental Collaborative Education project, with aim to develop a multidisciplinary transatlantic curricula in the area of e-commerce. The support for the EU participants was from EC.
The University of York, has extensive experience of FCD programmes and is leading, in collaboration with the e-Skills NTO, the PanICT consortium of 7 European Universities (most of them participants in GENIUS) in the analysis and identification of novel e-Learning pedagogical approaches.
The companies involved in this project, IBM, Intel, BT and PHILIPS Semiconductors, have substantial experience in corporate e-Learning and software environments for e-learning. **IBM** will contribute with its **Learning Spaces** and **'Domino'** software. **BT** through **Mentergy** will contribute with their '**LearnLinc**' system, first version of which was deployed in 1994 and is having the longest track record with the most customer

experience of any company in the live online learning market offering white board, audio and videoconferencing, streaming video and extensive administrative functions. Intel will contribute with their advanced prototype eLearning Platform, which offers innovative and efficient mechanisms for distributing rich multimedia content, addressing many of the concerns associated with network bandwidth availability. This capability has been successfully piloted internally within Intel over the past year.

B. Objectives, activities envisaged, results anticipated.

B.1 Types of activity and anticipated results: **The E-Learning action plan as published by the EC has highlighted this form of learning as a significant contributor to** addressing the Information and Communication Technology (ICT) skills shortage **within the EU. The Career Space consortium,** a flagship public-private partnership**, was established with the objective of addressing the skills shortage through the identification of generic skill profiles to which the higher education curricula can be aligned. E-learning environments that have been or are being developed offer innovative opportunities to universities and other education providers to collaborate whilst concurrently offering enhanced learning opportunities to all learners and ensuring their learning is in line with the needs of the new economy** and offer solutions in bridging the skills gap**. We envisage therefore the following activities:**

New Curricula Content Development : Detailed curricula content development for the New ICT Curricula proposed in the Career Space consortium Phase II final report, focusing on the five different strands Undergraduate, Postgraduate, Non-traditional learners, Multidisciplinary Curricula and Training in accordance with the suggested guidelines.

Investigating innovative Instruction/Delivery paradigms: to test different instruction and content delivery paradigms of the New ICT curricula corresponding to the new pedagogical paradigms and based on the learning environments offered by the industrial partners. To evaluate and blend these environments through a collaborative framework to deliver an innovative learning environment. To validate the approach and test different modes of delivery for each group of modules and to test how they best blend with the five different strands.

Evaluation, Validation and Dissemination: To evaluate the new content delivery paradigms. To validate our approach through experiments. To disseminate the results progressively through seminars, workshops and publications online and in the mainstream conferences and journals.

The Expected Results are:

1.Content of the new curricula composed of educational objects and modules suitable for mixed mode of delivery;
2.New Instruction/Contend delivery paradigms for the New ICT Curricula;
3.New e-Learning Environments that facilitate a hybrid mode of delivery and incorporate new pedagogical approaches;
4.Test results and validation of the approach(es).

B2. Justification and Objectives.

The ICT skills gap remains and according to Harvey Nash despite the significant redundancies and reduction in ICT industry growth "the gap between skilled ICT worker supply and projected needs across the EU is still estimated to reach 1.5 million in 2003." The UK eSkills National Training Organization estimates that 10% of UK ICT posts are unfilled. Finding a way forward in *narrowing the gap is an important objective of our consortium*.

Therefore we plan to formulate, investigate and validate the relevant pedagogical approaches that facilitate a hybrid mode of delivery for the new ICT curricula as proposed by the Curriculum Guidelines for the Higher Education within the Career Space consortium (www.career-space.com) covering the following strands: First Cycle Degree (FCD), Second Cycle Degree, Multidisciplinary FCD and SCD, Non-traditional learners (Undergraduate Students in Employment, Night school and Distance Learners) and Teacher Training.

The reason we focus on all these five strands is that they correspond to the main groups of learners, e.g. traditional and non-traditional students and to narrow the gap a wide coverage of learners is required. We plan to implement the New ICT Curricula and our

approach for these major groups. If we consider US statistics[51] it is expected a 20% rise in enrolments of students under 25 and an increase of 4% in the number of 25s and over by 2007. **Similar is the situation in Europe.** This shows that the number of traditional students is not a minority at all. On the other hand the group of non-traditional students is significant: 25% of all undergraduate students are being over thirty, 23% of all graduate students are being over 40 years old and almost 60% of graduate students being part –time [1].

On the other hand our five strands correspond to four modes of instruction: First Cycle Degree, Second Cycle Degree, continuing education and training. These modes have different requirements, for example, in the training mode we have predominantly a transmission of knowledge only whilst the purpose of education is not just transmission of knowledge but it also deals with transformation of persons and the development of critical thinking skills. Within First and Second Cycle Degrees and non-traditional students there are also major differences: traditional students are young, generally attend face-to-face classes and socialization is a major component in the learning process. "Non-traditional students and Second Cycle Degree may require less socialization and are more suitable for online instruction." And finally Online teaching is "**usually a shift from efficiency to quality**" [1] and it is known that this quality does not come cheaply. The consortium, therefore, plans **to develop a multifaceted approach** and has the following **objectives** :

To explore and test existing and emerging learning environments (platforms) and innovative pedagogical/technological paradigms and support mechanisms required within the participating Universities Consortia and other stakeholders within the European virtual campus.

To evaluate and report on the scalability of the approach involving all project participants.

B.3 The Target group includes traditional and non-traditional learners (teachers and students) both within First (FCD) and Second Cycle (SCD) degree cohorts. Insofar as the skills gap within the ICT industry within the European Union is focused both on the output of FCD and SCD learners four of the proposed strands focus on this level. Career Space, a consortium of eleven major ICT companies, has been primarily established to address the estimated skill shortage of 1.5 million people and in collaboration with education partners develop strategies to unblock this serious potential barrier to economic progress in the European e-Economy.

The target groups will benefit from the rich diversity of current and emerging technology being developed by the industrial partners which will wherever possible be made available to the project to establish an integrated, innovative and unique e-learning platform with European coverage and impact. The target groups whilst therefore primarily the learners, the beneficiaries are all the partners of the project and the wider learning community through dissemination of the outcomes.

B.4 Added Value and Innovation

Integrated approach which offers a multifaceted range of learning experiences, opportunities, inclusion and accessibility, which could not be provided through traditional delivery mechanisms.

The development of the blended open collaborative learning environment offered by the leading edge technological capability offers an innovative alternative to the existing technologies.

Standardization and Modularization as well as Scalability of the approach

B.5 Main Pedagogical Approaches and Concepts

Our approach is based on the educational model which assumes that the learning process is an interactive process of seeking understanding, consisting of three fundamental components: Conceptualization, Construction and Dialogue. The relevant modules of the New Curricula will be mapped onto these three components and a hybrid way of delivery will be investigated. We will focus mainly on the construction and dialogue and investigate how different learning environments facilitate these phases. It is known that much significant learning arises through dialogue and debate and new paradigms of content delivery are needed. There are several approaches, one is to mimic traditional methods using the new technology and the other to develop new paradigms blending the content and technology. We will focus on the later approach

[51] Teaching at an Internet Distance: the Pedagogy of Online Teaching and Learning , Report, 2000 (www.vpaa.uillinois.edu/tid/report/tid_report.html)

since it is best suited for the dialogue phase. For discussion based modules we will use text based collaborative learning approach and for didactic courses (for example, geometry, physics fundamentals, theorem proving) a graphic based more individualized approach will be applied[1]. We will also identify the modules where mixture of the above can be applied. We will investigate how the new learning platforms facilitate the teachers online three important functions: 1.contextualizing functions, which compensate for the limitations of the medium; 2. monitoring functions, which compensate for physical cues; 3.meta-functions to remedy problems in context and to summarize the state of discussion.

B.6 The main focus in the call : This proposal builds on the 'Career Space Higher Education (HE) Curriculum Guidelines' which underpin both the 'New Curricula for ICT in HE' and subsequently this proposal. The uniqueness of the Career Space partnership will enable the establishment of a Virtual Campus offering **new learning environments** and **pedagogy** combining the expertise of all partners to the benefit of a wider community of learners. Access to leading edge software technology will provide the opportunity to develop state of the art e-learning environments and communities providing access to intellectual resources by learners and institutions on a world-wide scale. The project will identify within the five strands the common and unique needs of the target groups and tailor appropriate e-learning environments. Such technology being developed by Intel, IBM, BT and others, will enable access to expertise, knowledge and guidance throughout the academic and industrial community. The developing open collaborative e-learning environment will enable learners and teachers throughout the European Community to share and learn, be sensitive to and learn about cultural differences and enable the development of new pedagogy. The latter will require the re-orientation, education and support of teachers, facilitators and mentors both on a face to face level 'on-site' and specifically in the new e-learning environment to ensure they are able to 'teach', 'guide' and 'support' as effectively online as they do off line.

C. Project approach and organization

C.1 Our approach is based on the close working relations of the partners in Career Space project and the following achievements giving an unique strength and leading edge position of the proposed consortium:

the results of Phase II of Career Space and the strengths of the partners: Reading, Thessaloniki and Madrid have worked in the past four years on developing flexible second cycle degrees (supported by EC SOCRATES and later EC-US Intercontinental Collaborative Education grant, and IBM), York, has extensive experience of FCD programmes and is leading, in collaboration with the e-Skills NTO, the PanICT consortium of 7 European Universities (most of them participants in GENIUS) in the analysis and identification of novel e-Learning pedagogical approaches. Trinity College is a traditional University, which has the largest department of Computer Science in Ireland. In addition Trinity has focused on non-traditional learners (e.g. students in employment attending traditional (evening) and open-learning programmes) in the IT area since 1967. University Carlos 3 Madrid is running collaborative programmes using e-learning environments with other Spanish Universities already.

All partners, i.e. 20 Universities and 11 major international ICT companies actively supported by CEN/ISSS – the European standardisation body for the information society, Eurel- the convention of national societies of electrical engineers of Europe and *e*-skills NTO – the UK national training organization for ICT, have worked together and delivered New Curricula guidelines within the Career Space consortium.

The companies involved, IBM, Intel, Microsoft, BT, Thales (formerly Thomson CSF), CISCO, SIEMENS, PHILIPS Semiconductors, Nortel Networks, Nokia and Telefonica have substantial experience in corporate e-Learning and software environments for e-learning. **IBM** will contribute with its **Learning Spaces** and **'Domino'** software. **BT** through **Mentergy** will contribute with their '**LearnLinc**' system, first version of which was deployed in 1994 and is having the longest track record with the most customer experience of any company in the live online learning market offering white board, audio and videoconferencing, streaming video and extensive administrative functions. Intel will contribute with their advanced prototype eLearning Platform, which offers innovative and efficient mechanisms for distributing rich multimedia content, addressing many of the concerns associated with network bandwidth availability. This capability has been successfully piloted internally within Intel over the past year. **University of Reading** is working with Emory University in the last few year in developing the **Collaborative Computing Framework (CCF)** . CCF offers integrated

framework for collaboration based on Collaborative Computing Transport Layer (CCTL). CCTL provides two simplifying group abstractions, where sessions are traditional groups meaning that each process wishing to participate must join a session. The CCF offers integrated framework
Based on the above, we are therefore in a leading position to blend the content of the New Curricula with the e-learning environments of the partners and to investigate novel paradigms and collaborative learning platforms that will impact on all of the Higher Education institutions in the EU.
A **multifaceted approach** defining the core, area specific core and optional modules for the four curricula suggested by Career Space curricula guidelines will be undertaken. We then propose to blend the content based on new pedagogical paradigms with the existing and emerging e-learning environments to create a **new, open collaborative e-learning environment.**

C2 a) The project consists of the following main stages:
Detailed curriculum content development based on the Career Space curriculum guidelines for HE.
Formulation of the new pedagogical and content delivery paradigms.
Experimenting with Blending the content with the existing and emerging learning environments.
Testing and evaluating the approaches.
Disseminating the findings.

C2 b) Overall work plan (the participating institutions in each task are shown in brackets):
MONTH 1 - 6 of the project:

Stage 1 - Detailed curriculum development
1.1 FCD, applicable to strands 1, 2, 3 (UOY, UOU, UOL, INESC, 20 mdays per partner)
1.2 SCD, applicable to strands 3, 4 (UOR, AUT, UC3M, INS, 20 mdays per partner)
1.3 Identification of trainer development, applicable to strand 5 (TCD, 20 mdays)
DELIVERABLES:
Detailed set of ICT curricula based on the Career-Space curriculum guidelines
Stage 2 - Formulation of pedagogical paradigms
2.1 FCD, applicable to strands 1, 2, 3, 5 (UOY, TCD, INESC, UOL 20 mdays each)
2.2 SCD, applicable to strands 3, 4, 5 (UOR, U3CM, INS, AUT , 20 mdays each)
2.3 Non-traditional, applicable to strands 2, 3, 4, 5 (TCD , e-Skills NTO, 20 mdays each)
DELIVERABLES:
Enhanced pedagogical and content delivery paradigms + Report

Stage 3 - Pilot a pan-European e-Learning delivery system
All partners including Intel, BT and IBM
Installation and Operation training at each University (ALL + IBM,Intel,BT, 5 mdays each)

MONTH 1 - 12 of the project:
Stage 3 - Pilot a pan-European e-Learning delivery system
Integration to form pan-European Delivery System with first prototypes available at the end of month 6 of the project (UOR, AUT, UC3M, UOY, TCD , RA per partner + IBM, Intel, BT, 10 mdays each)
Use Collaborative Computing Framework to create open collaborative e-Learning environment with first prototype available at the end of month 6 of the project (UOR, 1 RA + IBM, Intel, BT, 5 mdays each)
DELIVERABLES:
Evolving open and collaborative e-Learning environment

MONTH 6 - 18 of the project:
Stage 4 - Pedagogical paradigm trials
4.1 Formulate trials plan (ALL -20 mdays each + Companies -5 mdays each)

4.2 Develop technical material for trials (ALL – 20 mdays each)
4.3 Perform trials (ALL – 40 mdays each + Companies – 5 mdays each)
4.4 External evaluation (to hire external evaluator(s))
Evaluate pan-European delivery system and Internal evaluation of the trials at the end of months 12 and 18 (ALL – 10 mdays each + Companies – 10 mdays each)

DELIVERABLES :

Report on the trials, Internal and External evaluation reports.
Enhanced skill base within the teaching community on the e-Learning environment

MONTH 12 - 18 of the project:
Stage 5 - Dissemination
5.1 Pan-European Education Conference (ALL + Companies)
Dedicated GENIUS dissemination event (ALL + Companies)
Various academic and industrial journals, conferences, workshops and seminars (ALL)

MONTH 1-18 of the project
Stage 6 - Project Management
Managing the according to the work plan (UOR 30 mdays + ½ Secretary)
Liaison with Career Space, organizing Conferences and other dissemination activities (ICEL, 1 administrative person, 18 months)
Initial project meeting and project review meeting at month 6 (ALL + Companies)
Workshop to present and discuss first results of the project at month 12 (ALL + Companies)
Conference and Final Project meeting, end of month 18 of the project (ALL + Companies)

Summary of deliverables:

Detailed set of ICT curricula based on the Career-Space curriculum guidelines
Reports on Enhanced pedagogical and content delivery paradigms
Evolving open and collaborative e-Learning environment
Evaluation reports (external and internal).
Final Report.

C.3 The working language is English.

D Evaluation and Dissemination

D.1 Monitoring and Evaluation of the project

A Steering Committee will be established that will monitor and guide the development of the project. This body will ensure the project's adherence to its development cost plan and will use staged verbal and non-verbal reports for this purpose.
The Steering Committee will oversee the appointment of the external evaluators and ensure the results of the evaluation are utilized in the project development. On a day to day basis, the project coordinator will liaise with the external evaluators and feed comments to all partners.
Each institution will be responsible for:
The internal evaluation of its development work through meetings, seminars and individual discussion.
The selection of external evaluation body.
Will consider the reports of the external evaluators (months 8 and 12 of the project) and make recommendations to make alterations to the detailed work plan if necessary.
Contributing to project meetings the results of its findings.
Taking cognizance of other partners findings.
Ensuring outcomes are delivered to budget and on time.
Using these internal and external assessment instruments we will be able to assess the efficacy of the various outcomes of the project as delineated in C2.

D.2. Evaluation of outputs

Our evaluation is based on top-down accountability and bottom-up instructional improvement approaches according to Harasim (1995) which are also known as "summative" and "formative" evaluation.
An externally appointed body will evaluate the project methodology and outcomes. In addition, internal assessment instruments such as student and teacher questionnaires will be used to inform the overall project evaluation. Specific points that will be addressed include:

Formative Evaluation

Objective 1: **To implement the new pedagogical approaches and test the relevant e-learning platforms over an 18 months time period with a targeted number of student participants at each partner institution.**

Measurable outcomes include the following:
Targeted number of participating students enrolled from each institution over 18 months period.
Student completion of compulsory and elective distance education modules.

Formative Evaluation Methodology
Data will be collected via two strategies. First using the internet-based systems from the industrial partners. The second data collection strategy within the formative evaluation aspect of this project will come directly from student activities in the class. Faculty from each institution will be responsible for maintaining the records of participation and activity for each of their participating students. Also we will build concept maps by both students and teachers to measure students depth of knowledge. The project evaluator will archive this information for use in the summative evaluation component of the project. During the formative research phase, this data will serve to document that the project was actually developed, monitor programme implementation, and maintain records on resource allocation.

Summative Evaluation
Objective 2: To document the efficacy and strengths and weaknesses of these new paradigms.
Measurable outcomes include the following:
Learning and short-term retention of module content.
Student experiences in participating in this course.
Faculty experiences in teaching a course this way.
Details regarding activities and practices during project.
Measure of attainment of targeted student number goals
Identification of problems and how they were resolved.

Objective 3: To document results from this project so that others can use in creation of multi-institutional programmes

Measurable outcomes include the following:
Enhancement of the Career-Space website
Publication in mainstream journals, conferences and workshops
Dedicated information dissemination event

Summative Evaluation Methodology
This evaluation component employs multiple data collection measures to maximize validity and generalizability of results. First the consortium and student archives will provide much of the detail regarding the activities and practices during the project and attainment of student participation goals. Second, the extent of student learning from the online courses will be assessed via post tests at the conclusion of each module(s). Short-term retention of this material will be tested through a generic online post test administered to all students at the conclusion of the project. Third, the project evaluators will develop and administer an online survey to both students and faculty. This online survey will include a combination of demographic questions, like items asking participants to rate their experiences, and open-ended questions which gather information regarding experiences, required resources, consequences, and satisfaction with the learning model(s).
The various outcome data will allow us to test the efficacy of our learning approach. In addition, simple descriptive techniques will be used to document costs associated with this educational model and look at the average cost per student. Also, as part of our analysis of open ended items and interviews, we will look for recurring themes regarding problems, achievements, strengths and weaknesses of our approach.

In summary: the evaluation portion of this project seeks to document how the New ICT Curricula, based on new pedagogical paradigms is implemented in a open collaborative pan European e-Learning environment. Because this project seeks to create a scalable educational model that will meet the needs of five strands of learners,

the evaluation must be relevant to others outside of this specific project. Thus our evaluation seeks to consider the strengths and weaknesses, and costs of the overall approach. In this way, the evaluation considers information that would be helpful for future adopters of such an educational model, both students and teachers. Also, because of our reliance on information technology for project coordination, much of the data to support our formative and summative evaluations is automatically gathered as GENIUS participants go about developing, implementing, and experiencing the educational model. Project documents and records provide data for ongoing process evaluation while also serving as the communication foundation through which the entire project operates.
The ongoing **sustainability** of this project will depend, in large part, on how well we are able to demonstrate successful achievement of our objectives. If we can demonstrate that this model provides a cost-effective means to provide multi-institutional experiences in the specified context, that expands the resources of each institution without imposing additional burdens, and that results in student learning and satisfaction, then the participating institutions will be committed to continuation over the long term. Further, the partnering organizations are in a close working relations through Career Space project and plan to seek corporate sponsorship to cover some of the ongoing costs of the student projects on later stages. We will actively seek to leverage the funds provided by the European Commission in order to bring additional resources to the project. Given the timeliness and universal demand for the types of training that our program will provide, we think industry sponsors will line up to be involved with the GENIUS project.

D.3 The partners will disseminate through:
Their own institution. Information gained will be widely published within the appropriate departments of participating institutions.
The Career Space Web site
Publishing on the Web through local Web sites and Career Space Web site relevant reports and other appropriate materials created as part of the project.
Conferences and Workshops will be attended and held to disseminate the activities and findings of the project.
E. Other Information
The proposed project offers e-learning solution, which will narrow **the** skills gap in ICT**. It is based on the New ICT Curricula Guidelines developed by the Career Space consortium,** a flagship public-private partnership**, which was established with the objective of addressing the skills shortage through the identification of generic skill profiles to which the higher education curricula can be aligned and is a corner stone in the E-Learning action plan as identified by the European Commission. It draws the wide support of the 11 industrial partners IBM, Intel, Microsoft, BT, Thales (formerly Thomson CSF), CISCO, SIEMENS, PHILIPS Semiconductors, Nortel Networks, Nokia and Telefonica,who have substantial experience in corporate e-Learning and software environments for e-learning. It draws also support from 20 participating Universities across the EU.**

The New Curricula and establishment of the open collaborative pan-European learning environment will allow reusability and customization, thus laying the foundations of the demand driven education paradigm and will :

Offer this multifaceted solution to the five strands of learners investigated in this project;
Take down the barriers to accessibility of wider learner community.
Scalability “down” through customization and scalability “up” through its flexibility.

The new curricula guidelines envisage that the ICT graduates need in addition to the technical skills both from the engineering and informatics cultures also **soft** and **business skills** (15% of the New Curricula) such as teambuilding, experience in real team projects and teamwork, problem solving, awareness of the need for life long learning, readiness to understand fully the needs of the customer, awareness of cultural differences acting in a global environment, basic understanding of economics, market and business issues. Our approach with the New Curricula makes ICT, we believe, more attractive to wider group of learners and specifically for women and learners with non-computing background. Thus making it better suited for re-training purposes both inside

the ICT industry and for the wider community. We expect, therefore, to widen the group of prospective students and to narrow also the gender gap in ICT industry.

The proposed mode of delivery, based on collaborative e-learning environment, is in its essence a flexible one to interact with (both in time and place) and therefore more attractive for a wider non-traditional learner community, especially for learners with family and work responsibilities. Recent statistics show that this share of the learners is growing. According to NCES, 23 % of the postgraduate students were over 40 years old and almost 60% of the postgraduate students are studying part-time [1].

The proposed collaborative e-learning pan-European environment enables virtual mobility of learners and teachers and contributes to the virtual ERASMUS idea. Indeed currently Reading, Thessaloniki, UC3M from this consortium and 6 other EU Universities run a join European MSc Program. We aim, based on the results of the experiments in this project, to widen the accessibility for both virtually and physically mobile students and increase the advantages of the virtual ERASMUS approach.

The **sustainability** will depend, in large part, on how well we are able to demonstrate successful achievement of our objectives. If we can demonstrate that this model provides a cost-effective means to provide multi-institutional experiences, we expect that the approach and the proposed learning model will be used through the EU. The sustainability will come by implementing and scaling up and down the model through the EU HE and expecting the relevant institutions and national bodies to cover most of the costs. Also wide participation of the industry is expected due to the fact that, for example, in 2000 the value of Undergraduate and Postgraduate education market was 386 billion USD; postsecondary education – 268 billion USD; corporate training - 66 billion USD; Continuing education 12 billion USD. According to Equity Research (March 2000), market share of web-based learning is expected to surge and e-learning is expected to climb to 40% of the market in 2003 in comparison with 20% in 1999 [52]. Given the timeliness and universal demand for the types of training that our program will provide, we think industry sponsors will line up to be involved with the GENIUS project.

[52] Trace A. Urdan, Cornelia C. Weggen, Corporate E-Learning: Exploring a new Frontier, Report, Equity Research, March 2000.

12 APPENDIX B - THE LEARNLINC ENVIRONMENT

Administrative & Management

LearnLinc Virtual Campus
The LearnLinc Virtual Campus is a Web-based instruction management system that allows students to gain access to LearnLinc course information quickly and easily. Students may preview the course catalog, access self-paced course content, and view instructor/student profiles. Instructors and students can use a threaded discussion tool for each LearnLinc course to communicate outside the LearnLinc classroom. The LearnLinc Virtual Campus is fully customizable and offers course registration, online help, tutorials, and instant access to join LearnLinc classes.

Students can use the Virtual Campus Course Catalog to preview (or review) class content. Instructors can make homework and research assignments available to students through the Virtual Campus. Participants may also access recorded LearnLinc classes to be streamed or downloaded from the Virtual Campus.

One-step Download
Since the LearnLinc client is a true thin client that only requires a one-time download, getting to class is quick and easy. Users do not have to go through an installation process. The whole process is simplified and automated.

Smaller Client Size
LearnLinc leads the market with the smallest, non-Java client. The standard client download is roughly 2MB - less than half the size of the version 5.1 client, without reducing functionality. (The entire installation process takes less than eight minutes over a slow 44 kbps dial-up connection). The installation process is greatly simplified, demanding just one download from the virtual classroom or one click from email for the LearnLinc Meeting Area. When a user accesses the Virtual Campus, they receive a message such as, "LearnLinc must prepare your PC before you can join a class. Would you like to do this now or later?" If the user answers "Now," then a separate window comes up with a certificate, asking them to accept it. When they click "Accept," a progress meter runs in the small separate window; when it is completed the user receives the message, "LearnLinc is ready to use." Meanwhile, as this is happening, the user may continue to browse the virtual campus, etc. This same process runs if the user tries to join a class and has not yet installed the client. A reboot of the PC is not required, and the installation is not restricted on PCs that have been "locked down." Client size has been reduced by half, with half the download time. LearnLinc now offers the smallest client sizes on the market for a fully interactive virtual classroom.

Internationalization
The LearnLinc virtual classroom and virtual campus can be translated into any language to accommodate global corporate growth. German, Japanese, French, Portuguese and Spanish language versions are already available.

Web-based Administration
The LearnLinc Virtual Campus extends LearnLinc administration access to any location with an Internet connection. Administrators can access one user interface to create user accounts, create LearnLinc classes, add class materials, etc.

LearnLinc Network Monitor
The LearnLinc Network Monitor provides continuous feedback about the available bandwidth for LearnLinc data and communications connectivity during a LearnLinc class.

LearnLinc Audio Wizard
The LearnLinc Audio Wizard provides step-by-step procedures to configure LearnLinc audio conferencing under varying hardware and software conditions.

LearnLinc Security
LearnLinc provides two levels of security. Log-in security prevents users from logging-in to LearnLinc without an assigned user name, group name, and password. Class security prevents unauthorized users from joining a password-protected LearnLinc class. LearnLinc also allows guests to log-in with limited capabilities.

LearnLinc Virtual Classroom – Interactive Learning Tools
Handraising

LearnLinc instructors can view the list of students in a LearnLinc class. When a student clicks on their hand raise icon, the instructor can see a hand appear next to their name on the student list. The instructor can then highlight the student name and give control of the LearnLinc classroom including course content and audio conferencing to the student, who is heard by the entire class.

Collaboration between students and between instructor and student is an important element of a successful class environment leading to greater involvement and student retention of course material.

Floor Control

LearnLinc Floor Control provides instructor control and classroom coordination. Currently, there are two floor control policies for LearnLinc classes: instructor-led and open discussion. Floor control determines three key elements during a LearnLinc class:

¨ who may launch applications for everyone in the class
¨ who has control of course content
¨ whose voice is featured in the audio conferencing portion of the class.

Instructor-led Floor Control maximizes the control of the instructor. He or she decides who has the floor, when to give the floor to a learner, and when to take back the floor. The instructor can use "Privacy" to jump ahead in course content or use tools without being synchronized with the students. Learners can raise and lower their hands to be recognized by the instructor and address the entire class, just as in a traditional classroom.

Meeting Floor Control is similar to a roundtable discussion. During an open discussion class the instructor has no additional authority, and any learner can take control of the floor at any time. The meeting floor control policy allows small groups to collaborate in highly dynamic class. Meetings provide learners maximum freedom while maintaining order through floor control.

Shared Pointer

The shared pointer will point anywhere on the screen and always remain on top. This allows the floor holder to indicate to the class particular sections of the content or tool palette.

Assistant Instructor

Many LearnLinc customers have requested that an assistant be able to log on to class to help the instructor with class interaction. While the instructor is launching and leading the class content, one or more assistant instructors can be monitoring text chat, hand raising, and feedback. The assistant instructor may alert the instructor to student responses or reply using private text chat to individual students while the main class is continuing.

The Assistant Instructor feature allows LearnLinc classes to be structured to teach different learning styles and student capabilities. This feature results in more interaction with students, increased effectiveness of instruction (without as many distractions), and enhanced use of LearnLinc features by the instructor.

Record & Playback/Content Repositioning with SYNC2ASYNC

Live LearnLinc classes may be recorded by instructors or students for playback as self-paced study by students or off-line instructor training. All instructor/student audio and LearnLinc screen interactions are recorded, such as hand raises, feedback, text chat, and synchronized courseware. Recordings may be played back two ways: streamed through a network connection (26kbps or greater) or downloaded in advance for playback anytime, even when a network connection is not available.

LearnLinc's Record/Playback feature has enhanced editing and indexing capabilities. Recorded classes can be edited, providing "post production" options. Users are able to mark a start and end point in a recording, and then delete the contents inside (cut) or outside (crop) the markers. The audio track of a recording can be separately edited, allowing multi-language localization for recorded lessons. The editor allows you to label and annotate index points in each recording, and the player will allow you to jump to a specific index point. This provides tremendous capability to use LearnLinc to create asynchronous content by repositioning previously recorded synchronous events. Indexing also enables storage of segments of live lessons as learning objects.

Breakout Groups

To facilitate team discussions, role-playing, and brainstorming, LearnLinc instructors can set up breakout groups with specific students or random selection. Breakout groups can be set up on-the-fly to last for a specified time before the students return automatically to the instructor-led class.

TestLincTM
TestLinc is a separate software product that allows tests to be created, delivered, graded and reported in a standard Web-browser. TestLinc includes multiple question types and delivery options to match different learning styles, plus automatic grading and database reporting for integration with leading learning management systems. TestLinc requires a LearnLinc Server to function.
Q&A (Question & Answer)
Q&A can be used by an instructor or student to ask multiple choice or true/false questions during a class. The floor holder can ask one question at a time with up to five multiple-choice answers. Questions may be written ahead of time or composed spontaneously during a class. The answer results are displayed for the floor holder in easy-to-read percentages. Results can be shared with other class participants, or reviewed privately.
Feedback
Instructors can use Feedback to continuously poll learners about the progress of the class. Students select feedback answers such as "Faster," "Perfect," "Slower," and "Please review." The instructor can see the percentages for each response. Instructors may create custom response sets or choose among several default answer sets, including:
¨ Pace - Faster, Perfect, Slower, Please review
“Agreement - Strongly agree, Agree, Disagree, Strongly disagree
“Assignment Status - Not much progress, Still working, Almost finished, Completed
¨ True/False
¨ Yes/No
¨ A, B, C, D
Text Chat
LearnLinc Text Chat is a text-based communication tool that instructors and students can use to compose and exchange ideas and comments with everyone in a LearnLinc class. Students can also send private messages to the instructor or assistant. Everyone in the class can save text, paste text from other documents into text chat, and print a transcript of the text generated during a class. Instructors and Assistant Instructors can send private text chat messages to individual students. LearnLinc Text Chat allows the exchange of ideas, brainstorming, and discussions without interrupting the flow of the class. Private messages allow students to ask questions they might not ask in a public forum.
LearnLinc Picture ID
LearnLinc class interaction can be personalized with LearnLinc Picture ID. All participants (instructors, assistant instructors, and students) can use Picture ID to display pictures of themselves to the class, enhancing the sense of community and collaboration vital to successful online learning.
Glimpse
Instructors can use LearnLinc Glimpse to grab a screen capture of any student desktop. The instructor can then see the status of the student work to correct a problem, or view an assignment.
LearnLinc Virtual Classroom - Flexible Course Content
Note: Students joining class late are automatically synchronized with the current content.
Application Sharing
LearnLinc allows instructors to share one or more applications or the entire desktop, enabling software skills training on multiple applications. Both 16-bit and 32-bit applications can be shared. By launching multiple software applications from the desktop, instructors can demonstrate the interaction of complex interfaces.
Server-based LearnLinc Application Sharing is highly scalable, allowing instructors to select any software application on any class computer to demonstrate or share.
LearnLinc Application Sharing is 2 - 4 times faster than previous versions.
LearnLinc Application Sharing allows an instructor to select an application from a student machine to display or share without giving the floor to that student. This feature is one more example of the classroom control design of the LearnLinc environment.
Application Sharing simulates an interactive computer lab with shared control where students watch an instructor run a software application and then run their own copy of the software for assignments.
Split Screen for Application Sharing

The LearnLinc content area may be split into upper and lower sections for application sharing. The instructor may choose to place the shared application in the upper or lower half or full screen in the student's content area. This is most useful to allow students to run their own version of the shared application to mimic the instructor lessons.

Synchronized Multimedia Courseware

LearnLinc allows instructors and students to control Synchronize Multimedia Courseware created in Allen Communication Learning Services' own Quest software, Asymetrix ToolBook, Macromedia Authorware, and Macromedia Director.

These multimedia-authoring tools can be used to create highly interactive courseware containing audio and video clips, animation, simulations, learning exercises, and tests. As an instructor turns the pages of such multimedia courseware, pages are turned on all student computers as well.

Synchronized Web-browser

LearnLinc instructors and students can use the Synchronized Web-browser to lead everyone in class to different Web sites. When the floor holder navigates to a Web page, all other class browsers go to that site as well. Each learner can explore that site and its links or move on toother sites. Everyone may use forward and backward navigation tools and favorites in the Synchronized Web-browser. Both Internet Explorer and Netscape browsers are supported.

PowerBoard Feature

An Enhanced Instructor Power feature, PowerBoard is a presentation viewer for uploaded PowerPoint content. The PowerBoard toolbar contains navigation controls for moving through the presentation, as well as a full set of markup tools for highlighting items as they are presented. When the floor is passed, the new floor holder gains control of the markup tools. PowerBoard markup is synchronized, so that everyone in class can see the items that are highlighted in the presentation. Marks on the current slide are erased when the instructor/presenter moves on to the next slide.

This feature further gives the instructor the ability to emulate a true classroom environment, providing for the mark-up of a presentation to occur in real-time, just as it would happen in a traditional classroom. This enables the instructor to emphasize points, make note of important topics, add information on the fly, and cater to the students' learning needs.

Shared Whiteboard

With the LearnLinc Shared Whiteboard, instructors and students can easily add content to a LearnLinc class. Objects and text from any Windows supported application can be pasted in to the whiteboard and shared by everyone in class. The floor holder can highlight, add, delete, or edit the whiteboard contents. Whiteboard contents can be saved as text or whiteboard files, or printed by everyone in class. The whiteboard supports synchronized viewing, insuring that all students see what the instructor is viewing after scrolling. The whiteboard can also be accessed outside the LearnLinc classroom, to pre-load content or to access content between classes.

Streaming Video

Streaming Video offers one-way video and audio (live or pre-recorded) from instructor to students over the Internet/intranet.

Class Agenda

The LearnLinc Class Agenda allows instructors to list the learning components of a LearnLinc class to be launched automatically. Content prepared using tools such as the Synchronized Web Browser, Q & A, Shared Whiteboard or any other application can be launched on all class computers from the Class Agenda.

The Attendee List

The LearnLinc Attendee List is a list of all those in attendance at a particular time. This list can be saved at different intervals during a class if required.

LearnLinc Connectivity

Distributed Server Architecture

Distributed Servers allow students and instructors to join LearnLinc classes by connecting to the nearest distributed server automatically and share content from a central LearnLinc server and database. Since each distributed server can support up to 200 participants, Distributed Server Architecture allows live LearnLinc classes to be scaled to reach students at many locations across the enterprise without multiplying the bandwidth requirements for each location.

Firewall Bridging

Just-in-time corporate training demands that employees can access live online learning from any site regardless of firewall considerations. Firewall friendly LearnLinc uses

HTTP bridging for easy access through corporate firewalls that support Internet connections. LearnLinc even offers browser-based diagnostics for firewall configuration to speed deployment.

Enterprise-wide Database Integration with Microsoft SQL Server

LearnLinc is integrated with Microsoft SQL Server (part of Microsoft BackOffice) to offer a more efficient and scaleable database option for large-scale online learning deployments. Significant improvements to database and administration enhance integration with Learning Management Systems (LMS). LearnLinc integration is already complete with leading LMS software, including Click2Learn Librarian & Ingenium, Macromedia Pathware, Docent, Learning Connect, The Learning Center, and TrainingServer.

Communication Options

With LearnLinc, you can create a custom online learning solution tailored to the needs of your organization. LearnLinc Communication Options offer you different connectivity and conferencing methods to meet the needs of your organization today and tomorrow.

The LearnLinc Server supports the LearnLinc data-only virtual classroom without purchasing additional options. The LearnLinc data-only virtual classroom can be combined with existing phone conferencing, room videoconferencing or other communication systems.

Two-Way Video Enhanced e-Learning is available in unicast or multicast modes. Video bandwidth is automatically configured when running the class to allow video conferencing over LANs or the Internet at the same time. Inexpensive USB cameras are supported, as well as legacy Intel ProShare hardware. Students with higher bandwidth connections will be able to receive video and audio, while students with low bandwidth connections receive audio only-in the same class! The instructor can choose to change the size of the video window for all students during a class.

LearnLinc Streaming Video

Integrated one-way video and audio for communication (live or pre-recorded) from instructor to students over the Internet/intranet.

LearnLinc Unicast Audioconferencing

Full duplex (two-way) audio for student sites using the Internet/intranet from remote locations or home. Half duplex (click-to-talk) is also available.

LearnLinc Multicast Audioconferencing

Full duplex (two-way) audio which minimizes bandwidth requirements for large-scale classes. Half duplex (click-to-talk) is also available.

LearnLinc Meeting Features

LearnLinc also features an easier and more comprehensive way to attend a meeting using LearnLinc. Email invites are automatically sent when someone creates an online meeting, and it is no longer necessary to create a new class with a separate user ID and password for each attendee.

Special Note: LearnLinc clients configured for any of the Communications Options listed can join any LearnLinc session to share data. Audio may be shared, depending on system configurations.

http://www.allencomm.com/products/live_eLearning/LearnLinc/LearnLinc_features.html

13 APPENDIX C – INSTRUCTIONS FOR ONLINE TECHNICAL TRIAL

Subject: Instructions for online technical trial evening 7/10/02
Date: Tue, 5 Nov 2002 09:46:39 -0000
From: "Catherine O' Connor" <Catherine.OConnor@cs.tcd.ie>
To: <genius@cs.tcd.ie>
CC: eilis dunne" <eilis.dunne@cs.tcd.ie>, "Alan Mullally" <alan.mullally@cs.tcd.ie>

Technical Trial Evening
7th November 2002

Please read this message through to the end.

This is a 'drop-in' session. On 7th November, 2002. We are inviting students to join the class 'Pilot run -7th November' between 6 p.m. and 8 p.m.

Students attending at TCD
Location: ICT 2 Laboratory located upstairs in the portakabiin opposite the steps to the Hamilton building.
You will need your username and user password to access the Trinity network. This will be the same as you use at any laboratory on campus or when you access your email remotely.

Once you are allowed access to the Trinity network you can log on to LearnLinc.

The following applies to all students:

URL: http://isweb.cs.tcd.ie/LearnLinc

The log in ID is the same as your username for your tcd.ie mail account. The password for LearnLinc is also your username for your tcd.ie email account. BOTH OF THESE ARE TO BE ENTERED IN UPPERCASE.

When you have successfully logged on, you may then join a virtual class. Your course name is IT and the Enterprise, and the class you will be joining for the Technical Trial Evening is called - 'Pilot Run - 7th November 2002'. The password for the class is genius.

When you join the class, LearnLinc will automatically download the required client software to your computer. There is no need to download any software to your computer.

The class environment will then open up on your computer with a message welcoming you to the pilot run. When you have reached this stage, you have successfully joined the class.

Please check that the sound and microphone is working on your computer. You can do this by running the Audio Wizard which is on the drop down menu of the tools function on the toolbar.

This evening will be supported by the genius team and our technical support team, Willie O'Connor and Ronan Healy.

Telephone lines will be open from 6.00 p.m. - 8.00 p.m. to assist students. Should you encounter any difficulties please telephone Eilis Dunne during this time with your query at: 6082418/6082414/6081735.

Further instructions will be issued by email on Monday 11th November

regarding the online lecture sessions for Thursday 14th, 21st and 28th November.

Many thanks

Dudley Dolan
Audrey Jennings
Catherine O'Connor

14 APPENDIX D – QUESTIONNAIRE 1

Information Technology and the Enterprise

The course on Information Technology and the Enterprise covers aspects of Information Technology related to the structure and management of organisations. It considers the use of hardware, software and communications for the effective implementation of Management Information Systems. It also covers how to build or buy and implement Information Systems and examines what factors lead to the successful implementation of such systems.

In Michaelmas term we will use our technology to more effectively delivery course content. This will be done by conducting interactive online lecture sessions. Students will be able to access these sessions from home, from their office or from a specific College laboratory. The course lecturer will host the lecture from a remote location.

These interactive online lecture sessions will last approximately one hour and will be conducted on Thursday evening the 7th (the pilot week) 14th, 21st and 28th November between 6 and 9 pm. For these sessions you will be required to access the Internet either on your own computer or through a College computer. To enable you to participate in these lectures you will need a particular specification on your PC.

Please examine the table below carefully to determine if your computer is appropriate for these interactive online lectures.

Should your computer not meet the required specifications it will be necessary for you to participate in these sessions from a designated College laboratory.

Please check which of the following system types you have at your disposal.

Windows 95,98,ME		**Windows 2000 or XP**		**Windows NT 4.0**	
Intel Pentium 166 64 MB RAM 26 kbps Internet connection (minimum) Supported web browser* Sound Card Headset (or speakers and microphone)		Intel Pentium II 300 128 MB RAM 26 kbps Internet connection (minimum) Supported web browser* Sound Card Headset (or speakers and microphone)		Intel Pentium 166 64 MB RAM 26 kbps Internet connection (minimum) Supported web browser* Sound Card Headset (or speakers and microphone)	

*Web browsers include: Internet Explorer 4.01 w/spl or sp2, 5.0,5.5,and 6.0, Netscape Navigator 4.08, and Netscape Communicator 4.7.

Please complete and return the questionnaire (two pages) at your next lecture on Thursday 17th October 2002.
Dudley Dolan – Course leader

Information Technology and the Enterprise
Questionnaire

Personal and Contact details

Name:

_____

Place of Work: _____

Trinity College Email Address: _____

Other Email address: _____

Telephone:
Work: _____ **Home:** _____

Mobile Number:_____

Internet Access Details
Internet Service Provider (e.g. Eircom, IOL etc.): _____

Do you pay for this service? Please Circle answer Yes/No

Modem Speed (kpbs)? _____

Telephone Line or ISDN/Other (please specify): _____

Location of Access
Having reviewed the required machine specification where do you plan to participate in the online lectures. Please circle answer

a) **at home**
b) **place of work**
c) **Trinity laboratory**
d) **Other**

Please state your operating system (e.g. Windows 95,98 etc.) _____

Do you intend to use…
Please circle answer

a) **Headset?**
b) **Speakers and microphone?**

Have you tested your sound system? Please circle answer. Yes/No

Please indicate which of the following system types you have at your disposal.

Windows 95,98,ME		**Windows 2000 or XP**		**Windows NT 4.0**	
Intel Pentium 166 64 MB RAM 26 kbps Internet connection (minimum) Supported web browser* Sound Card Headset (or speakers and microphone)		Intel Pentium II 300 128 MB RAM 26 kbps Internet connection (minimum) Supported web browser* Sound Card Headset (or speakers and microphone)		Intel Pentium 166 64 MB RAM 26 kbps Internet connection (minimum) Supported web browser* Sound Card Headset (or speakers and microphone)	

*Web browsers include: Internet Explorer 4.01 w/spl or sp2, 5.0,5.5,and 6.0, Netscape Navigator 4.08, and Netscape Communicator 4.7.

If you have none of the above systems please state which system you have.

_____

Any other comments

_____
_____
_____
_____

Signed _____Dated_____

15 APPENDIX E – QUESTIONNAIRE 2

IT and the Enterprise
Internet Technology to create a virtual classroom
Genius Project

The following questionnaire helps assess the effectiveness of the use of internet technology to create a virtual classroom to support or enhance the learning experience within the course 'IT and the Enterprise'.

You are invited to complete two questionnaires.

This questionnaire is to be completed tonight 24th October and is used to assess your ***expectations*** of using this technology. This questionnaire contains two sections.

- Section A: Contains 27 statements about your perception of the use of this technology. You are invited to express the strength of your opinion on a nine-point scale where **1** means you **Strongly disagree** and **9** means you **Strongly Agree**. For each statement please circle a number that corresponds to your level of agreement. Please circle only **one** number for each of the 27 statements.

- Section B: Contains descriptive questions as well as an opportunity for you to provide open-ended comment on your expectation concerning the forth coming experience.

On 5th December 2002 you will be invited to complete a questionnaire on your opinion of the ***performance*** of the technology. The format will be similar and specific instructions for its completion will be given on that evening.

Your reply will be treated in confidence.

Thank you very much for your assistance. Your completed questionnaire will be collected by the team members this evening.

Genius Team
Dudley Dolan
Audrey Jennings
Catherine O'Connor

24th October 2002

Email Support: genius@cs.tcd.ie

SECTION A - Expectations
All questions asked refer specifically to the 'Genius' project. Please respond by circling the number that corresponds to how much you agree or disagree with the following statements of expectation.

		Strongly Disagree								Strongly Agree
1.	I expect ease of access to computing facilities for this project.	1	2	3	4	5	6	7	8	9
2.	I expect the internet technology to be easy to use.	1	2	3	4	5	6	7	8	9
3.	I expect to access a quiet space in which to use this technology at home/work/TCD.	1	2	3	4	5	6	7	8	9
4.	I expect the internet service I use to be able to support the use of this technology.	1	2	3	4	5	6	7	8	9

		Strongly Disagree	Strongly Agree
5.	I expect a high degree of technical competence from college systems support staff.	1 ____ 2 ____3 ___ 4____ 5 ____6 ___ 7____8 ___ 9 ___	
6.	I expect to have a high level of confidence in the systems I use	1 ____ 2 ____3 ___ 4____ 5 ____6 ___ 7____8 ___ 9 ___	
7.	I expect a provision for disaster recovery/fall-back position.	1 ____ 2 ____3 ___ 4____ 5 ____6 ___ 7____8 ___ 9 ___	
8.	I expect excellent system's response time.	1 ____ 2 ____3 ___ 4____ 5 ____6 ___ 7____8 ___ 9 ___	
9.	I expect excellent technical training.	1 ____ 2 ____3 ___ 4____ 5 ____6 ___ 7____8 ___ 9 ___	
10.	I expect fast response time from support staff to remedy problems	1 ____ 2 ____3 ___ 4____ 5 ____6 ___ 7____8 ___ 9 ___	
11.	I expect to be in touch with my peers through the use of the e-mail support facility.	1 ____ 2 ____3 ___ 4____ 5 ____6 ___ 7____8 ___ 9 ___	
12.	I expect the use of this technology to reduce the interactive experience of the classroom.	1 ____ 2 ____3 ___ 4____ 5 ____6 ___ 7____8 ___ 9 ___	
13.	I expect this learning experience to be positive	1 ____ 2 ____3 ___ 4____ 5 ____6 ___ 7____8 ___ 9 ___	
14.	I expect that I will like the idea of working on my own away from my fellow students	1 ____ 2 ____3 ___ 4____ 5 ____6 ___ 7____8 ___ 9 ___	
15.	I expect to be comfortable communicating with others using this technology during live sessions.	1 ____ 2 ____3 ___ 4____ 5 ____6 ___ 7____8 ___ 9 ___	
16.	I expect the use of this technology to reduce my commuting time.	1 ____ 2 ____3 ___ 4____ 5 ____6 ___ 7____8 ___ 9 ___	
17.	I expect I will need to find the time to learn the systems I use.	1 ____ 2 ____3 ___ 4____ 5 ____6 ___ 7____8 ___ 9 ___	
18.	I expect a high standard of presentation of course material	1 ____ 2 ____3 ___ 4____ 5 ____6 ___ 7____8 ___ 9 ___	
19.	I expect these sessions to be intellectually stimulating.	1 ____ 2 ____3 ___ 4____ 5 ____6 ___ 7____8 ___ 9 ___	
20.	I expect this learning environment to be more conducive to learning than the traditional classroom.	1 ____ 2 ____3 ___ 4____ 5 ____6 ___ 7____8 ___ 9 ___	
21.	I expect excellent documentation to support technical training.	1 ____ 2 ____3 ___ 4____ 5 ____6 ___ 7____8 ___ 9 ___	
22.	I expect the use of this technology to enhance my ability to learn.	1 ____ 2 ____3 ___ 4____ 5 ____6 ___ 7____8 ___ 9 ___	

		Strongly Disagree	Strongly Agree
23.	I expect that participating in the online sessions on my own will allow me to concentrate better.	1 ____ 2 ____3 ___ 4____ 5 ____6 ___ 7____8 ___ 9 ___	
24.	I expect to participate in discussion more freely in the virtual classroom than in the traditional lecture theatre	1 ____ 2 ____3 ___ 4____ 5 ____6 ___ 7____8 ___ 9 ___	
25.	I expect the use of this technology to enrich my learning experience.	1 ____ 2 ____3 ___ 4____ 5 ____6 ___ 7____8 ___ 9 ___	
26.	I expect the benefits derived by myself from the systems I use to be measured	1 ____ 2 ____3 ___ 4____ 5 ____6 ___ 7____8 ___ 9 ___	
27.	I expect the use of internet technology to improve my productivity	1 ____ 2 ____3 ___ 4____ 5 ____6 ___ 7____8 ___ 9 ___	

SECTION B

1. Where do you expect to avail of the online learning lectures. Please tick **one** only.

At home _____ At work ____ At TCD ____

19. What do you expect you will like most about the online learning experience?

_____
_____

20. What do you expect you will like least about the online learning experience?

21. Do you envisage that there may be other benefits for you in the use of the virtual classroom which have not been mentioned in Section A of this questionnaire?

_____
_____

22. Do you envisage your use of the virtual classroom will involve you in any other specific costs?

_____
_____

25. Additional Comments:

Please supply any further comments you wish to make concerning the forthcoming online learning experience.

_____
_____
_____
_____
_____

_____
_____
_____

Please supply the following information about your position:

26. In which Industry Sector do you work (Tick one)?

(a) Financial Services ___
(b) Industry ___
(c) IT ___
(d) Public Service ___
(e) Service Industry ___
(f) Education ___
(g) Other (please specify) _____

27. What is your current job category (Tick one)?

(a) Owner/Director ___
(b) Manager ___
(c) Administrative ___
(d) IT Development ___
(e) IT Support ___
(f) Other (please specify) _____

29. How many years experience have you had working with computers ____

30. How many hours per week do you use a computer**?** ____

Signed: _____ **Dated:** _____

16 APPENDIX F – QUESTIONNAIRE 3

IT and the Enterprise
Internet Technology to create a virtual classroom
Genius Project

The following questionnaire helps assess the effectiveness of the use of internet technology to create a virtual classroom to support or enhance the learning experience within the course 'IT and the Enterprise'.

On 24th October you were invited to complete a questionnaire designed to assess your ***expectations*** of the use of the technology.

Tonight, 5th December, you are invited to complete a second questionnaire which will assess your opinions on the ***performance*** of the technology.

This questionnaire contains two sections:

- Section A: Contains 27 statements about your perception of the use of this technology. You are invited to express the strength of your opinion on a nine-point scale where **1** means you **Strongly disagree** and **9** means you **Strongly Agree**. For each statement please tick a number that corresponds to your level of agreement. Please circle only **one** number.

- Section B: Contains descriptive questions as well as an opportunity for you to provide open-ended comment on your expectation concerning the forthcoming experience.

Your reply will be treated in confidence.

Thank you very much for your assistance. Your completed questionnaire will be collected by the team members this evening.

Genius Team
Dudley Dolan
Audrey Jennings
Catherine O'Connor

5th December 2002

Email Support: genius@cs.tcd.ie

SECTION A - Performance

All questions asked refer specifically to the 'Genius' project. Please respond by ticking the number that corresponds to how much you agree or disagree with the following statements of ***performance***.

		Strongly Disagree								Strongly Agree
1.	I found ease of access to computing facilities for this project.	1	2	3	4	5	6	7	8	9
2.	I found the internet technology to be easy to use.	1	2	3	4	5	6	7	8	9
3.	I was able to access a quiet space in which to use this technology at home/work/TCD.	1	2	3	4	5	6	7	8	9
4.	I found the internet service I used was able to support the use of this technology.	1	2	3	4	5	6	7	8	9
5.	I found a high degree of technical competence from college systems support staff.	1	2	3	4	5	6	7	8	9
6.	I had a high level of confidence in the systems I used	1	2	3	4	5	6	7	8	9
7.	I found that there was a provision for disaster recovery/fall-back position.	1	2	3	4	5	6	7	8	9
8.	I had excellent system's response time.	1	2	3	4	5	6	7	8	9
9.	I received excellent technical training.	1	2	3	4	5	6	7	8	9
10.	I had a fast response time from support staff to remedy problems	1	2	3	4	5	6	7	8	9
11.	I was in touch with my peers through the use of the e-mail support facility.	1	2	3	4	5	6	7	8	9
12.	I found the use of this technology reduced the interactive experience of the classroom.	1	2	3	4	5	6	7	8	9
13.	I found this learning experience to be positive	1	2	3	4	5	6	7	8	9
14.	I liked the idea of working on my own away from my fellow students	1	2	3	4	5	6	7	8	9
15.	I was comfortable communicating with others using this technology during live sessions.	1	2	3	4	5	6	7	8	9
16.	I found the use of this technology reduced my commuting time.	1	2	3	4	5	6	7	8	9
17.	I needed to find the time to learn the systems I used.	1	2	3	4	5	6	7	8	9
18.	I found a high standard of presentation of course material	1	2	3	4	5	6	7	8	9

		Strongly Disagree	Strongly Agree
19.	I found these sessions to be intellectually stimulating.	1 ____ 2 ____3 ___ 4____ 5 ____6 ___ 7____8 ___ 9 ___	
20.	I found this learning environment to be more conducive to learning than the traditional classroom.	1 ____ 2 ____3 ___ 4____ 5 ____6 ___ 7____8 ___ 9 ___	
21.	I had excellent documentation to support technical training.	1 ____ 2 ____3 ___ 4____ 5 ____6 ___ 7____8 ___ 9 ___	
22.	I found the use of this technology enhanced my ability to learn.	1 ____ 2 ____3 ___ 4____ 5 ____6 ___ 7____8 ___ 9 ___	
23.	I found that participating in the online sessions on my own allowed me to concentrate better.	1 ____ 2 ____3 ___ 4____ 5 ____6 ___ 7____8 ___ 9 ___	
24.	I participated in discussion more freely in the virtual classroom than in the traditional lecture theatre	1 ____ 2 ____3 ___ 4____ 5 ____6 ___ 7____8 ___ 9 ___	
25.	I found the use of this technology enriched my learning experience.	1 ____ 2 ____3 ___ 4____ 5 ____6 ___ 7____8 ___ 9 ___	
26.	I understand that the benefits derived by myself from the systems I use are being measured	1 ____ 2 ____3 ___ 4____ 5 ____6 ___ 7____8 ___ 9 ___	
27.	I found the use of this internet technology improved my productivity	1 ____ 2 ____3 ___ 4____ 5 ____6 ___ 7____8 ___ 9 ___	

SECTION B

1. Please tick the appropriate boxes in the following table in relation to your attendance at the online learning sessions. If you attended from different locations each evening, please state why in the comments box.

	At Home	**At work**	**At TCD**	**Comments**
7th Nov Technical Trial				
14th Nov Lecture 1				
21st Nov Lecture 2				
28th Nov Lecture 3				

2. Please specify the exact location in the city/county/country from which you attended the online sessions, e.g. Bray, Co. Wicklow
Tallaght, D.24
Seattle, USA

7/11 _____

14/11 _____

21/11 _____

28/11 _____

3. Did you test your sound/audio quality before each session? Yes/No (please circle answer)

4. Please state the name of your Internet Service Provider? _____

5.Is it a subscription or free service? _____

6. How would you rate the sound quality form the perspective of how you heard the lecturer? Please circle appropriate response.

Poor Fair Good Very Good Excellent

Please comment

_____

_____

7. How would you rate the sound quality from the perspective of how you heard other students/participants at the lecture? Please circle appropriate response.

Poor Fair Good Very Good Excellent

Please comment

_____

_____

8. How often did you access LearnLinc to view recordings/documentation? Please circle appropriate response

Never 1-3 times 4-8 times More than 8

9. Did the text chat activity interfere with your concentration at the lecture? Please circle appropriate response.

Not at all A little A lot

Please comment

_____

---

10. Did the text chat activity support a sense of class community? Please circle appropriate response.

Not at all A little A lot

Please comment

_____

_____

11. Were the photographs useful to you. Please circle appropriate response

Yes No

12. Did the photographs support a sense of class community? Please circle appropriate response.

Not at all A little A lot

Please comment

_____

_____

13. Do you think the Questions and Answer facility as demonstrated during the virtual lectures is a useful tool for enhancing the learning environment?

a) for the student

Not at all A little A lot

b) for the lecturer
Not at all A little A lot

Please comment
_____
_____

14. Was the use of the PowerPoint slides as effective in the virtual classroom compared to the traditional lecture theatre? Please circle appropriate response.

Worse No difference Better

15. How did the online discussions compare to live discussions in the lecture theatre. Please circle appropriate response.

Favourably Unfavourably No difference

16. Did you become more relaxed with the technology by the end of the series of the online lectures? Please circle appropriate response.

Not at all A little A lot

17. Did you feel that your learning experience improved as you became more familiar with the technology?

Not at all A little A lot

18. Would you be more likely to ask a question using:
a) text chat
b) hand up facility
c) face to face in lecture theatre

Pease circle appropriate response.

Please comment
_____
_____

19. What did you like most about the online learning experience?

_____
_____

20. What did you like least about the online learning experience?

21. Did you find any other benefits for you in the use of the virtual classroom which have not been mentioned in this questionnaire?
_____
_____
_____

22. Did you incur any other specific costs in your use of the virtual classroom?

_____
_____
_____

23. Would you like to experience a blend of this type of learning and traditional learning in your future years at TCD?

_____
_____
_____

24. What do you believe to be the strengths and weaknesses of this form of learning compared to the traditional lecture?

_____
_____
_____
_____

25. Additional Comments:

Please supply any further comments you wish to make concerning this online learning experience.

_____
_____
_____
_____
_____

Please supply the following information about your position:

26. In which Industry Sector do you work (Tick one)?

(a) Financial Services ____
(b) Manufacturing ____
(c) IT ____
(d) Public Service ____
(e) Service Industry ____
(f) Education ____
(g) Other (please specify) _____

27. What is your current job category (Tick one)?

(a) Owner/Director ___
(b) Manager ___
(c) Administrative ___
(d) IT Development ___
(e) IT Support ___
(f) Other (please specify) _____

28. How many employees work in your organisation?. Please circle appropriate response.

0-9 10-19 20-49 50-99 100+

29. How many years experience have you had working with computers

31. On October 24th you completed a questionnaire outlining your expectations of the performance of the technology. Please circle appropriate response.

Were these expectations based on

a) your expectations of technology
b) your expectations of Trinity College
c) both
d) other

Please comment

_____
_____
_____

Name (in block capitals please) _____

Signed: _____ **Dated:**_____

17 APPENDIX G - LISTSERV

Current Folder: INBOX Sign Out
Compose Addresses Folders Options Search Help SquirrelMail
Paginate | Toggle All Viewing Messages: 1 to 126 (126 total)
Move Selected To: Transform Selected Messages:
INBOX Drafts Sent Trash mailbox

From	Date	Subject
Andy Beaven	Jan 3, 2003	RE: LearnLinc Troubleshooting
Andy Beaven	Jan 3, 2003	RE: LearnLinc Troubleshooting
jennina@cs.tcd.ie	Dec 20, 2002	Re: LearnLinc Troubleshooting
Andy Beaven	Dec 19, 2002	A+ LearnLinc Troubleshooting
catherine o'connor	Dec 19, 2002	+ questionnaires
Maire Jones via RT	Dec 12, 2002	[CompSci #8491] CS Account expiry
sysadmin	Dec 11, 2002	[CompSci #8491] AutoReply: CS Account expiry...
Maire Jones	Dec 10, 2002	Computer Account has passed its expiry date...
Coran McSweeney	Dec 9, 2002	Problems downloading LearnLinc
Audrey Jennings	Dec 6, 2002	+ Slides
Gary.Cronin@friendsfirst.ie	Dec 4, 2002	Message relayed (genius@cs.tcd.ie)
Gary.Cronin@friendsfirst.ie	Dec 4, 2002	! Learn linc
jennina@cs.tcd.ie	Dec 3, 2002	IT and the Enterprise
paul bernard hogan	Dec 3, 2002	Automatic reply
jennina@cs.tcd.ie	Dec 3, 2002	IT and the Enterprise
Catherine O' Connor	Nov 25, 2002	online lectures
Audrey Jennings	Nov 21, 2002	+ anal add comments
Audrey Jennings	Nov 21, 2002	+ ajanalysis
Catherine O' Connor	Nov 19, 2002	a little reminder to students logging on at TCD...
Catherine O' Connor	Nov 18, 2002	online lectures and recordings
Catherine O'Connor	Nov 13, 2002	In the name of genius

conrad.greene@cie.ie Nov 13, 2002 RE: Genius Project

Catherine O' Connor Nov 12, 2002 Schedule for online lecture sessions November 2002...

Catherine O' Connor Nov 12, 2002 Online Lecture Sessions

Audrey Jennings Nov 12, 2002 + file

silksl Nov 7, 2002 ! RE: Instructions for Online Lecture

Catherine O' Connor Nov 7, 2002 RE: instructions for online technical trial evening ...

Catherine O' Connor Nov 7, 2002 + FW: Catherine

Catherine O' Connor Nov 7, 2002 + FW: picture dudley

Catherine O' Connor Nov 6, 2002 RE: Access to Labs on 7th Nov....

dempsegj Nov 5, 2002 (no subject)

grogang Nov 5, 2002 Read this if Preparing LearnLinc Classroom Hangs...

Catherine O' Connor Nov 5, 2002 RE: Extra licenses

Catherine O' Connor Nov 5, 2002 instructions for online technical trial evening 7/...

Catherine O' Connor Nov 5, 2002 RE: logging on

Catherine O' Connor Nov 5, 2002 RE: Couldn't test the sound or down load the softw...

Audrey Jennings Nov 5, 2002 + file

dempsegj Nov 4, 2002 (no subject)

Catherine O' Connor Nov 4, 2002 RE: Initializing Error

doylevj Nov 4, 2002 RE: Initializing Error

grogang Nov 1, 2002 RE: need link to LearnLinc page...

Doyle, Val Nov 1, 2002 + RE: Initializing Error

Audrey Jennings Nov 1, 2002 + [Fwd: Question (Answered)] Log File Analysis...

perseb Oct 31, 2002 need link to LearnLinc page

Catherine O' Connor Oct 31, 2002 RE: logging on

Ronan Healy Oct 31, 2002 A+ Your photos

Catherine O' Connor Oct 31, 2002 logging on

Audrey Jennings Oct 31, 2002 + files

eobrien4 Oct 30, 2002 Logging on

Catherine O' Connor Oct 30, 2002 initializing errror etc.

Audrey Jennings Oct 30, 2002 + [Fwd: error messages]

Catherine O' Connor Oct 30, 2002 FW: Initializing Error

Catherine O' Connor Oct 30, 2002 class for this afternoon

Catherine O' Connor Oct 30, 2002 RE: Initializing Error

Gibbons, Paul Oct 30, 2002 RE: Initializing Error

Catherine O' Connor Oct 30, 2002 Andrew O'Hare - error message '500'...

boylejw Oct 30, 2002 Getting In

oharea Oct 30, 2002 Initializing Error

Catherine O' Connor Oct 30, 2002 logging on

aoosulli Oct 30, 2002 unable to log on

John Boyle Oct 29, 2002 RE: unable to log on

Dudley Dolan Oct 29, 2002 Re: FWD: unable to log on

grogang Oct 29, 2002 FWD: unable to log on

Dudley Dolan Oct 29, 2002 Re: unable to log on

perseb Oct 29, 2002 ! unable to log on

Catherine O' Connor Oct 29, 2002 Instructions for Online Lecture

Catherine O' Connor Oct 29, 2002 + FW: Online IT in the Enterprise Lectures...

Catherine O'Connor Oct 29, 2002 + Re:Online IT in the Enterprise Lectures...

Diana Wilson Oct 29, 2002 Re: training for Dudley!!!

Dudley Dolan Oct 29, 2002 Re: training for Dudley!!!

Catherine O' Connor Oct 25, 2002 student numbers for genius

Catherine O' Connor Oct 25, 2002 RE: Genius ISWEB

William J. O' Connor Oct 25, 2002 + RE: Genius ISWEB

William J. O' Connor Oct 25, 2002 + Re:Genius ISWEB

Catherine O' Connor Oct 24, 2002 genius

Catherine O' Connor Oct 24, 2002 training for Dudley!!!
Catherine O' Connor Oct 23, 2002 ! FW:
Paginate | Toggle All Viewing Messages: 1 to 126 (126 total)

18 APPENDIX H – IS2 ASSIGNMENT

IS2 Assignment December 2002

The use of Technology in the Enterprise is evolving. In this context write a critical analysis of your experience of participating in Technology Assisted Learning with particular reference to its potential use in Business and Education.

Your submission should relate to your recent experience with LearnLinc and include the following:

- Your initial thoughts on the approach
- The preparation and management process
- The practical use of the technology
- The learning experience and its value in comparison with the traditional approach
- Your opinions following the experience
- The potential role of this technology in Education and Business
- Explore the political, economic, social and technological implications

Submission Instructions:

- Submit your assignment by e-mail as a word document
- Document should be 5 to 7 pages
- Spacing 1.5
- Subject of email: IS2 Assignment
- Send to dudley.dolan@cs.tcd.ie
- Submit by Monday 20th January 2003
- Access to recordings will be limited after 31st December

19 APPENDIX I – EXTERNAL GENIUS EVALUATION

GENIUS Evaluation: IT and the Enterprise
at Trinity College, Dublin
Revised draft

A Module and delivery details and contact information

Module name	IT and the Enterprise
Academic level	First Cycle Degree. The module IT and the Enterprise is delivered during the second year of a five-year degree course, but it should be noted that many students with relevant prior qualifications enter direct into the second year of the course.
Time required (taught and private study)	The IT and the Enterprise module runs throughout the year (22 weeks). The material delivered by e-learning comprised three separate sessions, each with one hour of formal input, replacing three two hour face-to-face lecture sessions. In addition there was a training evening in October and a trial session on 7 November to ensure that the system and equipment worked and that students were able to use them. It is expected that students will need to spend around three hours of private study for each formal session (whether face-to-face or e-learning) and there was also an assignment to complete at the end of the third lecture. Small group work is required during the complete module, although not in relation to the e-learning sessions. The e-learning modules followed the first four weeks of normal face-to-face lectures.
Originating institution(s)	Trinity College Dublin (TCD)
Contact person(s)	Dudley Dolan, Audrey Jennings, Catherine O'Connor, Alan Mullally Catherine.oconnor@cs.tcd.ie
Lecturer(s)	Dudley Dolan
Software environment	LearnLinc
Website URL	http://isweb.cs.tcd.ie/LearnLinc/
First round (2002) Dates	7 November (trial) and 14, 21, 28 November 2002
Trialling institution(s)	TCD only
Number of students at each	47 students participated in the e-learning sessions and some others viewed the recordings. Attendance was slightly higher for e-learning than for the traditional classes; 57 students had enrolled on the course initially but some were known to have dropped out.
Type of student (eg traditional, mature)	Mature students, typically aged around 30 and in employment, studying in this evening only course. Approximately two thirds work in IT, but the course has traditionally also attracted graduates of other disciplines wishing to change direction into IT. For many students, however, it was the first time that they had used computerised sound, chat room, white boards, etc. The fees for the course are substantial (around £10,000 total for those who complete all five years), a small amount of tax relief is available and many students are supported by their employers.
Second round (2003) Dates	No repeat of this exact module in GENIUS in early 2003. See appendix for 'Managing the IS/IT infrastructure.
Evaluation undertaken by institution(s)?	For First Round, detailed initial and final student questionnaires. Full results not yet available.
Evaluator checklist Viewed material	Three recorded lectures including the introductory chat before the second lecture. Sets of OHPs.
Student questionnaire	See above

Student interviews	Three students interviewed face-to-face (together)
Tutor interviews	Discussion with Dudley Dolan (project leader and lecturer), Alan Mullally (course director and academic adviser), Audrey Jennings and Catherine O'Connor (research assistants).
Assessment results	An assignment was set on completion of the three e-learning lectures, asking students to undertake a critical appraisal of the potential for use of e-learning within organisations, drawing on their experience. The lecturer reported that the work submitted was of a uniformly high quality, above the average expected at this stage of the course. As a further check on the quality of learning in comparison with students who had not experienced e-learning, it was proposed that one question in the end of year examination (in May 2003) should repeat a question on this topic set in the previous year's examination, to allow comparison of results.

B Module description

Content covered	Information Systems in the Enterprise; Information Systems, Organisations, Management and Strategy
Learning objectives	See Annex
Academic pre-requisites	Students in this year of the course must either have completed the Trinity College preliminary year (first of the five years), leading to the TCD Diploma in Information Systems, or have received exemption on the basis of similar qualifications already obtained.
Skills developed (technical, inter-personal etc)	Mainly analysis, and evaluation (see learning objectives)
Type of delivery (lecture, seminar etc)	Lecture, incorporating some feedback and discussion (see next section).
Software features used (whiteboard etc)	Slides (previously delivered as OHPs in face to face lectures) An attempt at sharing web pages was somewhat unsuccessful, as many students did not see the image on their screen. Use of whiteboard to allow students to add to or modify a diagram produced by the lecturer was trialled, but not used in the module itself. Lecturer is able to see what is on the students' screen ('glimpse feature') and then offer to help. Photographs of lecturer and of all other participants. Text chat (used extensively). Question and answers using five option multiple choice, partly to elicit information or feedback about the lecture and partly to test whether the student had retained the information.
Type of material on website (recording, lecture notes, animations etc)	Recordings of lectures and trial run; slides, both for introduction to course and also for the three online lectures.
Student activities (project, exercises etc)	Training session, trial run, some interaction during lectures. Assignment on completion of the three online lectures

Is this a new module or an existing module delivered in a new way?	Existing module
How were students recruited to the module?	The online lectures form a compulsory part of the course. As the course prospectus did not inform students that this experiment might take place, it was essential to provide facilities in TCD for students without appropriate equipment at home.
How does the module relate to the rest of the course? Does it give credit?	Compulsory part of the course. Credits based on results of the assignment.
What initial training in use of LearnLinc was given: a) to students	A full evening of lecture time was devoted to training the students in October. A week prior to the first lecture (on November 7) there was a trial session, during which students were able to log in, ensure that they could hear the sound and see the slides and check that they could use the various features (for example 'hand up'). Each function was checked with each student.
b) to tutors	The project team's technician attended a LearnLinc training session in London in August 2002, followed by the two research assistants attending a similar session in September to become familiar with LearnLinc. One to one training, together with several trial sessions, were conducted among Genius team members. Lecturer also self-taught through experimentation with package. The department had had a previous unsuccessful experience of e-learning using a synchronous materials and was therefore very anxious to ensure that this experiment was successful. The department staff reported that students had commented favourably on the College's approach to implementing e-learning and the amount of management and planning which had gone into it and that this provided an example of good IT implementation.

C Other information

Pedagogy

The lecturer acknowledged that the initial e-learning lecture contained far less interaction with students than would normally be the case in a face-to-face lecture, partly because he was still getting to grips with the technology. Subsequent lectures were more interactive, as he became more comfortable with the environment. He would like to develop the use of e-learning to make more use of case studies, project based work and greater use of such LearnLinc facilities as application sharing. Role plays could also be used. This would be in line with the general trends in pedagogy for post-18 students to a more discussion and problem solving based approach.

The availability of course material online was in line with existing trends within the department, where lecture notes were normally made available by this method. LearnLinc gave the added advantage that the full recording of the lecture and student interaction could be available, as well as a transcript of text messages.

There was some evidence that by the end of the three e-learning lectures, students were more at ease and actually asking more questions than was normal than in a face-to-face lecture. This built on good relationships established during the first four weeks of the course (via face-to-face lectures), but it seems that using e-learning they felt they had an almost one-to-one relationship with the lecturer.

The students interviewed confirmed these impressions and said that the lecturer normally (in face-to-face lectures) involved them in discussions and drew on the variety of business experience which was available in this mature mixed class. They would like to see more of this interaction in e-learning and suggested more use of questions and also that the lecturer could ask for examples from their experience to support the principles being discussed. The examples could be sent by text and this would provide a resource for examination after the lecture, as well as some to be elaborated during the lecture.

The students would also like to see more use of online questioning to test their understanding of what had just been said.

Operational effectiveness

A major issue for this experiment was the hardware, software and communications available to students who were following the e-learning lectures in their own homes or at their workplace. College staff agreed that in future they would set out in advance the minimum hardware and software required if students were to participate at a distance, although they realised that this would limit access to the course. Examples of technical considerations were:

- lack of bandwidth was a constraining factor; the course team had simplified slides (eg by removing colour and some diagrams) to overcome this; an alternative would be to have the slides downloaded in advance, but this would require students to have PowerPoint, which not all home computers have
- concerns about bandwidth limitations also influenced the decision not to use video, although the main reason for this was pedagogical – it was felt that it would not add any educational value, and indeed was considered too distracting.
- there were some difficulties with sound; all students could hear the lecturer easily, but there were difficulties in hearing other students, sometimes because the student speaking had not turned the microphone up sufficiently
- when the lecturer was using web pages to illustrate a point, not all students received the images on their screens
- from one of the web pages the lecturer opened a document in Acrobat, which students did not receive if they did not already have Acrobat reader on their own machine; in future they could be asked to download this in advance
- it had been assumed that students at home would be able to use a mobile phone to telephone the help line if help was required (as they would not normally be able to use a land line when their computer was online), but in practice a number of them did not have mobiles available
- in future the college would insist that students should have head sets for sound; if a student uses a microphone and speaker, then there is echo when the sound is relayed to other participants.

It was clear, both from student comments and from listening to the recordings, that a lot of time was spent, especially initially, in checking that participants could hear one another, that screens could be seen etc. With time this diminished. The general feeling seemed to be that in the first lecture the technology 'got in the way' of effective teaching, but by the end of the third lecture participants were comfortable with the technology and able to focus on the subject matter.

All the participants made extensive use of the LearnLinc text chat facility, to establish contact before the lecture, to ask questions, to respond to the lecturer's questions and also for social reasons. Text was essential if there was a problem with the sound. Both the lecturer and the students interviewed agreed, however, that the volume of text messages during the lecture was too high, as there were social messages interspersed with the serious content. All were therefore agreed that the use of the text chat for social purposes should be banned during the lecture, although it has a valuable role in cementing relationships outside lecture time. The course team envisaged that in future they would write a 'protocol' to specify 'etiquette' for this and other aspects of e-learning.

One disadvantage of the lecture recordings is that it is not possible to scroll the text chat messages independently of the sound; this means that it is difficult to check through to read important, subject-related messages. Following feedback from the students interviewed, the course team plans to solve this problem by making a transcript of the text messages available on the course website.

The students were generally complimentary about LearnLinc features; they said that it was easy to use, with a good user interface, although they envisaged that students of another discipline might have some difficulty if they were ‘not IT literate’.

Learner support

One disadvantage of e-learning is that the lecturer is not able to gauge from students' faces whether the material is being understood. It seems that students were making very little use of the facilities available to them to indicate where there were problems:

- there is an installed feedback feature, allowing students to click when they wish the delivery to be faster or slower, but there was very little use of this
- students can send a private text message, which is seen only by the lecturer and there was some use of this
- students can send a public text message, likely to be an unattractive option as it will reveal to other students their lack of understanding
- students can click the 'hands up' button to indicate that they would like to ask a question orally; this was not used to ask questions where the material was not understood (for the same reasons as for a public text message), although it was used to contribute to discussions.

The students interviewed suggested that because of the lack of automatic visual feedback which is obtained in a lecture hall, it was important that the lecturer should provide more opportunities for discussion and should ask questions to check understanding at frequent intervals. As they considered that the first lecture had been too fast and students seem reluctant to admit publicly to a lack of understanding, it might also be advisable for a lecturer using LearnLinc to request feedback on speed of delivery at regular intervals.

Peer support can be an important component of student support. Somewhat surprisingly, the students felt that the e-learning had helped them to get to know one another better; face-to-face lectures, even where they involve interaction, provide little time for socialising and they felt they did not know one another well before the e-learning sessions. They also thought that the availability of a photograph of each student, which was displayed when the student was speaking, contributed to getting to know one another.

Cost effectiveness

The course team said that they had devoted a great deal of staff resources to setting up and supporting the e-learning lectures and that this could not be sustained on a long term basis. For example, several of the project team had been available throughout each of the lectures to provide technical support. Although future e-learning could be operated with less support, training and support would still be needed for each new lecturer who participated, as well as for each new student.

The cost of LearnLinc licences also imposed constraints on the extent to which e-learning could be expanded. The team considered, however, that LearnLinc would become cost effective if it could be used for a number of courses (pricing relates to the number of students participating at any one time, but a different group of students could participate at another time). Expansion of e-learning might also, in the longer term, reduce the number of computer laboratories needed on site at the college.

For the mature, evening course students who formed the target group for the IT and the Enterprise course, e-learning offered clear benefits in reducing travel time and allowing study from home. e-learning would also allow the college to attract a wider target group and indeed they plan to launch a Masters Degree in IT using a mixture of e-learning and evening classes. e-learning on the LearnLinc pattern could also play a valuable part in the work of Oscail, Ireland's equivalent of the Open University, in which course team members are also involved. These benefits would not necessarily apply to the same extent in a course for traditional students in the 18-21 age range.

The view of the students was that they would not wish to take a course which consisted only of e-learning, as they value the face-to-face lectures and participation in a course on site. They would, however, welcome an expansion of e-learning to provide a more even mix between the two modes, because of the benefits offered by the opportunity to study from home. One disadvantage, not elsewhere mentioned, was that a student who spends his working day in front of a computer screen, was a little unhappy about a screen based lecture.

The students also said that there was considerable potential in using LearnLinc for group work, which otherwise involved travelling to small face-to-face sessions on a Saturday.

Evaluator's comments

The greatest strength of this e-learning module is that there is a clear rationale for undertaking the experiment, ie to test out the benefits of e-learning for a specific target group (mature learners studying in the evening), for whom the availability of lectures in their own home or workplace offers significant benefits.

A second major strength is the setting of a student assignment on the use of e-learning in enterprises, prompting the students to think critically about their experiences of e-learning and to relate these to the subject matter of the course.

Other strengths of the experiment are:

- the high degree of commitment and support from the institution, enabling the provision of adequate resources
- thorough preparation before the lectures
- the high level of support offered to learners before and during the lectures
- thorough evaluation (although the results are not yet fully available) and a commitment to learn from the experience
- the intention to build on experience, both within the existing course and to make new provision available to non traditional learners.

The disadvantages of the experiment are all related to its short length; with hindsight it is clear that a trial run and three lectures have barely been sufficient to iron out all the difficulties. It is recognised, however, that there were good reasons for choosing to run a short experiment:

- a prior unsuccessful experience in this area
- a high risk factor with 57 students
- students pay high fees and expect a quality service, with no glitches
- the average age of the non-traditional students taking the course is 30 years and most are in full-time employment.

Disadvantages of the experiment were:

- the very limited interactivity in the first lecture, although this was later rectified
- the lectures did not fully exploit the facilities available in LearnLinc, especially in application sharing
- it took longer than had probably been expected to become familiar with the technology and overcome minor technical problems.

Overall the advantages clearly outweighed the disadvantages and experiment is judged to have been a success which lays a foundation for further development of e-learning.

20 APPENDIX J – INSTRUCTIONS FOR ONLINE LECTURE

Subject: Instructions for Online Lecture
Date: Tue, 29 Oct 2002 17:54:46 -0000
From: "Catherine O' Connor" <Catherine.OConnor@cs.tcd.ie>
To: <genius@cs.tcd.ie>

Hello All,

The Server facilitating the Online Lectures using the LearnLinc software is now up and running at :

URL : http://isweb.cs.tcd.ie/LearnLinc

You can now log in to the Virtual Campus using a login id and password.

The login id is the same as your username for your tcd.ie email account.
The password is also your username for your tcd.ie email account. BOTH OF THESE ARE TO BE ENTERED IN UPPERCASE.

When you have successfully logged in, you may then join a virtual class.
Your course name is IT and the Enterprise, and the class you will be joining for the Pilot run is called - "Pilot Run - 7th November 2002". The password for the class is "genius".

When you join a class LearnLinc will automatically download the required client software to your computer.

The class environment will then open up on your computer with a message welcoming you to the pilot run. When you have reached this stage, you have successfully joined the class.

Please check that the sound and microphone is working on your computer, you can do this by running the Audio Wizard.

Please notify genius support group at: genius@cs.tcd.ie if you encounter any difficulties.

If possible, please carry out the above before lectures on the 31st October.
The sooner we receive feedback the sooner we can rectify any potential problems.

Thanks for your cooperation,

Catherine, Audrey and Dudley.

21 APPENDIX K – ONLINE LECTURE SESSIONS

Subject: Online Lecture Sessions
Date: Tue, 12 Nov 2002 12:39:43 -0000
From: "Catherine O' Connor" <Catherine.OConnor@cs.tcd.ie>
To: <genius@cs.tcd.ie>

Dear All

Many thanks for your cooperation during our technical trial session on Thursday last.

Some students were having difficulty with sound.

The sound quality can be maximised by the following
a)running the audio wizard in LearnLinc which can be accessed on the toolbar under the dropdown menu of tools and/or
b)clicking on the loudspeaker icon located under the student photograph on the LearnLinc Classroom Palette and/or
c)clicking on the volume control icon located on the lower right hand corner of your computer screen.

If you have not attended the technical trial session, please join us for the first of the live lectures on Thursday 14th November. The virtual lecture theatre will open at 6.30 p.m. and the lecture will start at 7 p.m.

If you have not completed a questionnaire relating to your expectations on the use of this technology and would like to do so, please contact Catherine O'Connor by email at genius@cs.tcd.ie or telephone at 6082414.

For students attending at TCD, the location has been changed to the downstairs laboratory in the portakabin opposite the Hamilton Building (ICT 1). Please attend at 6.30 p.m. to ensure that any technical difficulties can be addressed before the lecture begins.

A more detailed schedule will follow this email.

Many thanks

Dudley Dolan
Audrey Jennings
Catherine O Connor

22 APPENDIX L – ONLINE LECTURE SERIES

Subject: Schedule for online lecture sessions November 2002
Date: Tue, 12 Nov 2002 13:28:16 +0000
From: Catherine O' Connor <Catherine.OConnor@cs.tcd.ie>
To: genius@cs.tcd.ie

Dear All

Online Lecture Sessions - 14th November, 21st November, 28th November

Please read this message through to the end.

14th November: Please join the course IT and the Enterprise as you have done previously*. Please join the class: Lecture 14th November. The password is genius.

The following time schedule applies:

6.30 - 7.00 p.m. Students log on and join the lecture as advised above. Please note that this is the time to check any technical issues before the lecture formally begins. Technical issues will not be addressed by the lecturer, however, telephone lines (see below) will be open to deal with any problems you may encounter.

7.00 - 8.00 p.m. Live online lecture delivered by Dudley Dolan

8.00 - 8.15 p.m. Optional open forum to make comments on the experience

8.15 - 8.30 p.m. Optional open forum for students to communicate with each other by using the text facility within LearnLinc

Help Desk

For the duration of these sessions this project will be supported by the GENIUS team, and our technical support team, Willie O'Connor and Ronan Healy.

Telephone lines will be open from 6.30 p.m.– 8.30 p.m. to assist students. Should you need to contact us please telephone our Programme Secretary, Eilis Dunne, during this time at: 6082414 /6082418/6081735

On **21st November**, 2002 you will join 'Lecture 21st November' and similarly On **28th November** (week 3) you will join 'Lecture 28th November'.

The same time schedule will apply, unless otherwise notified.

Thursday **5th December**, 7 p.m: Lectures will resume in the lecture theatre as normal. Please note the starting time of 7 p.m.

Students attending at TCD:

Location: ICT 1 laboratory located downstairs in the portakabin opposite the steps to the Hamilton building. Please note change of venue from 7th November.

Please remember that you will need your username and ID to access the network at the computer at the ICT laboratory as you do when using any laboratory facility or when remotely accessing your TCD email account.

*** A little reminder to all about logging on:**

URL: isweb.cs.tcd.ie/LearnLinc

The login id is the same as your username for your tcd.ie email account.
The password is also your username for your tcd.ie email account. BOTH OF THESE ARE TO BE ENTERED IN UPPERCASE.

When you have successfully logged in, you may then join a virtual class.
Your course name is IT and the Enterprise. Please join the appropriate class i.e. on 14rh November join 'Lecture 14th November',
on 21st November join 'Lecture 21st November' and on 28th November join 'Lecture 28th November'. The password for all three classes will be genius.

When you join a class LearnLinc will automatically download the required client software to your computer.

The class environment will then open up on your computer. When you have reached this stage, you have successfully joined the class.

Please check that the sound and microphone is working on your computer, you can do this by:
a)running the Audio Wizard in LearnLinc which can be accessed on the toolbar under the dropdown menu of tools and/or
b)clicking on the louspeaker icon located under the student photograph on the LearnLinc Classroom Palette and/or
c)clicking on the volume control icon located on the lower right hand corner of your computer screen.

Many thanks

Dudley Dolan
Audrey Jennings
Catherine O'Connor

23 APPENDIX M – IT AND THE ENTERPRISE, LAST LECTURE

Subject: IT and the Enterprise
Date: Tue, 3 Dec 2002 08:53:31 -0000 (GMT)
From: <jennina@cs.tcd.ie>
To: <genius@cs.tcd.ie>

Hi All,

Just to remind everyone that your last lecture of this term for 'IT and the Enterprise' will take place in the Lecture Theatre at 7.00pm on Thursday, 5th December.

Recordings and materials for the three online lectures are available on the LearnLinc site - http://isweb.cs.tcd.ie/LearnLinc
Log in to the Campus and under 'IT and the Enterprise' you will see
+ Course Materials
Expand this and you will get a list of all the course materials including slides and recordings.

For the lecture 14th November, the material is as follows:
Slides - Chapter 2 - 14th November
Recording - Lecture 14th November

For the lecture 21st November, the material is as follows:
Slides - The Networked Virtual Organisation
Recording - Lecture 21st November

For the lecture 28th November, the material is as follows:
Slides - Chapter 3 - 28th November
Recording - Lecture 28th November

You can view the slides and save them. To play a recording, click on play and the necessary software required to play a recording will be downloaded to your machine.

If you have any difficulties do not hesitate to contact us.

Many thanks,

Genius Team.

24 APPENDIX N – INPUT FOR 10 QUESTIONS FOR FACTOR OPERATIONAL

Factor Operational - Before	Questions												Factor Operational - After	Questions										
	1	2	3	4	5	6	7	8	9	10	Total	AVG	1	2	3	4	5	6	7	8	9	10	Total	AVG
Student																								
Q1	8	8	5	8	8	5	8	5	7	7	69	6.9	9	9	9	9	9	8	5	8	9	9	84	8.4
Q2	8	6	6	6	9	7	9	7	3	8	69	6.9	7	7	7	7	7	7	5	6	6	6	65	6.5
Q3	9	9	9	9	9	9	9	9	9	7	88	8.8	8	8	8	9	9	9	9	7	8	8	83	8.3
Q4	6	7	8	7	9	9	9	8	8	9	80	8	5	6	7	7	5	4	3	5	2	4	48	4.8
Q5	4	6	3	7	8	8	8	4	4	9	61	6.1	7	8	8	9	7	6	6	8	3	7	69	6.9
Q6	8	8	8	8	8	7	3	3	5	5	63	6.3												
Q7	9	9	5	9	6	9	7	7	6	8	75	7.5	9	9	9	9	9	9	9	9	9	9	90	9
Q8	9	8	9	8	9	9	8	6	5	5	76	7.6	9	9	9	9	9	9	9	9	7	9	88	8.8
Q9	8	5	7	7	9	7	5	7	9	9	73	7.3	7	6	9	5	8	6	4	4	4	7	60	6
Q10	9	9	9	9	9	8	8	9	5	7	82	8.2												
Q11	5	5	8	8	8	7	8	7	6	5	67	6.7	6	7	9	7	9	8	8	7	7	8	76	7.6
Q12	9	6	9	7	4	9	4	3	5	5	61	6.1	9	9	9	6	6	7	3	5	5	5	64	6.4
Q13	6	7	6	9	8	7	9	6	5	4	67	6.7	8	9	9	9	9	9	4	9	6	7	79	7.9
Q14	9	9	9	9	9	9	9	6	7	9	85	8.5	9	9	9	9	6	9	3	4	6	8	72	7.2
Q15	7	6	7	7	8	8	9	6	6	7	71	7.1												
Q16	9	9	9	6	9	7	9	6	7	8	79	7.9	7	9	9	5	6	5	4	5	5	8	63	6.3
Q17	5	6	7	7	7	6	5	4	6	5	58	5.8	6	7	6	8	8	8	5	5	5	5	63	6.3
Q18	8	9	9	9	8	8	9	7	8	7	82	8.2	5	7	8	6	6	5	7	3	6	6	59	5.9
Q19	5	9	9	9	7	9	8	6	5	5	72	7.2	9	9	9	9	5	9	2	3	4	4	63	6.3
Q20	8	8	7	7	7	6	6	6	6	5	66	6.6	7	7	7	8	5	8	6	6	5	5	64	6.4
Q21	5	5	5	5	5	8	8	8	9	7	65	6.5	6	6	7	6	6	7	5	5	5	8	61	6.1
Q22	7	8	7	7	8	7	9	6	7	7	73	7.3	8	8	6	8	7	7	5	7	7	7	70	7
Q23	7	7	7	6	7	8	7	6	7	9	71	7.1	8	8	7	8	7	8	7	7	5	7	72	7.2
Q24	9	9	9	9	8	8	9	7	7	7	82	8.2	5	5	5	6	6	6	3	3	4	5	48	4.8
Q25	5	7	9	9	9	9	5	6	3	5	67	6.7												
Q26	6	9	9	9	4	6	9	8	7	9	76	7.6	9	7	4	9	4	4	2	5	2	4	50	5
Q27	7	6	7	6	7	5	5	5	4	6	58	5.8	6	7	8	9	8	8	7	8	6	8	75	7.5
Q28	9	7	8	8	6	8	6	7	7	6	72	7.2	8	9	6	9	8	9	5	9	9	9	81	8.1
Q29	9	9	9	9	9	9	8	8	7	8	85	8.5	7	7	8	5	7	7	3	6	5	7	62	6.2
Q30	9	9	9	9	9	9	9	9	9	9	90	9	9	9	9	9	9	7	3	9	1	5	70	7
Q31	9	9	9	9	9	8	9	6	7	7	82	8.2	9	9	6	7	8	8	5	6	4	5	67	6.7
Q32	7	8	6	8	8	8	9	7	8	7	76	7.6	8	7	6	8	8	6	8	6	7	7	71	7.1
Q33	8	8	7	7	6	7	8	6	6	6	69	6.9	6	6	6	6	6	6	5	6	5	5	57	5.7
Q34	5	7	8	6	8	8	8	2	5	5	62	6.2	9	9	9	4	9	3	4	1	9	9	66	6.6
Q35	9	8	9	8	8	8	8	7	8	7	80	8	9	9	9	9	9	9	7	7	9	8	85	8.5
Q36	4	4	4	6	5	7	4	4	4	3	45	4.5												
Q37	5	5	7	7	8	6	7	4	6	4	59	5.9	5	7	3	9	9	8	6	7	5	7	66	6.6
Q38	9	8	9	9	9	9	9	9	9	9	89	8.9												
Q39	5	8	5	8	8	8	5	5	5	5	62	6.2	9	9	7	9	9	8	8	8	8	8	83	8.3
Q40	5	6	8	6	6	7	7	6	5	6	62	6.2	5	7	9	7	6	6	6	6	6	7	65	6.5
Q41	5	9	9	9	6	7	5	5	4	7	66	6.6	9	9	9	9	9	9	9	8	8	9	88	8.8
Q42	8	7	9	9	9	8	8	7	8	7	80	8	3	4	9	4	4	3	3	3	3	4	40	4
Q43	9	7	7	8	9	5	5	7	5	6	68	6.8	8	9	9	8	8	5	7	8	8	9	79	7.9
Q44	9	7	9	7	9	5	9	5	5	9	74	7.4	9	9	9	9	9	9	3	5	3	6	71	7.1

Q45	4	5	7	5	6	3	7	3	3	4	47	4.7												
Q46	8	8	8	9	9	8	8	7	7	8	80	8	6	6	8	6	6	7	5	6	6	6	62	6.2
Q47	6	5	3	5	6	5	5	4	4	4	47	4.7	8	7	5	6	6	7	4	5	4	7	59	5.9
Q48	4	6	8	6	9	6	5	3	6	6	59	5.9	9	9	9	9	9	9	5	9	9	9	86	8.6
Q49	6	7	7	6	8	9	6	6	8	8	71	7.1	6	9	7	9	9	9	6	7	7	9	78	7.8
Min.	4	4	3	5	4	3	3	2	3	3	45	4.5	3	4	3	4	4	3	2	1	1	4	40	4
Max.	9	9	9	9	9	9	9	9	9	9	90	9	9	9	9	9	9	9	9	9	9	9	90	9
Range	5	5	6	4	5	6	6	7	6	6	45	4.5	6	5	6	5	5	6	7	8	8	5	50	5
Avg.	7.1	7.3	7.5	7.6	7.7	7.4	7.3	6	6.2	6.6	70.6		7.4	7.8	7.6	7.6	7.4	7.2	5.3	6	6	6.9	69.1	
S.D.	1.8	1.4	1.7	1.3	1.4	1.4	1.7	1.7	1.7	1.7	10.7		1.6	1.3	1.6	1.6	1.6	1.7	2	2	2	1.6	11.8	

25 APPENDIX O – INPUT FOR 10 QUESTIONS FOR FACTOR PEDAGOGICAL

	Factor Pedagogical - Before Questions												Factor Pedagogical - After Questions											
	13	16	18	19	20	22	23	24	25	27	Total	Avg	13	16	18	19	20	22	23	24	25	27	Total	Avg
Student																								
Q1	6	5	7	5	4	5	7	1	4	9	53	5.3	8	5	7	6	3	3	3	2	5	5	47	4.7
Q2	5	9	6	4	1	1	2	1	1	1	31	3.1	6	9	5	3	2	3	4	3	3	3	41	4.1
Q3	5	1	7	8	3	6	2	2	6	6	46	4.6	6	8	8	4	4	5	4	5	6	4	54	5.4
Q4	7	9	9	9	6	9	9	9	7	7	81	8.1	6	8	6	6	3	6	5	3	5	7	55	5.5
Q5	4	8	6	7	2	4	4	1	2	5	43	4.3	8	9	8	8	7	7	4	7	5	8	71	7.1
Q6	8	9	8	7	8	3	8	5	8	5	69	6.9												
Q7	8	8	7	7	6	8	7	4	7	6	68	6.8	9	5	8	8	7	8	9	7	8	8	77	7.7
Q8	9	9	9	9	6	9	9	9	9	9	87	8.7	8	9	7	6	8	8	9	3	8	9	75	7.5
Q9	9	9	9	8	5	5	5	5	7	7	69	6.9	7	9	4	5	4	4	4	3	3	5	48	4.8
Q10	5	3	8	7	3	2	3	2	4	3	40	4												
Q11	7	2	5	8	4	8	2	4	5	4	49	4.9	7	4	7	7	6	6	6	4	3	3	53	5.3
Q12	9	1	8	3	7	3	4	9	5	9	58	5.8	8	5	5	6	6	5	8	6	7	5	61	6.1
Q13	7	1	6	6	5	6	5	2	5	3	46	4.6	9	1	5	1	2	3	3	7	4	4	39	3.9
Q14	9	5	9	9	6	9	6	6	8	6	73	7.3	8	9	8	8	5	7	6	5	7	5	68	6.8
Q15	6	7	5	6	4	4	5	5	7	6	55	5.5												
Q16	7	9	9	9	5	5	5	5	5	5	64	6.4	7	5	7	7	5	5	4	4	5	5	54	5.4
Q17	5	9	7	7	5	6	5	3	5	7	59	5.9	6	7	6	5	1	4	2	2	5	5	43	4.3
Q18	9	9	8	8	7	5	5	7	8	7	73	7.3	6	9	5	4	3	4	2	7	5	4	49	4.9
Q19	9	9	8	9	5	3	5	5	8	3	64	6.4	7	5	7	7	5	5	3	2	8	4	53	5.3
Q20	7	8	7	7	6	7	5	6	7	7	67	6.7	6	6	5	6	5	5	5	4	6	6	54	5.4
Q21	6	5	8	8	8	7	8	7	7	7	71	7.1	6	4	5	5	2	3	2	2	3	3	35	3.5
Q22	8	9	6	6	4	6	7	2	6	7	61	6.1	6	9	5	6	4	5	7	6	6	6	60	6
Q23	8	8	7	8	5	8	5	5	9	8	71	7.1	9	9	6	8	5	5	5	5	9	6	67	6.7
Q24	8	9	8	8	5	7	5	7	8	7	72	7.2	5	7	4	2	2	4	3	3	3	4	37	3.7
Q25	7	9	9	9	5	4	4	9	5	5	66	6.6												
Q26	3	9	9	9	1	4	4	7	4	4	54	5.4	2	4	4	3	2	2	2	3	2	2	26	2.6
Q27	7	8	7	7	5	7	4	4	7	7	63	6.3	8	9	7	7	7	8	8	3	8	9	74	7.4
Q28	6	8	6	6	3	5	6	7	7	5	59	5.9	5	1	6	6	3	3	3	1	3	3	34	3.4
Q29	8	8	8	9	5	8	8	7	7	6	74	7.4	6	8	8	7	5	5	5	7	7	5	63	6.3
Q30	7	1	9	7	4	9	7	5	6	9	64	6.4	6	1	5	5	4	1	3	6	5	3	39	3.9
Q31	7	7	8	6	4	5	5	4	6	5	57	5.7	8	5	6	5	3	4	3	2	5	3	44	4.4
Q32	8	8	8	8	8	8	9	8	9	8	82	8.2	8	8	6	6	5	7	7	5	7	7	66	6.6
Q33	8	6	7	7	5	6	6	5	7	7	64	6.4	6	5	6	6	4	5	5	4	5	5	51	5.1
Q34	9	8	6	6	8	7	7	7	7	7	72	7.2	9	9	9	4	5	5	5	5	5	5	61	6.1
Q35	9	9	9	9	5	8	8	2	2	9	70	7	9	8	9	9	5	8	8	4	9	8	77	7.7
Q36	4	7	4	4	2	4	3	3	3	4	38	3.8												
Q37	6	1	8	9	5	5	9	6	7	7	63	6.3	7	4	6	6	4	4	2	1	3	4	41	4.1
Q38	9	8	9	9	9	9	9	7	9	8	86	8.6											0	
Q39	7	1	8	7	1	1	1	2	5	1	34	3.4	8	1	7	5	3	3	3	3	8	3	44	4.4
Q40	7	8	7	8	5	5	5	5	7	5	62	6.2	6	7	7	7	2	6	3	6	6	3	53	5.3

Q41	9	3	7	7	8	7	7	7	9	8	72	7.2	9	9	9	7	7	8	7	9	9	8	82	8.2
Q42	8	9	8	8	7	8	9	9	7	9	82	8.2	3	3	6	3	3	4	3	3	4	4	36	3.6
Q43	8	4	8	8	7	7	6	6	8	8	70	7	6	9	7	9	6	9	7	3	9	7	72	7.2
Q44	8	9	7	9	9	5	6	5	5	9	72	7.2	7	9	7	3	5	6	6	1	5	6	55	5.5
Q45	7	9	7	4	4	7	5	8	8	5	64	6.4												
Q46	9	2	8	9	6	7	6	8	9	6	70	7	8	1	7	8	4	6	4	2	5	6	51	5.1
Q47	6	9	5	7	3	2	1	1	7	2	43	4.3	7	9	4	6	3	3	2	4	5	3	46	4.6
Q48	9	9	6	5	7	7	4	6	6	8	67	6.7	9	9	8	9	9	9	5	7	9	9	83	8.3
Q49	9	5	7	9	8	9	8	8	8	7	78	7.8	7	5	7	7	5	8	5	7	9	7	67	6.7
Min.	3	1	4	3	1	1	1	1	1	1		1.7	2	1	4	1	1	1	2	1	2	2		1.7
Max.	9	9	9	9	9	9	9	9	9	9		9	9	9	9	9	9	9	9	9	9	9		9
Range	6	8	5	6	8	8	8	8	8	8		7.3	7	8	5	8	8	8	7	8	7	7		7.3
Avg.	7.3	7	7	7.3	5	5.9	5.6	5.3	6.4	6			7	6	6.4	6	4.4	5	4.6	4.2	6	5.2		
S.D.	1.6	3	1	1.6	2	2.2	2.2	2.4	1.9	2			1.6	3	1.4	2	1.8	2	2	2	2	1.9		

26 APPENDIX P – INPUT FOR 5 QUESTIONS FOR FACTOR SUPPORT

	Factor Support - Before Questions							Factor Support - After Questions						
	8	9	10	11	21	Total	Avg	8	9	10	11	21	Total	Avg
Student														
Q1	5	7	7	7	7	33	6.6	8	9	9	8	7	41	8.2
Q2	7	3	8	5	7	30	6	6	6	6	2	5	25	5
Q3	9	9	7	7	8	40	8	7	8	8	4	8	35	7
Q4	8	8	9	9	9	43	8.6	5	2	4	6	3	20	4
Q5	4	4	9	9	4	30	6	8	3	7	8	6	32	6.4
Q6	3	5	5	5	6	24	4.8							
Q7	7	6	8	5	6	32	6.4	9	9	9	9	8	44	8.8
Q8	6	5	5	5	6	27	5.4	9	7	9	9	9	43	8.6
Q9	7	9	9	5	9	39	7.8	4	4	7	9	5	29	5.8
Q10	9	5	7	6	6	33	6.6							
Q11	7	6	5	7	6	31	6.2	7	7	8	7	7	36	7.2
Q12	3	5	5	5	7	25	5	5	5	5	5	4	24	4.8
Q13	6	5	4	4	4	23	4.6	9	6	7	3	3	28	5.6
Q14	6	7	9	9	9	40	8	4	6	8	7	2	27	5.4
Q15	6	6	7	7	5	31	6.2							
Q16	6	7	8	5	7	33	6.6	5	5	8	6	8	32	6.4
Q17	4	6	5	5	6	26	5.2	5	5	5	4	5	24	4.8
Q18	7	8	7	8	9	39	7.8	3	6	6	7	5	27	5.4
Q19	6	5	5	2	2	20	4	3	4	4	5	5	21	4.2
Q20	6	6	5	6	6	29	5.8	6	5	5	4	3	23	4.6
Q21	8	9	7	7	8	39	7.8	5	5	8	6	3	27	5.4
Q22	6	7	7	6	6	32	6.4	7	7	7	6	5	32	6.4
Q23	6	7	9	9	8	39	7.8	7	5	7	7	5	31	6.2
Q24	7	7	7	9	7	37	7.4	3	4	5	7	5	24	4.8
Q25	6	3	5	7	7	28	5.6							
Q26	8	7	9	9	9	42	8.4	5	2	4	5	4	20	4
Q27	5	4	6	7	5	27	5.4	8	6	8	6	8	36	7.2
Q28	7	7	6	6	7	33	6.6	9	9	9	6	9	42	8.4
Q29	8	7	8	8	8	39	7.8	6	5	7	7	5	30	6
Q30	9	9	9	7	9	43	8.6	9	1	5	1	1	17	3.4
Q31	6	7	7	7	8	35	7	6	4	5	1	4	20	4
Q32	7	8	7	6	8	36	7.2	6	7	7	7	7	34	6.8
Q33	6	6	6	7	6	31	6.2	6	5	5	5	5	26	5.2
Q34	2	5	5	5	5	22	4.4	1	9	9	9	5	33	6.6
Q35	7	8	7	7	5	34	6.8	7	9	8	8	7	39	7.8
Q36	4	4	3	3	4	18	3.6							
Q37	4	6	4	5	6	25	5	7	5	7	8	4	31	6.2
Q38	9	9	9	9	9	45	9							
Q39	5	5	5	8	5	28	5.6	8	8	8	8	7	39	7.8
Q40	6	5	6	6	6	29	5.8	6	6	7	1	8	28	5.6

Q41	5	4	7	7	7	30	6	8	8	9	9	9	43	8.6
Q42	7	8	7	8	7	37	7.4	3	3	4	4	3	17	3.4
Q43	7	5	6	7	7	32	6.4	8	8	9	9	8	42	8.4
Q44	5	5	9	4	5	28	5.6	5	3	6	1	3	18	3.6
Q45	3	3	4	6	8	24	4.8							
Q46	7	7	8	7	8	37	7.4	6	6	6	7	5	30	6
Q47	4	4	4	2	4	18	3.6	5	4	7	5	4	25	5
Q48	3	6	6	6	7	28	5.6	9	9	9	9	9	45	9
Q49	6	8	8	7	7	36	7.2	7	7	9	6	5	34	6.8
Min.	2	3	3	2	2		2.4	1	1	4	1	1		1.6
Max.	9	9	9	9	9		9	9	9	9	9	9		9
Range	7	6	6	7	7		6.6	8	8	5	8	8		7.4
Avg.	6	6.2	6.6	6.4	6.6			6	5.8	6.9	6	5.5		
S.D.	1.7	1.7	1.7	1.7	1.6			2	2.1	1.6	2.4	2.1		

27 APPENDIX Q – INPUT FOR 4 QUESTIONS FOR FACTOR SOCIAL

	Factor Social - Before Questions						Factor Social - After Questions					
	12	14	15	17	Total	Avg	12	14	15	17	Total	Avg
Student												
Q1	4	5	7	7	23	5.75	3	5	8	1	17	4.25
Q2	9	1	4	6	20	5	7	2	3	4	16	4
Q3	7	3	4	7	21	5.25	8	6	6	4	24	6
Q4	5	7	9	1	22	5.5	6	5	2	1	14	3.5
Q5	9	1	4	8	22	5.5	2	3	8	1	14	3.5
Q6	4	8	8	6	26	6.5						
Q7	7	6	5	3	21	5.25	1	7	8	2	18	4.5
Q8	1	9	9	2	21	5.25	3	9	9	1	22	5.5
Q9	7	5	7	5	24	6	5	6	9	3	23	5.75
Q10	9	4	7	5	25	6.25						
Q11	4	6	6	5	21	5.25	4	5	6	4	19	4.75
Q12	2	9	9	3	23	5.75	2	8	6	2	18	4.5
Q13	6	4	7	7	24	6	5	1	7	4	17	4.25
Q14	1	4	9	3	17	4.25	2	6	7	1	16	4
Q15	5	5	5	5	20	5						
Q16	6	5	5	7	23	5.75	5	5	3	5	18	4.5
Q17	7	7	7	8	29	7.25	8	7	5	6	26	6.5
Q18	8	9	8	5	30	7.5	2	3	7	2	14	3.5
Q19	2	5	5	3	15	3.75	3	5	4	1	13	3.25
Q20	4	4	7	5	20	5	4	4	6	3	17	4.25
Q21	6	7	6	5	24	6	5	3	5	5	18	4.5
Q22	7	9	9	2	27	6.75	6	9	9	1	25	6.25
Q23	4	4	8	5	21	5.25	5	5	7	2	19	4.75
Q24	2	6	6	7	21	5.25	7	5	2	5	19	4.75
Q25	2	3	8	9	22	5.5						
Q26	2	5	6	2	15	3.75	9	3	5	3	20	5
Q27	5	5	6	3	19	4.75	6	6	9	4	25	6.25
Q28	5	8	6	3	22	5.5	8	7	5	1	21	5.25
Q29	4	7	8	8	27	6.75	4	6	7	4	21	5.25
Q30	7	9	7	6	29	7.25	3	9	5	2	19	4.75
Q31	8	3	4	6	21	5.25	7	4	5	1	17	4.25
Q32	6	5	4	9	24	6	7	6	6	4	23	5.75
Q33	4	4	7	6	21	5.25	3	3	6	4	16	4
Q34	5	7	8	2	22	5.5	9	9	9	1	28	7
Q35	3	6	9	4	22	5.5	3	7	9	3	22	5.5
Q36	8	2	2	7	19	4.75						
Q37	7	3	4	8	22	5.5	7	6	4	2	19	4.75
Q38	7	6	8	9	30	7.5						
Q39	5	5	8	8	26	6.5	6	5	8	1	20	5
Q40	4	5	6	6	21	5.25	3	5	5	7	20	5
Q41	8	6	6	3	23	5.75	4	8	9	1	22	5.5
Q42	4	6	8	9	27	6.75	4	2	4	9	19	4.75
Q43	5	5	6	5	21	5.25	9	5	6	2	22	5.5

Q44	3	6	8	1	18	4.5	4	5	6	1	16	4
Q45	7	6	6	7	26	6.5						
Q46	6	5	6	5	22	5.5	7	5	9	5	26	6.5
Q47	8	2	6	4	20	5	6	3	6	3	18	4.5
Q48	2	7	4	7	20	5	1	5	9	2	17	4.25
Q49	5	5	7	6	23	5.75	1	6	6	3	16	4
Min.	1	1	2	1		1.25	1	1	2	1		1.25
Max.	9	9	9	9		9	9	9	9	9		9
Range	8	8	7	8		7.75	8	8	7	8		7.75
Avg.	5.22	5.4	6.5	5.4			4.9	5.33	6.3	2.9		
S.D.	2.21	2	1.7	2.2			2.3	1.98	2	1.9		

28 APPENDIX R – QUALITATIVE ANALYSIS

The following pie charts and graphs are the Qualitative Analysis as carried out as part of this research. The data was gathered qualitatively, analysed and collated and then summarised statistically. The questions are from Section B of Questionnaires 2 and 3.

Table 66 - Questionnaire 2 - Q.B19 - What do you expect you will like most about the online learning experience?

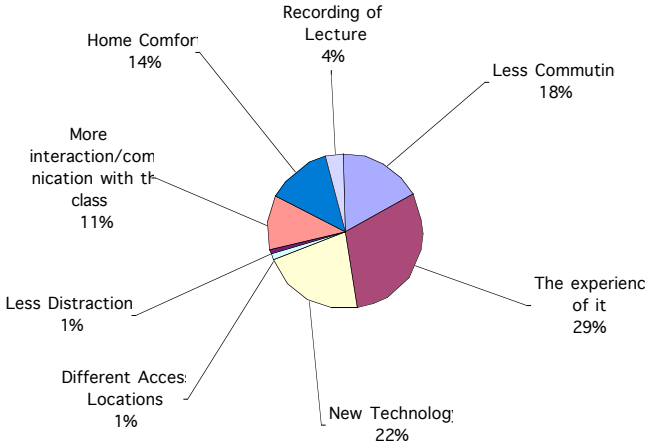

Table 67 - Questionnaire 3 - Q.B19 - What did you like most about the online learning experience?

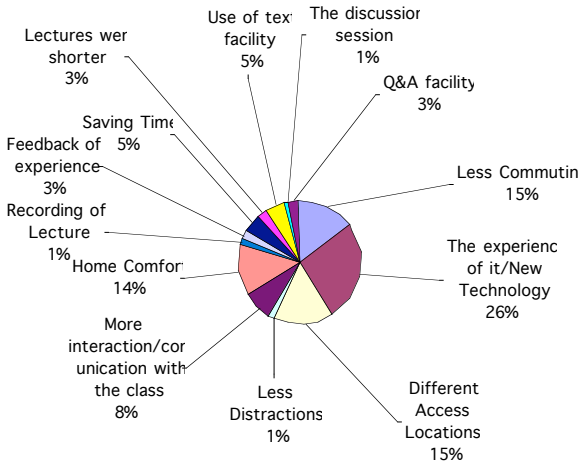

Table 68 – Questionnaire 2- Q.B20 – What do you expect you will like least about the online learning experience?

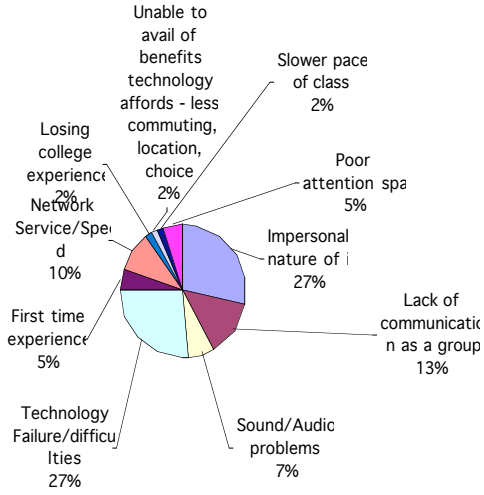

Table 69 - Questionnaire 3 - Q.B20 - What did you like least about the online learning experience?

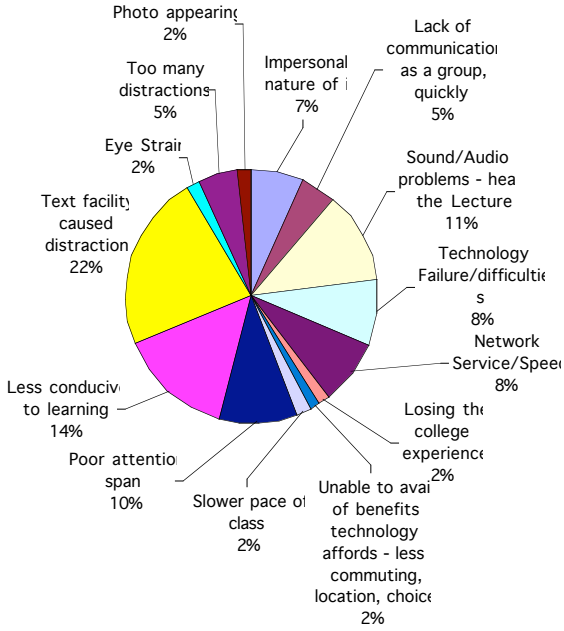

Table 70 –Q2. – Q.B21 - Do you envisage that there may be other benefits for you in the use of the virtual classroom which have not been mentioned in Section A of this questionnaire?

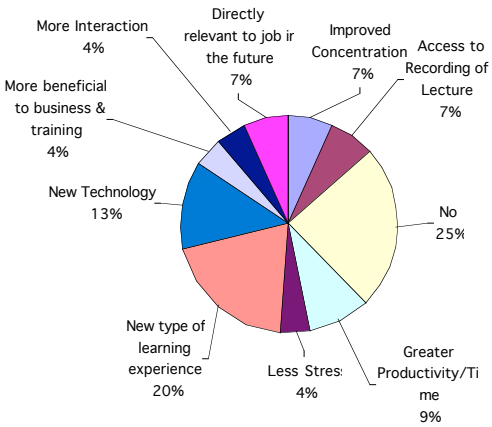

Table 71 -Q3. – Q.B21 - Did you find any other benefits for you in the use of the virtual classroom which have not been mentioned in this questionnaire?

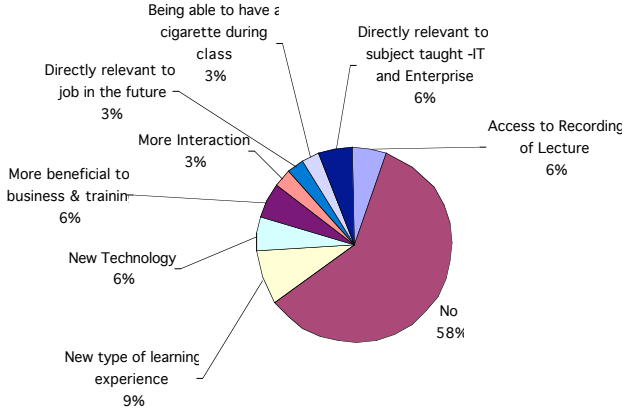

Table 72 – Q2 –Q.B22 - Do you envisage your use of the virtual classroom will involve you in any other specific costs?

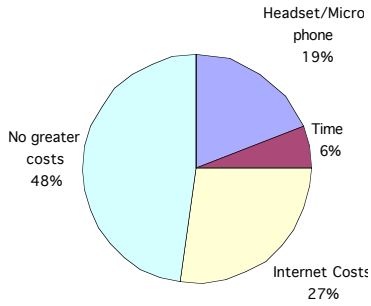

Table 73 -Q3 – Q.B22 - Did you incur any other specific costs in your use of the virtual classroom?

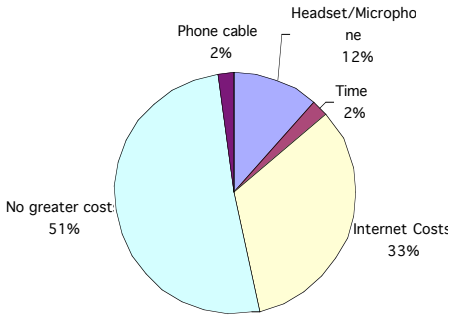

Table 74 - Q3 – Q.B23 - Would you like to experience a blend of this type of learning and traditional learning in your future years at TCD?

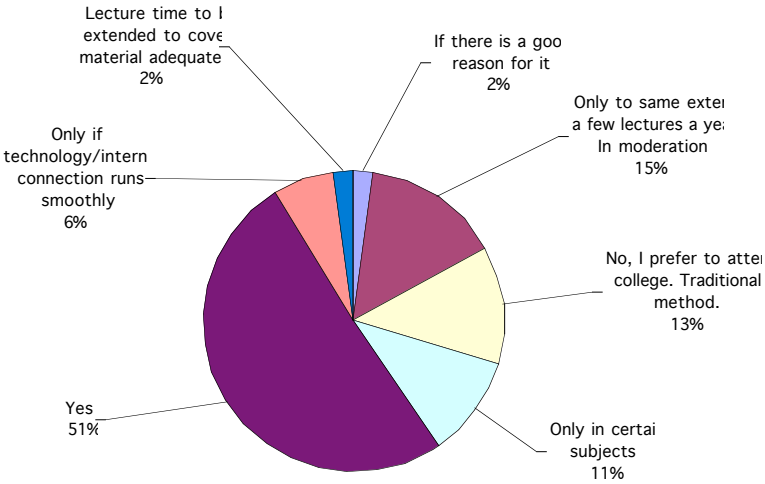

Table 75- Q3 – Q.B24 - What do you believe to be the strengths and weaknesses of this form of learning compared to the traditional lecture? - Strengths

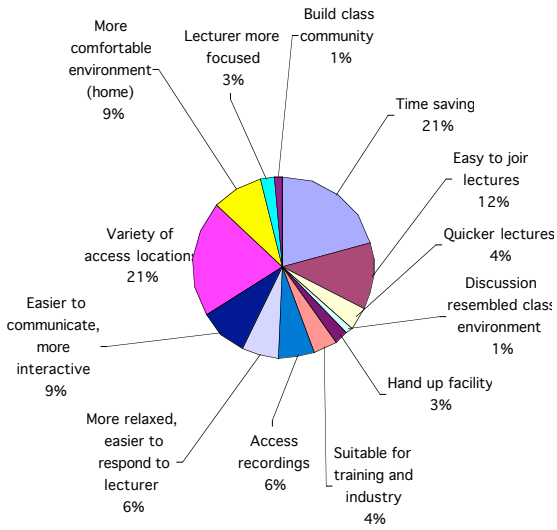

Table 76 - Q3 - QB24b-What do you believe to be the strengths and weaknesses of this form of learning compared to the traditional lecture? Weakness