Student Reactions to Learning with Technologies:

Perceptions and Outcomes

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Chapter 10
Students' Views of E-Learning: The Impact of Technologies on Learning in Higher Education in Ireland

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ABSTRACT

Students are the end users of the Information Systems that educators use to enhance students' learning experiences. The use of technologies in education has altered the ways in which lecturers and students can interact and has expanded the volume of information that students can access. This study was undertaken to obtain students perspectives on the uses of technologies in higher education to assist educators in improving the pedagogical design of e-learning platforms, known as learning management systems. This chapter provides students' perspectives on the academic use of technologies in two higher education institutions in Ireland. Analysis of the responses received from three hundred and twenty students indicates that students are of the opinion that the use of technologies in higher education can beneficially transform learning; however, technologies will never replace lecturers.

INTRODUCTION

In April 2009 a survey was conducted in the Faculty of Business, Dublin Institute of Technology and the findings were presented in a chapter of a book. "Critical Design and Effective Tools for E-Learning in Higher Education: Theory into Practice" was the title of the book, edited by Donnelly, Harvey, & O' Rourke (2010). The title of the chapter was "The Student Perspective: Can the use of technologies transform learning?" This book was published in June 2010 by IGI Global (IGI, 1988). In March 2010 the same survey was conducted in the School of Computer Science &

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Statistics, Trinity College Dublin. The findings of both studies are discussed in this chapter.

Networked technologies have been called transformational due to their wide ranging impact (Salmon, 2000; 2003, p. vii). As part of this wide-ranging impact, technologies are increasingly pervading all areas of education. This study particularly concentrated on the higher educational sector of education in Ireland. Nonetheless, a number of the findings and comments are relevant to the use of technologies with respect to learning in general.

The use of technologies has modified the ways lecturers distribute course materials to students; rarely do university students transcribe notes from blackboards/whiteboards. Course materials are disseminated online through files of course notes, PowerPoint (Microsoft, 2009) presentations, podcasts, video casts and web links, with e-dissemination enabling access to electronic learning resources (Littlejohn, 2009). The use of technologies has also brought alterations to students' ability to communicate with lecturers and fellow students, through the use of e-mail, discussion boards, wikis, online chat rooms and video conferencing. In addition, technologies have changed the ease with which students can access further information to read outside of the course material and conduct research through the use of online journals and databases.

In general, academics are very often encouraged to create an online presence without ever having studied online themselves or even considered the pedagogical impact that technology can have on the students' learning experience (Ambrose, 2001). Salmon (2000) stated that the use of the world wide web for learning and teaching was set to dramatically increase, and the onus was on all academics using technology to ensure that they familiarised themselves with the pedagogical skills necessary to ensure that the technologies used effectively enhanced the learning experience of students.

Broad, Matthews, and Mc Donald (2004) proposed that despite students prolific use of new technology, there is no need for academics to presume that students are disposed towards academic use of the Internet in the higher education sector. Furthermore, they question whether the use of technology in education is supported by sound educational rationales and that the benefits to be achieved from using the Internet in higher education have not yet been pedagogically proven (Broad, et al., 2004). All the time and effort that lecturers put into creating suitable teaching resources for use with technology is wasted, unless students actively engage with and gain some benefits from using the material provided.

As a result of a study conducted by Lofstrom and Nevgi (2007) at the University of Helsinki, Finland, the authors suggest that the relevance and meaningfulness of learning activities are crucial to the transferability of knowledge Educators should keep this in mind when designing material for use with technological devices.

McLoughlin's (2000) experiences from working in the Teaching and Learning Centre at the University of New England in Australia, lead her to suggest that despite the prolific availability of online teaching tools there is no established approach on how to develop quality learning programs that make the best use of these tools, which can only be achieved by educators forming a deeper understanding of how technologies can affirm and extend the principles of good teaching. Slevin (2008) from Roskilde University in Denmark, states that concentration upon practical problems associated with the opportunities afforded by modern technologies draw attention away from the theoretical concerns posed by e-learning. Apart from reading books and articles on the use of technologies in higher education, educators who attend e-learning and teaching Summer schools, conferences and seminars, afford themselves the opportunity to form a deeper understanding of how technology can affirm and

extend the principles of good teaching through shared experiences.

The objective of this study was to provide educators with a summary of students' general analysis of the impact that technology has on learning in higher education to provide academics with feedback from over three hundred students. Insights gleaned from student feedback could be incorporated into academics' pedagogical considerations when designing and developing learning activities which involve the use of technologies.

BACKGROUND

As part of the Dublin Institute of Technology's Strategic Plan, a Learning Technology Team was established in 2003 to roll out the institutional virtual learning environment (Learning Technology Team, 2009). In January 2009, the Learning Technology Team was combined with the Learning & Teaching Centre to form the Learning, Teaching & Technology Centre for the Dublin Institute of Technology (Learning, Teaching & Technology Centre, 2009). Similarly, the Centre for Academic Practice and Student Learning was established in 2003 in Trinity College Dublin to assist in supporting best academic practice and student learning in line with the Strategic Plan (CAPSL, 2003). The principle objective of this study was to obtain students' views on the impact the technologies promoted by the respective strategic plans had on their learning experience so necessary strategic changes could be implemented to create a more student centred environment.

One of the most important contributory factors to the success of strategic plans is to get all persons involved in the process engaged in the process. Studies like this will get the students involved in the strategic plan by incorporating their views in implementation/change strategies. But it is also important in an educational environment to get the academics involved in implementing changes. The provision of training to use virtual learning environments is not enough, because when one commences an introductory course to using an electronic learning platform, the extent of the task can seem quite daunting; even to educators who are literate with technologies. Connolly, Jones, and Jones (2007) state that a range of skills are required to develop an effective e-learning course. It takes time for lecturers to familiarise themselves with the use of an electronic learning platform, to compile learning material in a suitable format to use the technologies with students and to realise the pedagogical benefits that can be achieved by using technologies in different ways. However, in order to make e-learning courses successful students' perspectives and views on the use of technologies in higher education must be heeded and taken into consideration by e-learning development officers and educators.

The use of technologies in higher education has increased the modes of delivery of information to students by making information more readily available and ubiquitous. The association between classrooms and lecture halls as primary places of learning has ceased to exist (Slevin, 2008). Learning is now perceived as ubiquitous, occurring any time regardless of location, which makes further education more accessible to people who previously would not have had the opportunity, for example, people who work shifts and are unable to attend structured classes on a regular basis.

James, Bexley, and Devlin (2007) conducted a national survey of Australian university student finances and found that over one third of part-time undergraduate students, one quarter of all postgraduate students and over one fifth of full-time undergraduate students missed classes to attend work to support survival and expenses related to their studies. Light, Nesbitt, Light, and Burns (2000) noted that technology theoretically enables students to organise their study practices to suit their individual lifestyles. Students can also learn from online learning activities in ways not previously envisioned by the lecturers. Shank (2008)

observed that online learning occurs which is not directly related to specific learning activities.

Student Perspectives and Learning Experiences

Rogers (2004) sought students' opinions on the use of online learning and how it had impacted on their learning, his findings on students' perceptions of online learning were positive, with 79% responding that online learning positively impacted on their study.

Churchill (2005) an Educational Developer in the United Kingdom recommended that in order for the use of technologies to effectively enhance the students' learning experience, minimum requirements should be clearly outlined for the students by the lecturers, thus informing students of the lecturers expectations of their participation with e-learning, for example setting a minimum requirement for student engagement with the e-learning resources. Students should be given clear guidance on how the lecturer expects them to use technologies in the form of blended learning. Blended learning is where a suitable combination of traditional teaching and e-learning are combined to enhance students' level of attainment from a particular course of study.

Condie and Livingston (2007) while conducting a study of one particular online programme designed for students in the post-compulsory years of secondary schooling in Scotland found that while online learning did appear to have a positive influence on attainment, the evidence suggested that attainment might have been greater had the teachers modified their methods by combining online learning with more traditional methods (blended learning).

Gilbert, Morton, and Rowley (2007) conducted a study of nineteen students across the globe participating in an online course of study leading to MSc Information Technologies and Management (e-Learning) to obtain an insight into the students perspective on the experience and concluded that more in-depth studies would enhance understanding of how e-learning can contribute to enhancing the quality of learning. More in-depth studies of the use of technologies in higher education, the dissemination of findings, successes, and failures, will assist in establishing facts in response to Gilbert et al., concerns regarding how e-learning can contribute to enhancing the quality of student learning.

Podcasts and video casts are used by teachers to provide alternative ways of delivering course material to the student population. Students involved in a debating class were able to use technologies to record and review their debating techniques, which enabled them to compare changes in their attitudes after exposure to multiple perspectives on a controversial topic. Video casts can be used to record student activity from which they can learn, for example, students participating in a civil discourse public speaking class at a private comprehensive university in the Pacific Northwest, North America, through the use of technology i.e. recording their presentation on video tapes, were able to judge previous presentations that they had made in order to reflect upon their changing stance on various controversial topics under discussion (Gayle, 2004). As students reflected on their presentations they got the chance to identify shortcomings and confront their own assumptions, which enabled them to improve their delivery and open their minds to the thoughts and opinions of others.

Web teaching can effectively enhance the learning experience of students through the use of bulletin boards; resources and databases; online quizzes; student portal pages; e-journals; assignment submission; sharing of files, graphics, and so forth, to augment course material (McLoughlin, 2000).

Several times over the last few years at various seminars and courses, lecturers have expressed concerns that using e-learning platforms will effectively lead to the demise of the teaching profession and ultimately their redundancy. Don-

nelly and O' Rourke (2007) also noted that some academic staff in Irish higher education institutions believed that the introduction of an online learning environment could lead to their own redundancy.

Teacher: Student and Student: Student Relationships

Professors/lecturers will not be replaced any time soon according to Wilson and Christopher (2008) two educators based in Colorado, United States of America, who also suggest that e-learning depends on lecturers in order for the whole system to run effectively, from planning and design to management and delivery, as well as being role models and providing guidance for students.

Computer mediated communication is increasingly being used in higher education, along with other technological enabling opportunities to supplement face to face interaction with lecturers and fellow students. Lecturers have to shift the level of control from that of the lecturer to that of the student to enable students become self-regulated, reflective learners who have developed independent study habits (Jelfs & Colbourn, 2002). This is a very interesting area, and further investigation is needed to establish whether or not beneficial learning can take place as a result of students using computer mediated communication. Light, Nesbitt, Light, and Burns (2000) recognised that the atmosphere between students within the computer mediated communication area must be supportive, rather than hostile or competitive in order for successful learning to be achieved.

When designing online interactive communication tools for students it is paramount for the success of the learning activity that educators advise their students that the rules of netiquette should be observed when working online, for example, no discriminatory remarks to be included in students' postings to discussion boards. This is possibly significantly more important than the way that etiquette should be observed during discourse with lecturers and fellow students in a classroom situation. Body language, a nudge and a wink can convey a joke is intended in a real life situation, but in an online environment, the written word or recorded electronic data can have a more lasting effect on an individual, than a quick murmured comment. Because of the nature of stored electronic data, the data can be revisited again by the victim and the hurt occasioned repeatedly, also, more people may be privy to the exchange. Video conferences, etc. are stored electronically and can be viewed later by others.

Mason and Rennie (2006) suggest that enabling learners some control over their pace and learning style can provide a richly stimulating learning experience for the student. Students' satisfaction can be influenced by quality instruction, instruction that accommodates various learner/student characteristics/learning orientations (Overbaugh & ShinYi, 2006). When designing content suitable for electronic delivery, the designer must consider contemporary student characteristics and identify the tools most appropriate for each learning orientations and create a range of course activities that will encompass as many of the preferred learning orientations as possible.

Park (2005) noted that the Felder and Silverman theory can be used to identify individual students learning styles and preferences. Course material that has been purposely developed to suit the learning abilities and learning styles of a wide range of students should be instrumental in keeping the attention of a broader range of students. Mainemelis, Boyatzis, and Kolb (2002) conducted research on student learning preferences and suggested that web based learning as a pedagogical approach poses an interesting research question.

One of the dilemmas for lecturers in trying to accommodate various learning preferences is whether to give out all course material at the start of the academic year or to enable student access to each topic prior to or subsequent to each individual lecture. One student from Trinity College Dublin observed that "not providing physical handouts means student notes and lecture notes become

separated". This was an interesting point to make and one that the author also found had a certain nuisance value i.e. when a lecturer conducts a class using PowerPoint (Microsoft, 2009) slides and informs the class at the end of the session that the slides will be made available online at a later date. One lecturer in particular could take over a week to post the slides and by this time the impetus to collate the notes taken in class with the handouts provided online had passed. Revising lecture notes which have become separated from the notes taken by students in class, can be a frustrating process, the whole process of revision can become disjointed and confusing. Not many students would have the time to collate notes taken in class with the printed copy of the online handout subsequent to the lecture.

Access to Information, Learning Outcomes and Skills Development

The speed of access to information realisable through the use of technology and the increased means of collaboration were previously unachievable. Hartman, Moskal, and Dziuban (2005) found that 80% of students were of the opinion that the Internet had a positive influence on their education and 75% claimed they used the Internet more than the library for research purposes.

Learning outcomes must be realized, developed and fine tuned over time, and interventions made based on the findings. Broad et al (2004) tentatively concluded that the use of an Integrated Virtual Learning Environment (IVLE) can facilitate student learning but their measurements of improved student performance were less conclusive. Assessment of critical thinking is one of the most difficult to quantity as per the experience of Peach, Mukherjee, and Hornyak (2007). Sullivan and Thomas (2007) observed that increased interest in learning outcomes was unreasonable when at the same time higher education authorities and accreditation agencies have still not agreed any standardised ways of measuring student learning outcomes. This may be so, but it is paramount to the success of the educational system to establish a recognised process to identify the best ways to improve students' critical thinking skills and how to measure student learning outcomes. Rogers (2004) researched the ability to measure improvement in critical thinking skills in history students and how this ability would be influenced by students' pre-conceived ideas and the nature of the assessments used, and referred to the fact that it would be audacious to claim that his study had found solutions to the difficult questions encountered.

Trees and Jackson (2007) stated that students take notes, listen to the lecturer and observe the proceedings in traditional teaching methods. In Technology Enhanced Learning (TEL) notes are usually made available online for the students to read online or printout to read at a convenient time. McKinney, Dyck, and Luber (2009) stated that students who personally created their own set of notes achieved higher educational outcomes than students who had been given a full set of notes by lecturers.

Ambrose (2001) an e-learning officer based in Brisbane concluded from personal experience as an online learner that in order for lecturers to be successful in their delivery of e-learning they must possess organisational, intellectual and social facilitation skills in order to provoke intelligent responses from students and create group harmony.

METHODOLOGY

This study was initially conducted in the Faculty of Business, Dublin Institute of Technology (Dublin Institute of Technology), and subsequently in the School of Computer Science & Statistics, Faculty of Engineering, Mathematics and Science, Trinity College Dublin. An evaluation of current literature was performed to identify key attributes to be explored and from these attributes statements were devised to seek student perspectives regard-

ing the issues identified. A survey was compiled to ascertain students' perspectives on the concept that the use of technologies in higher education has the ability to transform learning.

The survey was designed with three sections:

1. A list of 27 statements was created for students to evaluate using a five point Likert scale i.e. strongly agree, agree, neutral, disagree, strongly disagree.
2. Very basic personal information was sought such as level of study.
3. Students had the opportunity to share perspectives on statements such as "can the use of technologies transform learning" and "what use of technology has the most beneficial impact on student learning".

Research Ethical Clearance

Permission was sought and granted from the Dublin Institute of Technology's Research Ethics Committee (2009) to conduct this study. One hundred and sixty full-time business students in the Faculty of Business, Dublin Institute of Technology, completed a paper based survey to establish their perspectives on "Can the use of technologies transform learning" in April, 2009. Likewise, permission was sought and granted from the School of Computer Science & Statistics Research Ethics Committee (2011), Trinity College Dublin in March 2010. One hundred and sixty full-time students in the School of Computer Science and Statistics, Trinity College Dublin completed the same survey.

SUMMARY OF STATISTICAL ANALYSIS

Following on from the themes addressed in the literature review for this research, the statistical analysis is presented below under the headings: Student perspectives; learning experiences; Attendance at lectures; Teacher: student and student: student relationships; Access to information; and Learning outcomes and skills development. The Likert scale options of "strongly agree" and "agree" were merged to form the statistics presented as findings in this chapter, as were the Likert scale options of "strongly disagree" and "disagree" merged.

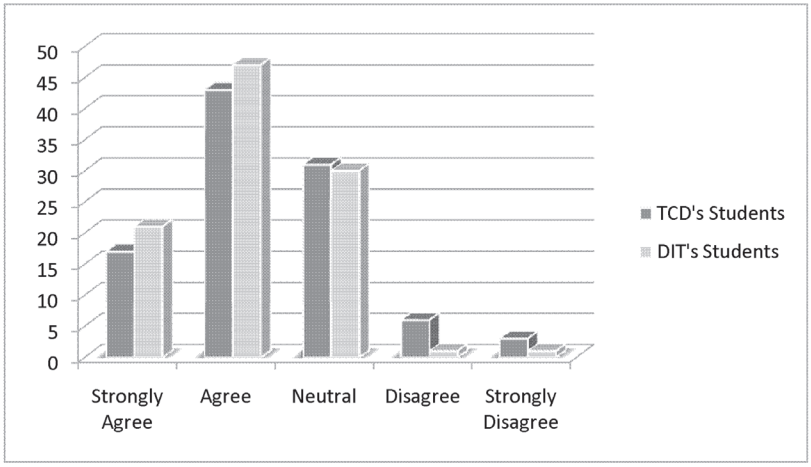
Student Perspectives

Overall the outcome of this research was that students' perspectives on the use of technologies in higher education were quite positive. The students' perspectives when analysed showed while they clearly realised the benefits to be achieved from using technologies in their education they still appreciated the benefits of having face to face tutorials with lecturers, and face to face interaction with peers. One student commented "the use of technology should be used in parallel to lectures as the best way of learning is through human interaction". Increased use of technologies in education could empower the user by enriching the learning experience (Dagger, 2006).

Of the students participating in this study, 92% respectively, from both Trinity College Dublin and Dublin Institute of Technology, agreed that the use of technologies in higher education makes a positive difference to studying, these findings are consistent with those found by Rogers (2004).

One student from Trinity College Dublin remarked that "technology has to be properly integrated with an approach to teaching. Not just technology for the sake of technology". Taking heed of the advice offered in this statement is crucial to the continued successful use of technologies in higher education. A clear definition of the pedagogic rationale and learning outcomes expected from each unit of learning should be realized by the educator prior to the integration of technology into the learning experience. Another student from Trinity College Dublin suggested that "It's not the technologies we should be focusing

Figure 1. Technology facilitates a student centred environment that was not possible before



on - rather the pedagogy - supported through the technology. (That is, it's not what you use, rather how it's used). New technologies to support new pedagogies!". The pedagogical approach which enhances the students learning experience should be the driving force behind the technologies integrated into the classroom not the integration of technology prior to pedagogical considerations. Technology should not be integrated into the students learning experience unless there are sound pedagogical benefits to be achieved by doing so.

Sixty percent of students at Trinity College Dublin and 68% of students at Dublin Institute of Technology agreed that technologies can facilitate student centred environments that were not possible previously (Figure 1). The effective creation of student centred environments depends on the design skills and implementation methods employed.

As part of the survey, students were asked for their agreement or disagreement on the ability of discussion boards to force students to open their minds to the thoughts and opinions of others. This study found that 51% of Trinity College Dublin's students and 55% of Dublin Institute of Technology's students agreed that online discussion boards force students to open their minds to the thoughts and opinions of others. 30% of Trinity College Dublin's and Dublin Institute of Technology's students had no opinion on this statement. The high number of students who contributed no opinion on this statement could be that they had no personal experience of using discussion boards. In a previous study conducted in the Dublin Institute of Technology, only 20% of students had used an e-learning platform to participate in discussion boards (O' Donnell, 2008).

Learning Experiences

In this research 80% of Trinity College Dublin's students and 68% of Dublin Institute of Technology's students agreed that the quality of students' learning is enhanced by using technologies to augment lectures, this would be in the form of blended learning, these findings are consistent with those found by Condie and Livingston (2007).

One student from Trinity College Dublin commented "I think that learning essentially remains the same, technology just makes it an easier means to the same end", this view is similar to the views

of Gilbert et al (2007) learning essentially remain the same.

This study found that 53% of Trinity College Dublin's students and 54% of Dublin Institute of Technology's students agreed that podcasts and video casts of lectures would facilitate student learning more so than handouts. One student from Trinity College Dublin responded "I think, in general, technology can only add value to existing teaching methods. I don't see it replacing existing teaching methods. Podcasts and screen casts would be a great addition". Another student from Trinity College Dublin remarked "I think podcasts and videos of lectures should be used more to help students". McKinney, Dyck, and Luber (2009) on examining student attitudes about using podcasts found that students were of the opinion that revising from podcasts was more effective than revising from textbooks.

This study also found that 56% of Trinity College Dublin's students and 59% of Dublin Institute of Technology's students agreed that using podcasts or video casts for revision purposes improves recall more so than revising course notes, 30% of Trinity College Dublin's students and 26% of Dublin Institute of Technology's students were neutral, and 14% of Trinity College Dublin's students and 15% of Dublin Institute of Technology's students disagreed with this statement. One student from the Dublin Institute of Technology commented that "Yes, it makes things quicker, more entertaining and easier to revise" in response to "Can the use of technologies transform learning?"

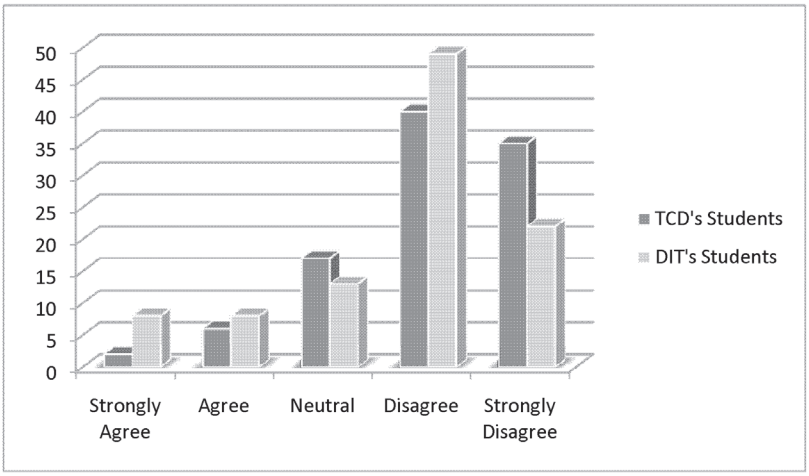
Results from the student survey showed that 82% of students agreed that using technology in higher education effectively enhances the learning experience of students, these findings are consistent with those found by McLoughlin (2000). O' Donnell (2008) also came to the same conclusion in a study for a master's theses, 77% of students and 61% of lecturers agreed that using an e-learning platform as a form of blended learning improves the learning experience of students more than using traditional teaching methods. In addition 68% of students and 59% of lecturers agreed that using an e-learning platform as a form of blended learning is better for preparing students for work than traditional teaching methods (O' Donnell, 2008).

In this study, 78% of Trinity College Dublin's students and 66% of Dublin Institute of Technology's students disagreed that the use of technology in higher education would make lecturers disposable. In excess of two thirds of students disagreeing with the statement that "the use of technology in higher education will make lecturers disposable" should be reassuring to lecturers who believe that the use of technology in education is a threat to their employment, Donnelly and O' Rourke (2007) noted that some academic staff were of the opinion that engaging with online learning environments would make them disposable. One of the Dublin Institute of Technology's students commented that "Yes, technology can transform learning, but only as an aid, not as a replacement".

The third section of the survey afforded students the opportunity to share any other perspectives on "Can the use of technology transform learning" over 50% of the thirty-two students from the Dublin Institute of Technology that completed this section of the survey commented that technology could never replace lectures/lecturers/class discussions/debates and interaction. O' Neill, Singh, and O'Donoghue (2004) came to the same conclusion that technology can be used to enhance the learning experience of students, but not replace the lecturer. A student from Trinity College Dublin commented "It should be used along with the current methods. Neither should stand alone, i.e. lectures or technology". Another student from Trinity College Dublin mentioned that "Technology should be used as an additional resource, it should not replace any existing methods altogether".

In addition, 63% of Trinity College Dublin's students and 58% of Dublin Institute of Technology's students disagreed with the statement that the use of technology in education could successfully replace the learning achieved through interaction

Figure 2. There is no longer any need to attend lectures because course notes available online are a good substitution.



with lecturers. One student from Trinity College Dublin commented that "It helps but does not replace attending lectures". Another student from Trinity College Dublin remarked that "Technology can help with learning, but it is no substitute for being able to listen to a lecturer and ask questions whenever you need to".

Another comment from a student in Trinity College Dublin was that "The use of technologies cannot transform learning, or leave in-person lectures defunct, but it can be very helpful. Technology allows for organisation on both student and lecturer's behalf". These comments are all very positive about the use of technology in higher education. The following statement by a student from Trinity College Dublin sums up the observations of many "It is a useful tool not a substitute".

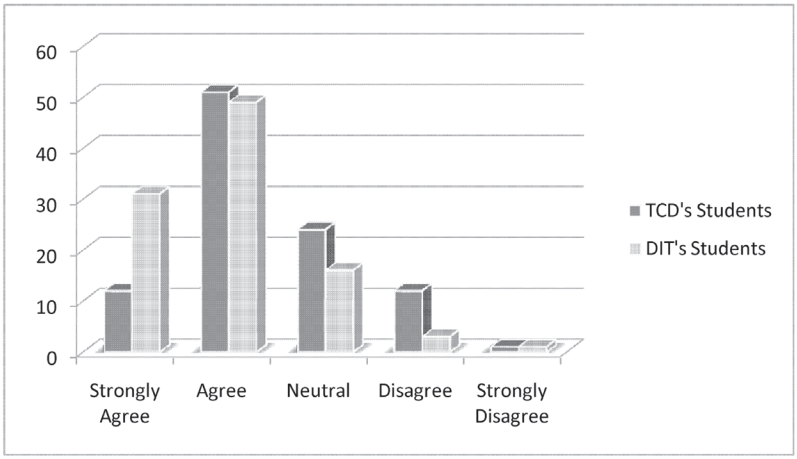
Attendance at Lectures

75% of Trinity College Dublin's students and 72% of Dublin Institute of Technology's students surveyed disagreed with the statement that there is no longer any need to attend lectures because course notes available online are a good substitution (Figure 2). These findings are consistent with those found by Wilson and Christopher (2008). A student from Trinity College Dublin remarked that "Depends on the lecturer. If the lecturer is not as good, would need better notes online". This is a very true observation, and one that most would have experienced at some time during their education, some lecturers are not as engaging as other lecturers. In addition, some lecturers apply themselves more diligently to the creation of engaging course content than others.

Another interesting opinion of a student from Trinity College Dublin was that "The comprehensive use of sharing in-depth lecture notes online, I think would make the pass-rate of practically all courses improve", this would be an interesting concept to explore as an hypothesis in future research i.e. the sharing of in-depth lecture notes online would make the pass-rate of practically all courses improve.

This may be the case, but still 51% of Trinity College Dublin's students and 52% of Dublin Institute of Technology's students agreed that having course notes available online makes them more likely to skip the occasional lecture. One

Figure 3. Attending formal lectures facilitates a deeper understanding of course content than online access.



student from Trinity College Dublin admitted that "In College, I got the notes before term and then attended no lectures". Another student from Trinity College Dublin commented that "Technology should be used to augment the lectures and as a revision aid rather than replacing them, if students use this as an opportunity to skip lectures that is their prerogative". Several different opinions on this statement have been made by various students, some realize the benefits to be achieved and others use the opportunity of having notes available online to avoid attending lectures. Some students are highly motivated and have the ability to study independently and can succeed without attending lectures. Others need the guidance of a lecturer, alternatively referred to as the: guide on the side; host on the post; or sage on the stage.

Yet again, 80% of students agreed that attending formal lectures facilitates a deeper understanding of course content than online access (Figure 3). One student from the Dublin Institute of Technology commented that "Yes, I think technologies can transform learning but also that lectures and class interaction increase further learning".

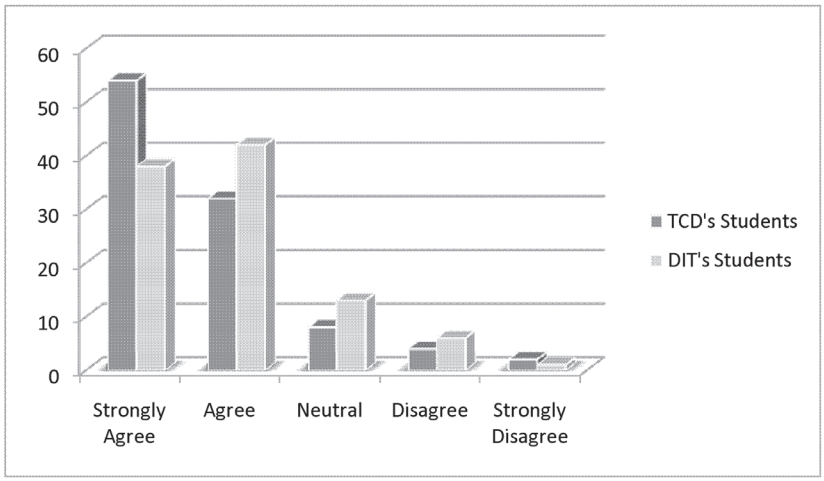
So, even though just slightly over half of the student population in both Trinity College Dublin and Dublin Institute of Technology who participated in this study agreed that having course notes available online makes them more likely to skip the occasional lecture, they still appreciate the fact that attending formal lectures facilitates a deeper understanding of course content.

This study found that 45% of Trinity College Dublin's students and 52% of Dublin Institute of Technology's students disagreed that watching a video cast of a lecture would be as educationally beneficial as attending the lecture in person. Similar to the findings of this study McKinney et al (2009) found that although 60% of undergraduate general psychology students felt that computer-based lectures were appealing, they still preferred the traditional lecture.

Teacher: Student and Student: Student Relationships

An interesting comment on this issue made by one student in the Dublin Institute of Technology was "Yes, technology can transform learning, it enables people to work to their own pace, e.g. if they are a night time student. However, attending lectures allows students to engage in debates and

Figure 4. If course material was available online at the commencement of term it would markedly change students' ability to learn at their own pace.



discussions which are fundamental to social skills because online discussions mean people don't have to think on their feet". This students' perspective is very intuitive, because in life there is a need to know when to respond immediately and when to pause and think before making a contribution, and of course, students need the ability to do both.

This research found that 86% of Trinity College Dublin's students and 80% of Dublin Institute of Technology's students agreed that if course material was available online at the commencement of term it would markedly change students' ability to learn at their own pace (Figure 4).

A student from Trinity College Dublin commented "technology used in an effective way can largely help education, although slides available online can lower attendance it can also improve learning". Once the material provided by lecturers is sufficiently absorbing, students should be suitably engaged to ensure satisfaction with the course, therefore, improving student attrition rates. This research found that 80% of Trinity College Dublin's students and Dublin Institute of Technology's students agreed that the use of technology in higher education increased their satisfaction with their course of study. These findings are consistent with those found by Overbaugh and Shin Yi (2006). Obviously other contributory factors such as personal circumstances, change of course preference, etc. will also influence student attrition rates and satisfaction with courses in all disciplines.

One student from Trinity College Dublin remarked "Technology helps by making course notes more accessible and engaging attention in class (i.e. Slides presentations)". Accessibility to course material and engagement in class can increase students' satisfaction with their course of study.

In this study 66% of Trinity College Dublin's students and 46% of Dublin Institute of Technology's students agreed that the use of video casts would be superior to podcasts for enhancing students' understanding of course material. One student from Trinity College Dublin mentioned "To have traditional lecture or seminar enhanced by modern technologies such as online paper searching, wiki, or some videos. But, technology can hardly replace conventional face to face learning style as current technology does not allow

such a high level of interaction, especially gesture, eye contact, etc". Video casts enable students to observe the body language of the lecturer which is an important factor of communication, in addition, to see any supporting blackboard/whiteboard or PowerPoint (Microsoft, 2009) presentations displayed, or even any demonstrations that are taking place, while also benefiting from responses to any questions posed by students attending the class.

Access to Information

Fifty two percent of Trinity College Dublin's students and 55% of Dublin Institute of Technology's students disagreed with the statement that they prefer accessing journal articles from hardcopies in the library to accessing journals online, therefore technologies facilitate fast and efficient access to required information which was not previously possible. Online journals make access to peer reviewed work much more easily obtainable and less time consuming than visiting libraries and trawling through hardbound copies of journals, which subsequently have to be photocopied. Numerous files and articles from electronic journals can be magnetically stored by academics and students conducting research on a technological device called a memory key. Printing from the electronic version is more user friendly than photocopying page by page. The time that is saved by using technology when conducting research can be better spent critically evaluating the relevance of the identified work.

Eighty seven percent of Trinity College Dublin's students and 64% of Dublin Institute of Technology's students disagreed with the statement that when they come across an acronym or new concept with which they are unfamiliar, they seek clarification in the library first and then online. These findings are consistent with those found by Hartman, Moskal and Dziuban (2005). These findings suggests that students' first port of call to seek information is to use technologies, rather than the traditional visit to the library, therefore, the impact of technologies on learning in higher education in Ireland is positive. One student from Trinity College Dublin contributed the following thought "Depends on what you mean by 'transform'. Certainly, it can be a help in finding resources more efficiently and improving collaboration".

A wiki is a web-based document which enables users to add and edit content using only their web browser (Bayne, 2008). In this study 61% of Trinity College Dublin's students and 40% of Dublin Institute of Technology's students agreed that using wiki interfaces increases the value of the students' learning experience. Jelfs and Colbourn (2002) concluded that there were positive correlations between how comfortable students felt while taking part in virtual seminars and the value of the learning experience.

Gilbert et al (2007) conducted a student evaluation of an e-learning module for the Master of Science in Information Technology and Management course, and found that the use of discussion boards and support from other students (peers) were the most frequently cited aspects of the learning process, and in general students felt that they learnt from their peers. One student from Trinity College Dublin commented "I know that the University of Catalonia is a virtual one, however, I still feel that regular interaction with other students is an integral part of the learning experience". In this study 70% of Trinity College Dublin's students and 55% of Dublin Institute of Technology's students disagreed that the use of technology in education could successfully replace the learning achieved through face to face interaction with fellow students (peers). Lea (2001) suggested that computer conferencing can enable students to reflect upon subject-based knowledge in ways that were not possible in more traditional teaching environments and emphasized the importance of students learning from each other in a collaborative learning environment.

Learning Outcomes and Skills Development

When the question regarding critical thinking skills was put to the student participants 41% of Trinity College Dublin's students and 54% of Dublin Institute of Technology's students agreed that the use of technology in higher education improves students' critical thinking skills. 50% of Trinity College Dublin's students and 36% of Dublin Institute of Technology's students were neutral on this statement, maybe the students would need more time to reflect on this statement before making a commitment to agree or disagree.

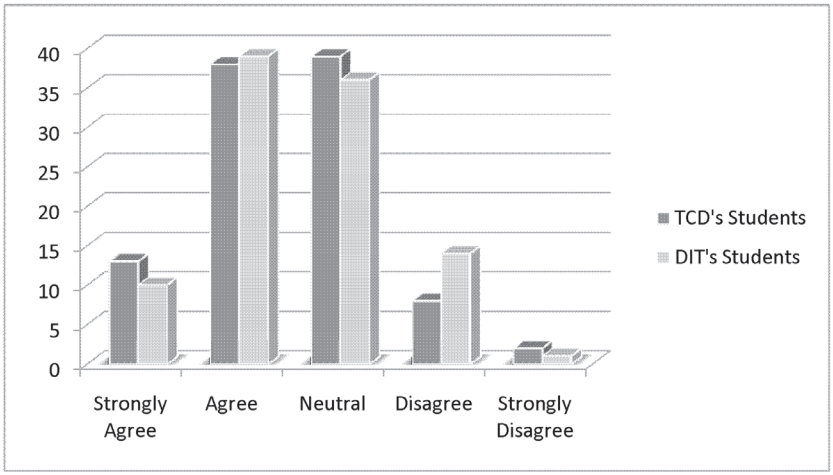
In this study 33% of Trinity College Dublin's students and 44% of Dublin Institute of Technology's students agreed that the learning experience of students would be altered for the better if lecturers discussed topics in class prior to making the notes available online. As previously mentioned one student from Trinity College Dublin observed that "not providing physical handouts means student notes and lecture notes become separated". This is a very relevant point but still some students prefer lecturers to discuss topics in class prior to making the notes available online or providing handouts, this could be attributed to the different learning styles and preferences of students. Students' views on this statement could also have been influenced by their motivational levels. Students who are motivated to do well will often prepare in advance for a lecture by printing off and reading the appropriate notes providing they are available online. Some students prefer to study the topic to be discussed prior to the lecture to enable them to put questions to the lecturer to facilitate their understanding of the topic and to ensure that they achieve the most benefit from the classroom experience.

Students' views on the above statement are clearly very evenly divided. This could be an indication of the difference in learning styles and preference of individuals, which leaves the educator in a quandary: whether to reveal the notes prior to class to suit the learning requirements of students who like to be prepared and engaged with the topic prior to entering the lecture theatre; or to discuss topics in class prior to making the notes available to students online. A student from Trinity College Dublin remarked that "Some students learn best by taking their own notes, others by being able to fully concentrate on what the lecturer is saying and having notes provided for them. It seems to me (possibly due to a fear of low lecture attendances) that lecturers will accommodate the former student but not the latter".

This research found that 37% of Trinity College Dublin's students and 49% of Dublin Institute of Technology's students agreed that they would be forced to learn more in lectures if they had to make their own notes as opposed to having the notes available online, these views on note taking are similar to McKinney, Dyck, and Luber (2009) observations that students who created their own notes during lectures achieved higher scores.

These findings are interesting and perhaps may lead lecturers towards enabling students' access to lecture notes subsequent to the lecture taking place to encourage students to make their own set of notes during the lecture. As lecturers can speak faster than students can write, students have to summarise what lecturers say in order to keep up with the class. This process of summarising content forces students to consciously think about what the lecturer is saying in order to select the most salient points to note. The mere process of writing engages brain activity which will also improve retention. Although, one student from the Dublin Institute of Technology commented that "Being able to add your own notes to the notes available online, learning is decreased if you're concentrating on taking lots of notes instead of listening to the lecturer" this comment was supported by a similar comment made by a student from Trinity College Dublin "Can listen in lectures and try to understand the concepts as they are being discussed, rather than transcribing notes".

Figure 5. Collaborative online research affords the lecturer the opportunity to identify the students that are making the most worthwhile contributions.



In the above discussion about taking notes in class, different viewpoints were expressed; this could be attributed to the acknowledged existence of different learning preferences and styles.

The fact that 77% of Trinity College Dublin's students and 80% of Dublin Institute of Technology's students agreed that the use of technology in higher education improves student engagement with course material indicates that the lecturers that do use technologies as part of their pedagogical approach with students are obviously using the right approach and gaining student recognition for their efforts.

Treleaven and Cecez (2001) from the University of Western Sydney, New South Wales, found that approaching assessment and submission dates had the effect of rapidly increasing the number of postings students made to the bulletin board. Lecturers can monitor students' engagement and participation in online discussion boards, quizzes, and multiple choice attempts, to identify the students who are actively getting involved with the course material and engaging with fellow students, and those who are not. Salmon (2003) recommends that "effective e-moderation underpins the delivery of quality education in the online environment." (p. 10) and "part of the e-moderator's role is to try and orchestrate appropriate participation for the purpose" (p. 59). Lecturers engaging in the use of e-learning platforms with their students should investigate the pedagogical skills recommended for use by e-moderators to improve the quality of the online learning environment that they are providing to enhance their students' learning experience. In addition, through understanding the pedagogical rationale of e-moderators, lecturers could improve their approach to engaging students by employing appropriate online learning activities, in order to achieve the intended learning objectives.

This research found that 51% of Trinity College Dublin's students and 49% of Dublin Institute of Technology's students agreed that collaborative online research affords the lecturer the opportunity to identify the students that are making the most worthwhile contributions (Figure 5).

FUTURE RESEARCH DIRECTIONS

The findings of this research have identified several areas suggesting further investigation would provide valuable insights:

- The sharing of in-depth lecture notes online would make the pass-rate of practically all courses improve. One suggestion for effectively testing this hypothesis is to select a course and split the class into two groups, preferably divided on the basis of equal ability, one group to be allowed share in-depth lecture notes online and the other denied access to this resource, to test if the pass-rate improves. Then conduct the same experiment on other courses to see if this hypothesis holds true.
- Can beneficial learning take place as a result of students using computer mediated communication? Similarly to the suggestion above, learning outcomes of some students would have to be gauged in comparison to the learning outcomes achieved by other students who do not have access to the computer mediated communication resource.
- Studying class notes prior to a lecture facilitates deeper understanding. Again, this hypothesis could be tested to see how it impacted on the learning outcomes achieved by two separate groups of students of similar ability pursuing the same course of study and sitting the same examination.

Another area that could be explored; will the current economic climate in Ireland impact on the volume of households subscribing to broadband access? This could be considered as a luxury, not a necessity to some, and could impact on students' ability to engage with learning technologies from their homes or rented accommodations.

CONCLUSION

In excess of 90% of the students involved in this study agreed that the use of technologies in higher education makes a positive difference to studying. More than 80% of students agreed that the use of technology effectively enhances the learning experience and increases satisfaction with their course of study. Over 75% agreed that technology improved student engagement with course material.

The statistics outlined in this chapter indicate that even though students expect technologies to be used in higher education, they realise that lecturers form the backbone of third level education, and while technologies can effectively be used to enhance students learning experience, the use of technologies in higher education will never replace the lecturers, these findings are consistent with those found by Wilson and Christopher (2008).

There is no indication at all to suggest that students wish to see academic staff removed from their educational experience. Over 70% of students disagreed that the use of technology will make lecturers disposable. Students realise the benefits to be achieved from face to face interaction with lecturers and peers. 80% of students agreed that attending formal lectures facilitates a deeper understanding of course content than online access. Even though students identified some beneficial uses of technologies in their learning experience, the human aspect is missing, as one student from the Dublin Institute of Technology commented that "Technologies major fault is that you cannot easily ask a question. Lecturers will be able to answer immediately, while searching through computer data may lead the answer seeker astray." Hence, the use of technologies can enhance the learning experience of students, but lecturers are required for guidance and support.

The use of technologies in higher education has certainly made information more readily available to students than before, but providing adequate guidance and instruction, basically educating

students on how to effectively turn this information into knowledge is still the responsibility of lecturers. One student from the Dublin Institute of Technology commented that "Lecturers will always be needed. Technology cannot always be trusted."

In order for e-learning to be a success university management and staff must take ownership of e-learning and satisfy themselves that pedagogy can be maintained, even though the medium of delivery is changing. The use of technological devices as enabling tools in higher education appears to bring some advantages, but to quote one student from the Dublin Institute of Technology "It helps definitely, but I do not think it can, or ever will, replace lecturers, interaction in class is how I feel I learn best." I think this comments nicely sums up the findings of this study.

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KEY TERMS AND DEFINITIONS

Attributes: An evaluation of current literature was performed to identify key attributes to be explored and; from these attributes statements were devised to seek student perspectives regarding the issues identified.

E-Learning: The skill of acquiring information through the use of technological devices which is subsequently turned into knowledge.

Higher Education: Educational establishments which students may attend at some period in their life, predominantly after leaving secondary/ post primary education in order to engage with further education.

Learning: The skill of acquiring information that is subsequently turned into knowledge.

Memory Keys or USB (Universal Serial Bus) Keys: Are small portable electronic storage devices which are compatible with most desktops and laptops.

Podcasting: Subject matter in audio format that can be downloaded to technological devices.

Student Perspective: Student opinions.

Technology Enhanced Learning: The use of technology to enhance the learning experience.

Video Casting: Subject matter in multi-media format that can be downloaded to technological devices.

Virtual Learning Environment (VLE): Technologically facilitated educational resources which provide ubiquitous access with the objective of enhancing the learning experience.