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## The Student Perspective: Can the Use of Technologies Transform Learning?

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# Critical Design and Effective Tools for E-Learning in Higher Education: Theory into Practice

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## Chapter 16

# The Student Perspective: Can the Use of Technologies Transform Learning?

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### ABSTRACT

*This chapter explores students' perspectives on the transformations that the use of technology has brought to higher education. The use of technologies in higher education facilitates flexible learning environments but the benefits to students who engage with these technologies will only be realised if the design is pedagogically sound. The pedagogic approach employed by lecturers when designing their e-learning platforms or learning management systems has the capability to transform learning. The author's discipline is Information Technology and Business Information Systems; from experience and case studies there is ample evidence to suggest that the use of technology does not always necessarily meet user requirements. Students are the end users of the technologies that educators use to enhance students' learning experiences. This chapter was undertaken to obtain students' perspectives (as the end users) on the uses of technologies in higher education to assist educators in improving the pedagogical design of their e-learning platforms. The responses received from students clearly indicate they are of the opinion that the use of technologies in higher education beneficially transforms learning but will never replace lecturers. In essence, the benefits that can be achieved through the use of technologies are totally dependent on the ways they are employed pedagogically by lecturers.*

### INTRODUCTION

Increasingly technology is pervading all areas of education. As part of the Dublin Institute of Technology's Strategic Plan, a Learning Tech-

nology Team was established in 2003 to roll out the institutional virtual learning environment. Students are the end users of the information systems that educators use to enhance students' learning experiences. This chapter was undertaken to obtain students' perspectives (as the end users) on the uses of technologies in higher education

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to assist educators in improving the pedagogical design of e-learning platforms alternatively known as learning management systems.

The use of technology has modified the ways that some lecturers distribute course materials to students, i.e., no longer do all students transcribe notes from blackboards/whiteboards. Course materials are disseminated online through files of course notes, PowerPoint presentations, podcasts, video casts and web links. The use of technology has also brought alterations to students' ability to communicate with lecturers and fellow students, through the use of e-mail, discussion boards, online chat rooms and wikis. In addition, technology has 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.

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. 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 lecturers 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.

An important point to note is that technologies are simply tools at the disposal of educators. The beneficial transformations in learning that can be achieved through the use of technologies depend on the skill levels and commitment of the educators, similar to all professionals' effective use of tools. When employing the use of technologies to transform learning a number of issues need to be considered, amongst them student perspectives, the learning experience, teacher–student and student–student relationships, learning outcomes, and so on, to ensure that the lecturers' pedagogical skills are utilised to best effect. Should any educators believe that their pedagogical approach

does not require enhancement from the use of technologies that is their prerogative.

Broad, Matthews, and McDonald (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, and they question whether the use of technology in education is supported by sound educational rationales and that 'this strategy has not yet been pedagogically proven' (p. 135). All the effort that lecturers, who employ the use of technologies with their students, put into creating suitable content is wasted unless students actively engage with and gain some benefits from using the material provided. As a result of a study conducted by Löfström and Nevgi (2007) at the University of Helsinki, Finland, the authors suggest that 'Experiences of relevance and meaningfulness are central facilitators of learning. In this context, meaningful learning entails learner activity and intentionality, application of constructivist principles, collaboration, dialogue, reflection, connection to context and transferability of knowledge' (p. 315). 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 programmes that make the best use of these tools, which can only be achieved by educators forming a deeper understanding of how technology 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 technology draws 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.

## **BACKGROUND**

On commencing an introductory course to using an electronic learning (e-learning) platform, the extent of the task can seem quite daunting, even to educators who are literate in Information and Communications Technologies. ‘Developing an e-learning course demands a range of contributions: subject, technical, design and resource expertise’ (Connolly, Jones, & Jones, 2007, p. 164). 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 technologically with students and to realise the pedagogical benefits that can be achieved by using technologies in different ways. Trial and error and discussions with colleagues on their experiences of using technologies with their students is possibly the best way forward for lecturers embarking on using technologies with their students. However, in order to make e-learning courses successful student perspectives and feedback on the use of technologies in higher education must be heeded and taken into consideration.

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; alternatively students who fall

ill or pregnant during the course of their study can still continue to keep up with the class even though their presence in the classroom is no longer feasible. James, Bexley, Devlin, and Marginson (2007) conducted a national survey of Australian university student finances and found that ‘22.7% of full-time undergraduate students and 37.4% of part-time undergraduate students regularly missed classes because they needed to attend employment for survival and to purchase study materials, as did around one quarter of all postgraduate students’ (p. 2). The learning materials designed by academics to use with technological tools increase the opportunity for students who are unable to attend all lectures provided to attain higher educational qualifications.

Some educators have expressed concerns that students lack the skills to critically evaluate the information they find on the Internet and that use of the Internet can lead to information overload. Hence, lecturers should provide guidance to students to assist them in focusing their ability to identify reliable and peer-reviewed sources of information and supply students with links to websites that provide suitable learning activities. Students can also learn from online learning activities in ways not previously envisioned by the lecturers ‘Many researchers and theorists have observed that much learning occurs online, even if it seems to be off-task from a well-identified learning activity’ (Shank, 2008, p. 255). The use of technology in education has altered the ways in which lecturers and students can interact and has expanded the volume of information that students can access in order to develop a broader knowledge of the subject under consideration. This chapter explores some examples of where the use of technologies can transform student learning, and provides some students’ perspectives on academic use of technologies in higher education.

The objectives of this chapter are to establish students’ perspectives on a number of issues related to the use of technologies that educators employ to augment and possibly enhance their teaching

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methods in higher education and to obtain students' views on whether it is possible for the effective use of technological tools to transform learning. In the context of this study, the term transform learning implies all the changes, alterations, modifications, improvements, developments, and so on, that the functionality, made possible through the use of technology, can make to the students' learning experience. The functionality provided by e-learning platforms enabled by the use of technology includes ubiquitous access to course documentation, PowerPoint presentations, podcasts, video casts, e-mail, discussion boards, chat facilities, and so forth. The competence of the lecturers' skills when designing course content is paramount to the learning achieved by students who engage with e-learning platforms.

Communications technology enables students to connect to the World Wide Web in order to access e-learning platforms, learning management systems, electronic journals and the wealth of information that is available through this medium. In addition, technology facilitates communication with lecturers and other students through the use of e-mail, discussion boards, chat facilities, wikis, blogs, and so on.

## **Methodology**

This study was conducted in the Faculty of Business, Dublin Institute of Technology. An evaluation of current literature was performed to identify key attributes to be explored; from these attributes statements were devised to seek student perspectives regarding the issues identified. A survey was compiled to ascertain students' perspectives on the use of technology in transforming learning.

The survey was designed with three sections:

- (i) 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).
- (ii) Very basic personal information was sought such as gender, level of study and current year of study.
- (iii) The third section provided students with the opportunity to share any other perspectives that they had on the questions 'Can the use of technologies transform learning?' and 'What use of technology has the most beneficial impact on student learning?'

A sample of full-time business students were approached in April 2009, and requested to complete a paper-based survey to establish their perspectives on 'Can the use of technologies transform learning?' The questionnaires were collected soon after distribution. A controlled group was not selected to avoid the opportunity of the students being biased by what they perceived expectations to be, which would inadvertently influence responses and skew statistical analysis derived from this data.

The students surveyed were advised in writing before completion of the survey that their perspectives were sought to enable the author to write a chapter for a book. Permission was sought and granted from the Dublin Institute of Technology's Research Ethics Committee (2009) to conduct this study in the Dublin Institute of Technology. The survey was reviewed by several academic colleagues and their comments taken on board before distribution to students for completion.

## **Results and Discussion**

From the initial survey completed by 164 students, 4 surveys were not included in the analysis because of missing data. 74 respondents were male, 66 were female and 20 chose not to identify their gender. Further research could be conducted to establish if there are dominant preferences for particular uses of technological tools attributed to gender. Statistics were compiled on students' perspectives regarding the use of technology in higher education from data collected and a comparison of the

findings of this study with the findings of other peer reviewed studies follows.

## **Student Perspectives**

Overall, students' perspectives on the use of technology in higher education are quite positive. However, their perspectives clearly show that they still appreciate the benefits of having face-to-face tutorials with lecturers and face-to-face interaction with peers.

In this study 91% of business students agreed that the use of technologies in higher education makes a positive difference to studying. Similar to this study, 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 are also positive with 79% responding that 'online learning made a positive difference to studying history' (p. 244).

Rogers (2004) found that 72% of students responded that online learning had developed their ability to work as a team members. In contrast to Rogers' (2004) findings this study found that 39% of business students agreed that online learning develops students' ability to work as team members, 39% were neutral in this instance and 21% disagreed. The high number of students that were neutral in this instance could be related to the fact that they lacked personal experience of working online in teams; this area possibly needs to be explored in more detail. However, 68% of business students agreed that technology facilitates a student-centred environment that was not possible before. It is important to remember that it is the design skills and implementation methods employed by lecturers that influence the online environment that students engage with and subsequently the learning outcomes achieved by students from using online learning environments.

Podcasts and video casts are used by teachers to provide alternative ways of delivering course material to the student population. This technology

can also be used to record student activity from which they can also 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, for instance 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). This example showed how students involved in a debating class were able to use technology 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. In this instance it has been shown that the use of technology can transform learning. 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 more importantly forced them to open their minds to the thoughts and opinions of others.

As part of this survey, business 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. Discussion boards provide students with the opportunity to review their own submissions and reflect upon their previous submissions and how their views might have changed as a result of alternative viewpoints presented by fellow students (peers). This study of business students found that 55% agreed that online discussion boards force students to open their minds to the thoughts and opinions of others, 30% had no opinion on this statement. The high number of students who contributed no opinion on this statement could be attributed to the fact that they had no personal experience of using discussion boards. In a previous study conducted on business students in the DIT, only 20% of students had used an e-learning platform to participate in discussion boards (O'Donnell, 2008).



## **The Learning Experience**

Churchill (2005), an Educational Developer in the United Kingdom, recommends 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 'The absolute minimum requirement to be able to continue on the course is logging on twice a week' (p. 50). Students should be given clear guidance on how the lecturer expects them to use technologies to enhance their 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.

In this research 68% of business students agreed that the quality of students' learning is enhanced by using technology to augment lectures: this would be in the form of blended learning. This level of agreement implies that students believe that online learning or distance learning on its own does not achieve the same level of student attainment as blending e-learning with traditional teaching methods. 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, also 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 19 students across the globe participating in an online course of study leading to M.Sc. 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.

This study found that 54% of business students agreed that podcasts and video casts of lectures would facilitate student learning more so than handouts. McKinney, Dyck, and Luber (2009) on examining student attitudes about using podcasts found that 'students believed that pod-casts helped them revise notes more effectively than textbooks' (p. 618). In this study 59% of business students agreed that using podcasts or video casts for revision purposes improves recall more so than revising course notes, 26% were neutral, 15% disagreed and one student commented that 'Yes, it makes things quicker, more entertaining and easier to revise'.

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 on, to augment course material (McLoughlin, 2000). Results from the student survey showed that 82% of students agreed that using technology in higher education effectively enhances the learning experience of students. O'Donnell (2008) came to the same conclusion in a study for a master's thesis; 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).

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. Donnelly 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.

In this study, 66% of business students disagreed that the use of technology in higher education will make lecturers disposable. Two thirds of students disagreeing 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. One of the 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 the question ‘Can the use of technology transform learning?’ Over 50% of the 32 students that completed this section 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. In addition to this argument, 58% of business students disagreed with the statement that the use of technology in education could successfully replace the learning achieved through interaction with lecturers.

The third section of the survey gave students the opportunity to share their opinions regarding

‘What use of technology has the most beneficial impact on student learning?’ Seventy-six of the students responded to this question, responses were analysed as per Table 1. Some students referred to more than one beneficial use of technology.

### Attendance at Lectures

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 (p.65). The overall findings of the research conducted in the Faculty of Business concur with the above opinions as 72% of the 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. This may be the case, but still 52% of business students agreed that having course notes available online makes them more likely to skip the occasional lecture. Yet again, 80% of students agreed that attending formal lectures facilitates a deeper understanding of course content than online access. One student

Table 1. Students’ Opinions on What Use of Technology Has the Most Beneficial Impact on Student Learning?

What use of technology has the most beneficial impact on student learning?	Number of students who mentioned this use
Online lecture notes/podcasts/video casts/e-learning	40
Ability to access a large selection of information	20
Access to academic journals/databases/books/library	13
Internet access	12
No time constraints, access anytime, day or night	5
Contact e-mail	3
Ubiquitous – accessible from anywhere in the world	2
Home office packages	2
Multiple choice testing	1

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commented that ‘Yes, I think technologies can transform learning but also that lectures and class interaction increase further learning’. So even though half of the student population that completed this survey 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 52% 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**

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 need to shift the level of control from that of the lecturer to that of the student to enable students to become self-regulated, reflective learners who have developed independent study habits (Jelfs & Colbourn, 2002). Light, Nesbitt, Light, and Burns (2000) recognise 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. 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, which can increase the hurt felt by the victim.

In this survey, 31% of business students agreed that computer-mediated communications achieve a more in-depth insight than classroom discussions, 33% were neutral, and 36% disagreed with the statement. The findings on this statement are inconclusive possibly due to students’ lack of experience using computer-mediated communication or students’ insufficient knowledge of what learning can be achieved through effective use of computer-mediated communication. 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. An interesting comment on this issue made by one student 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 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.

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 orientation and create a range of course activities that will encompass as many of the preferred learning orientations as possible. 'The Felder & Silverman theory categorizes an individual's preferred learning style by a sliding scale of four dimensions: sensing-intuitive, visual-verbal, active-reflective and sequential-global' (Park, 2005, p. 2). 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. This research found that 80% of business 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. 'These electronic opportunities theoretically allow students to organize their own learning to suit their lifestyle' (Light, Nesbitt, Light, & Burns, 2000, p. 85).

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 business students agreed that the use of technology in higher education increased their satisfaction with their course of study. Obviously other factors such as personal circumstances, change of course preference, and so on, will also influence student attrition rates and satisfaction with courses in all disciplines.

In this study 47% of students agreed that the use of video casts would be superior to podcasts

for enhancing students' understanding of course material. Video casts enable students to observe the body language of the lecturer which is an important factor of communication and, in addition, to see any supporting blackboard/whiteboard or PowerPoint (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**

Some 55% of students disagreed with the statement that they prefer accessing journal articles from hardcopies in the library to accessing journals online. 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. Memory keys or USB (Universal Serial Bus) keys are small portable electronic storage devices which are compatible with most desktops and laptops. 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.

Another 63% of 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. Hardbound encyclopaedias are no longer a first call of reference to seek information on any subject; the Internet offers an abundance of information on all topics. It is generally accepted in today's society that people expect immediate gratification. Students' satisfaction with their course of study is enhanced by the use of the Internet to aid them in understanding any new

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terms or concepts introduced with which they are unfamiliar. This speed of access to information was not previously achievable. 'Four out of five students believe that Internet use has had a positive impact on their academic experience, and three out of four say they use the Internet for research more than they do the library' (Hartman, Moskal, & Dziuban, 2005, p. 6.3).

A wiki is a web-based document which enables a group of users to add and edit content using only their web browser (Bayne, 2008). In this study 40% of business students agreed that using wiki interfaces increases the value of the students' learning experience, 42% were neutral and 18% disagreed with this statement. The fact that 42% of students were neutral in their opinions on the use of wiki interfaces increasing the value of students' learning experience could be through lack of experience of using wiki interfaces in the higher education learning environment. This could be an interesting area to explore in future research. The objective when getting students to work collaboratively online through the use of wikis using Web 2.0 is to ensure that the pedagogical requirements of the learning experience are met and that the students are involved in content generation and social networking. 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 undertaken.

Gilbert et al. (2007) conducted a student evaluation of an e-learning module on an M.Sc. in Information Technology and Management, 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. In this study 55% of business students disagreed that the use of technology in education could successfully replace the learning achieved through face-to-face interaction with fellow students (peers), 24% were neutral and 21% agreed with the statement. 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 emphasised the importance of students learning from each other in a collaborative learning environment.

## **Learning Outcomes and Skills Development**

Learning outcomes must be realised, 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, however, their measurements of improved student performance were less conclusive. Assessment of critical thinking is one of the most difficult to quantify as per the experience of Peach, Mukherjee, and Hornyak (2007). 'Increased scrutiny about student learning outcomes seems ubiquitous at a time when higher education and accreditation agencies are still grappling with identifying the best measures of these outcomes' (Sullivan & Thomas, 2007, pp. 321–322). 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. When the question regarding critical thinking skills was put to the student participants in the Faculty of Business 54% of them agreed that the use of technology in higher education improves students' critical thinking skills.

In this study 45% of business 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. This statement could well depend on the maturity of the students. Some students, for instance, 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. A comparison of undergraduate and postgraduate student perspectives on this topic would be an interesting study for future research.

‘In traditional lecture formats, students are note-takers, listeners, and observers’ (Trees & Jackson, 2007, p. 23). This research found that 49% of business 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). ‘Personally taking notes (as opposed to being given full notes of a lecture) was more important to higher educational outcomes. Higher scores were obtained by students that created their own notes’ (McKinney et al., 2009, p. 618). 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. Due to a basic fact of life that 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’s perspective was 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’. Here different viewpoints have come to light on note-taking; this could be attributed to the acknowledged existence of different learning preferences and styles.

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. The fact that 81% of business 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, in order to identify the students who are actively getting involved with the course material and fellow students, and those who are not. This research found that 50% of business students agreed that collaborative online research affords the lecturer the opportunity to identify the students that are making the most worthwhile contributions.

## **FUTURE RESEARCH DIRECTIONS**

One future research direction which is of particular interest to the author is the appropriateness of the employment of adaptive e-learning, to personalise the online learning experience of the individual student. This approach to online learning would facilitate students’ individual learning styles and preferences.

The findings of this research have identified several areas requiring further investigation, which may provide a more valuable insight, including:

- To establish whether or not beneficial learning can take place as a result of students

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- using computer-mediated communication.
- Can the use of wiki interfaces increase the value of students' learning?
- To conduct a comparison of undergraduate and postgraduate students' perspectives on whether studying class notes prior to a lecture facilitates deeper understanding.
- To establish if there are dominant preferences for particular uses of technological tools attributed to gender.

An interesting comment made by a student was 'It should be noted that even with the increase in technology within academic learning situations, both lectures and lecturers will never become redundant. As the degrees of computer literacy in Ireland to-date varies too much.' Not only is computer literacy an issue, broadband access and speeds can also have a big influence on students' ability to engage with technology. In addition, with the current economic climate, people are not investing in the latest computer technology, as in desktops and laptops, although iPod sales are performing better than expected. This trend could also impact on students' ability to effectively work with technology on an equal footing, as some students will have access to higher performance desktops and laptops than others. Another area that could be explored is whether the current economic climate will 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**

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.

There is no indication at all to suggest that students wish to see academic staff removed from their educational experience. Students realise the benefits to be achieved from face-to-face interaction with lecturers and peers. Even though students have identified some beneficial uses of technologies in their learning experience, the human aspect is missing, as one student commented 'Technology's 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 technology 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 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, however, to quote one student '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 comment nicely sums up the findings of this study.

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## KEY TERMS AND DEFINITIONS

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

**E-Teaching:** The skill of augmenting teaching practice using technological tools.

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**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.

**Podcasting:** Subject matter in audio format that can be downloaded to technological devices and played for the recipient to listen to at their leisure.

**Student Perspective:** The opinion, view, perception or regard, that student hold with respect to something.

**Technologies:** The use of any electronic device, for example, computer, laptop, iPod, mobile phone, for accessing information and for communication purposes.

**Video Casting:** Subject matter in multi-media format that can be downloaded to technological devices for viewing at a convenient time.