

# e-learning in Further Education: The Impact on Student Intermediate and End-point Outcomes

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## Glossary

Active Vote	Interactive whiteboard software that enables learners using key pads to participate in learning quizzes. Individual and group results are available.
CoVE	Centre of Vocational Excellence. Specialist areas of vocational provision characterised by close links between colleges, other providers, business partners, other employment interests and communities.
e-learning	The use of new technology for educational purposes related to teaching and learning. This includes the use of computers by students both within the class and for private study; the use of electronic devices for teaching purposes within the class, such as data projectors, interactive whiteboards (iWB) and tablet PCs; and the use of the internet, intranet or virtual learning environment (VLE) for communication between students, and students and tutors, and for storage and access to teaching and learning materials. This does not include computer use purely for administration or recording student attendance. When electronic individual learning plans (ILP) are shared with the students through the VLE this is part of e-learning.
ELU	e-learning use. Different new technology facilities can be used in different ways to support learning and teaching. Three main categories of e-learning use are being considered here: ELU A – e-learning as a medium eg internet, email ELU B – e-learning as a presentation tool e.g. use of PowerPoint ELU C – e-learning as a learning/problem solving tool (see table 2)
E2E	Entry to Employment Learning programme designed for young people with few or no prior qualifications who have been disengaged from learning.
FERL	An advice and guidance service supporting individuals and organisations in making effective use of ILT within the Post Compulsory Education sector.
HSC	Health and social care.
ICT skills	Information and communication skills. The technical ability to use common computer applications, such as word processors and spreadsheets, and to carry out internet searches and use email with attachments.
ILP	Individual student learning plans.

ILT	Information and learning technology. Particular new technology applications which are used in and around the classroom, relating specifically to learning objectives and intentions within subject learning (not including learning technical ICT skills). ILT is sometimes used interchangeably with e-learning.
ILT support staff	Staff appointed within colleges to assist tutors in their use of ILT or e-learning. Their roles vary, generally focusing on providing training in the use of particular items of equipment, such as the virtual learning environment (VLE) or interactive whiteboard (iWB). In some colleges they also assist tutors with their teaching and the preparation and development of ILT applications for use in the class. Most ILT support staff are not trained teachers.
Intranet	Networked facilities like the internet, but available only to registered users within an institution.
IT equipment	Computers, networks, servers, cabling etc, used within the college for teaching or administrative purposes
IT staff	Information technology staff. These are staff employed in colleges to develop and manage the IT infrastructure, including the main computer system and internet, intranet or VLE. They deal with the purchase of new IT equipment and upgrading of systems. They are technically trained, but generally have no background in education and do not work on ILT applications except to upload them onto the system or VLE.
iWB	Interactive whiteboard. An interactive display facility used with a computer and data projector for anything which can be shown on the computer, and for immediate drawing and writing on by hand. There are 3 or 4 main producers of iWB who have developed different, incompatible software for their products. Some are more limited and difficult to use, but the most advanced ones provide a wide range of very flexible resources for drawing and writing by hand, cutting and moving items on top of projected computer screens, and saving or recalling screens at any point.
NLN	National Learning Network. A national partnership programme designed to increase the uptake of Information Learning Technology (ILT) across the learning and skills sector.
SMS	Short message service.
VLE	Virtual learning environment.

# Executive Summary

## 1. Introduction

This study was carried out on behalf of the Department for Education and Skills (DfES) to look in depth at the way e-learning was being incorporated in colleges of Further Education, and the impact it was having on the intermediate and end-point student outcomes. The main research focus was detailed case studies conducted in six general FE colleges. The overarching aims were to:

- Identify those aspects and measures of e-learning input at the teaching and learning interface that have an important influence on the intermediate (e.g. on understanding of, and engagement with, the subject) and end point outcomes such as retention and formal attainment.
- Identify the main critical contextual factors within institutions which facilitate the effective use of e-learning.
- Determine how any positive impacts attributable to e-learning can be maximised within and across institutions.

## 2. Key Findings

### *Impact on intermediate outcomes*

- 'Effective' use of ILT (information and learning technology) had an important impact on students' intermediate outcomes, namely:-
  - acquisition of knowledge and skills and
  - development as autonomous learners.

Effects relating to *knowledge and skill* could be divided into: **engagement** factors, making students more receptive to learning; **cognitive** factors, making the learning materials more accessible and aiding understanding; and **performance** factors, producing better outputs and developing skills.

Effects relating to developing *maturity as autonomous learners* incorporated: the development of **self esteem**, particularly for students who have had little success in the past; **motivation to learn**; and **autonomy**, taking more responsibility for their own learning and learning how to learn.

### *Impact on end-point outcomes*

- The best practice examples of ILT use which had the strongest impact on intermediate outcomes, also showed higher than predicted attainment levels. However, this cannot be taken as evidence of a link between e-learning and end-point outcomes, because of the difficulty of disaggregating the overall impact of good teaching on retention and achievement from the impact of ILT use, and the presence of other confounding factors, particularly the wide range of other strategies deployed by the colleges to raise retention and achievement. Nevertheless, the link which we establish here between e-learning and intermediate learner outcomes, and the link between some of these outcomes and retention and attainment, which is referenced in the wider (non-e-learning related) educational literature, suggests a possible causal chain by which e-learning could, in theory, offer

some contribution to end-point outcomes, although it is not within the bounds of this study to be able to demonstrate such a link.

### ***Impact of different types of e-learning use***

- Different types of e-learning use (ELU) impacted on different intermediate outcomes, e.g. using the interactive whiteboard (iWB) with good use of the interactive features impacted on students' receptiveness to learning and cognition.

### ***Best practice***

- The practice which had the strongest impact on a range of intermediate outcomes incorporated the purposeful use of ILT to develop students' autonomy as learners, integrating many different types of ILT use to underpin the whole learning experience.

### ***Critical conditions for effective ILT use:-***

- The case studies highlighted four critical conditions:
  - ***Equipment:*** availability of adequate ILT equipment;
  - ***Tutors' intentions and teaching skills:*** deploying ILT purposefully within a teaching approach based on sound pedagogic understanding and practice;
  - ***Tutors' awareness:*** of how to use ILT to support learning and teaching in their subject and the range of resources that are available to support this;
  - ***Time allocated:*** to tutors for individually and collaboratively developing their ILT practices.

### ***Influence of contextual factors***

- The case study colleges were at different stages in implementing ILT. ILT use was most effective in colleges where the main focus of the ILT vision was on integrating ILT within learning and teaching. This in turn influenced priorities for the structural organisation of ILT, workforce development, equipment purchase, and expectations placed on tutors. Colleges at earlier stages of development tended to focus on the management of learning, which had less impact on student outcomes.

## **3. Methodology**

- Case studies were carried out in six general FE colleges. This involved information gathering from over 70 different staff, spanning senior leaders, middle managers, tutors, ILT support and technical staff. About 500 students also took part in either focus groups or surveys.
- A picture of contextual factors impinging on the use and impact of ILT at the teaching/learning interface was built from interviews at all levels in the college, and documentary evidence.
- Tutors in four subject areas were the focus for integrated data collection about their own

practice, their students' response to it, and the impact of contextual factors on their ILT use. This enabled links to be made between actual practice and student outcomes.

- The case studies were supplemented by a survey of 508 tutors from over 100 different colleges that attended National Learning Network (NLN) training events. This gathered national data on the use of ILT within a wide range of subject areas, with some indication of the types of uses which had positive impacts on student outcomes.

#### **4. Findings**

##### *e-learning at the teaching/learning interface*

While there was a clearly discernible impact of e-learning on intermediate student outcomes, evidence of impact on end-point outcomes was inconclusive.

##### *Impact of different e-learning uses*

- The use of e-learning as a presentation tool, particularly the use of the interactive whiteboard (iWB) had a strong impact on *engagement* factors.
- e-learning uses which facilitate *cognition* are:
  - interactive presentations
  - students' own individual or group presentations and
  - using learning tools provided through the virtual learning environment (VLE) or web sites and using revision sites
- *Performance* factors, such as the appearance of work, were mainly important only to students on lower level courses. These were impacted particularly by presentation technologies, word processing and the use of downloaded materials.
- Most ELUs can be used with the intention of raising *motivation*. Some tutors used ILT in order to introduce more variety into their sessions and students could also develop more *self-esteem* through producing quality outputs. However, while some students appreciated the use of ILT, it was such a common part of their educational experience it was taken for granted by the majority of students.
- The *autonomy* of learners was assisted by the use of a range of different e-learning uses: as a medium to retrieve and disseminate information and ideas (searching for and downloading internet materials, e-mailing, using discussion boards); using iWBs in class; and using subject specific software. As a result students developed persistence, self-esteem, the ability to make their own decisions on how to work, and learned how to collaborate. They were also beginning to recognise how they could learn best, and choosing realistic planning to get work done.

##### *Factors affecting take-up, use and impact of e-learning*

- The *availability of equipment* was the most immediate influence on the use of ILT at the teaching and learning interface.
- The intermediate student outcomes from the use of ILT depended crucially on the *tutors' intentions* in teaching with it, which in turn depended on their beliefs and understanding

of what was possible. Using e-learning with the intention of developing autonomy was particularly successful in improving learners' confidence, which in turn helped them to develop more successful learning strategies.

- Tutors' beliefs in the value of e-learning and the expectations they felt were placed on them were affected by the *leadership vision of the role of e-learning*.
- In the case study colleges use of ILT was only effective when deployed within a *sound pedagogic approach*, where the teaching style was highly interactive and student focused.
- Even when there was limited equipment available, specific e-learning uses (ELUs) aligned with specific pedagogic purposes led to positive outcomes, such as increased concentration, student confidence and cognition.
- The case studies showed that tutors in colleges often lacked skills to use ILT in their teaching. However, even those with little previous experience of using ILT were generally willing to try to incorporate it into their teaching, **if** they had *regular access to facilities* and were able *to see examples of how it could be used well*.
- Assessment methods were significant in determining the amount of e-learning use. Access to computers in class was rarely provided for courses where the dominant mode of assessment was hand written examinations, as in GCSE mathematics and AS and A2 science courses. Where assessment was through assignments and portfolios, which were generally prepared on computers, greater access was provided mainly for word processing. Only rarely in either mode of assessment were the more cognitive uses of computers being taken into account.

### ***The influence of contextual factors on e-learning use***

The take up and use of e-learning by tutors was influenced by a number of factors operating at an organisational level, which in turn affected the nature and degree of impact upon teaching and learning. All colleges were moving towards better integration of e-learning but the journey was an uneven one as different developments were phased in at different times. There was considerable inequity between departments in most colleges, in terms of the priority given to embedding ILT and the equipment available. Even the most advanced of the case study colleges have not yet achieved full integration.

- As colleges matured in the use of ILT there was a change in the emphasis of the vision. The least mature colleges focused on the management of learning, whereas those further along the continuum began to focus more strongly on the use of ILT within the classroom. Initially this took the form of promoting ILT for creating variety and interest in teaching to motivate the learners. In the most mature colleges the strongest emphasis was on embedding ILT within teaching and learning to improve students understanding and involvement in learning and in learning how to learn.
- The most effective ILT organisational structures: had a senior leader with oversight of all ILT developments and operations; drew together technical and ILT teaching and learning personnel; gave sufficient status to ILT managers; had a co-ordinated approach to ILT management across sites; and transparent processes for resource allocation. Department and course leaders who were unconvinced of the value of ILT sometimes acted as a block to ILT implementation.

- Workforce development was crucial in both increasing e-learning use and in enabling tutors to use ILT in ways that have positive impacts on student outcomes. Existing training focused on ICT skills and generic ILT uses. This had only limited impact. Tutors were willing and able to make effective use of ILT where they were provided with subject specific ILT training in addition to generic training, and they were given the time needed to work with their colleagues to source, develop and evaluate ILT resources and practices relevant to their subject.
- Innovative ILT practices, resources and leadership in the case study colleges were all supported by engaging with external contacts. Colleges with strong internal linkages at cross-college and team levels were best able to develop an effective e-learning culture.
- Most tutors shared and reused resources, particularly within teaching teams, and considered this an important reason for using ILT. There were a variety of mechanisms for sharing good ILT practices within colleges, but generally these were having limited impact outside individual subject teams. Even within teaching teams lack of staff time inhibited sharing of good practice. This was particularly acute for part time staff.
- Evaluation of ILT use and effectiveness was underdeveloped in all the case study colleges. More focused evaluations may have avoided practical and policy mistakes.

## **5. Conclusions and Recommendations**

e-learning has the potential to impact on students' learning outcomes - in particular the intermediate outcomes of the acquisition of skills and knowledge, and the development of learner autonomy. However, this impact is in many cases not fully realised as there are many factors relating to: organisational vision, structure and practices; tutors' access to appropriate equipment, training and subject ILT expertise and their pedagogical understanding, which must be in place for e-learning to be effective. In view of this we would make the following recommendations:-

- In making decisions on overall funding for FE, the total resource must be sufficient so that, if managed and deployed effectively at individual college level, it enables colleges to provide sufficient and appropriate ILT equipment, and resource the time required by tutors to develop ILT practices.
- Support is required for national and/or regional networks or schemes that can promote sharing of ideas and effective implementation of ILT within and between colleges.
- Colleges need to focus on supporting subject areas in realising the potential of ILT. To achieve this requires releasing time for subject teams to develop their practice in this area. This needs to be underpinned by subject-specific ILT training that focuses on how ILT can be used to enhance learning.
- Senior leaders need to give greater priority to embedding ILT within learning and teaching in their college's vision, strategies, organisational structure and operations.

## 1. Introduction

The effective development of e-learning is a key priority for all Further Education (FE) colleges. Significant investments in information and learning technology (ILT) infrastructure in colleges, supported by e-learning content development and national training initiatives, for example through the National Learning Network (NLN) and Further Education Resources for Learning (FERL) have opened up possibilities for transforming learning and teaching.

E-learning is central to education and training policy. The government's e-strategy 'Harnessing Technology: Transforming Learning and Children's Services' (DfES, 2005) sets out a bold vision for transforming the learning experience, to be backed up by a support and training package for practitioners and support for leaders in developing organisational ILT capability.

In recent years the FE sector has been the focus of a major government led drive to raise the quality and standards of learning and teaching. Effective implementation of e-learning within colleges has the potential to help meet a range of targets set within the Success for All Strategy, the agenda for transforming FE (DfES, 2005). Annual surveys of ILT implementation within the college sector since 1999 indicate significant progress (Becta, 2005), and there are many instances of individual colleges, and particular subjects or tutors, developing innovative approaches to ILT use. However, implementation in the college sector as a whole is still at a relatively early stage with much unevenness in development both between, and within, colleges. A study commissioned for the DfES in 2004 found that only 11% of schools and colleges had embedded ILT successfully within the curriculum (PriceWaterhouseCoopersLLP, 2004).

There is a growing body of studies that have sought to examine the impact of ILT both on achievement and intermediate learning outcomes such as motivation, learner engagement and the development of learner autonomy. Much of this work such as the Becta ImpaCT2 studies (Harrison et al., 2003) has focused on the schools sector, but undoubtedly has important messages for colleges. Cox et al.'s (2004) review of the literature on ICT and attainment found that specific uses of ILT had a positive impact on attainment in most National Curriculum subjects. Many of the studies that have focused on colleges show that leaders and teachers believe that there is a link between e-learning use and improved learning outcomes, however, since use of ILT is only one of many strategies deployed, they are usually unable to identify the extent of the improvement or the processes which link e-learning use to specific student outcomes.

To provide a more substantive evidence base to underpin the development of ILT within FE, the DfES commissioned a scoping study (Harris et al., 2004) to scope the available data in the research area and to advise on research approaches that could be taken to extend the evidence base. This study was then commissioned with the overall aim of identifying and clarifying the nature of the links between teachers' and students' use of e-learning in FE and intermediate and end-point learning outcomes, and identifying the organisational and pedagogical factors that act as enablers or barriers to these links. The specific objectives of the study in relation to FE were to:

1. Identify end-point learner outcomes upon which e-learning has a significant influence, such as retention and attainment.
2. Identify intermediate learning outcomes such as enthusiasm, ability to work together, on-task performance, improved attendance and mechanisms through which the use of

e-learning may have an impact on these outcomes e.g. improvements in motivation, access to learning and content, pedagogical changes, changes in the learning environment, and describing their relationships both to the outcomes and to one another.

3. Identify those aspects and measures of e-learning input at the teaching and learning interface, course, and institutional level that have an important influence on the intermediate and end point outcomes.
4. Identify the main critical contextual factors that are necessary and sufficient for the use of e-learning to influence the identified end-point and intermediate outcomes in FE, and the level at which these factors operate (e.g. individual, course, institution).
5. Provide examples of e-learning practice in FE that enhance learning outcomes.
6. Determine how any positive impacts attributable to e-learning can be maximised, through identifying the transferable features of good practice and appropriate mechanisms for achieving their effective dissemination and take-up across FE.
7. Identify possible metrics and/or approaches to measurement of the ILT inputs and outcomes.

The study comprised in-depth multiple case studies conducted in 6 FE colleges with data being gathered from leaders, managers, tutors, students, observations of practice and college documents. The study was organised around examining the impact of different types of e-learning uses. This approach was taken since previous studies, for example Passey et al.'s (2004) work on motivation and ICT, have highlighted that different types of e-learning approaches lead to different intermediate and end-point outcomes. Four subject areas selected for the study were science, mathematics, health and social care (HSC) and vocational courses that attracted learners with few prior qualifications.

This report sets out the findings of the study in relation to the development of ILT in the case study colleges, the impact of contextual factors on ILT use, the use and impact of ILT at the teaching and learning interface, and examples of good practice. Critical conditions for effective ILT use, and the enablers and barriers that influence effective ILT use are then presented, and recommendation made for government and its partner organisations and for college leaders.

## 2. Methodology

The agreed framework for the study was to carry out case studies in six colleges, looking at the same four subjects in each, to determine the ways that e-learning was being employed and the impact it was having on students' outcomes. For this it was agreed that measures would be taken at three different levels within each institution to determine the contextual factors which impinge on the e-learning taking place. These three levels relate to the:

- college organisation and senior leadership,
- the middle management and ILT deployment and support, and
- the teaching and learning interface in each of the four subject areas included in the study.

The outcomes to be considered were the end-point retention and attainment rates for each of the courses, and possible intermediate outcomes relating to changes in students' behaviour and development, such as improved concentration and motivation, enhanced employability skills and confidence as learners.

### Conceptual model

#### *Overarching design*

The conceptual model underpinning the case study design sees the teaching and learning interface as the kernel within a number of concentric shells relating to the subject area, the department, the site, the college, and the local and national educational context. The department, site and college are being taken together as constituting the working context in which the teaching and learning is taking place.

#### *Contextual measures*

Since the principal purpose of the study was to look at the impact of e-learning, the technical aspect of equipment provision, deployment and support have to be taken into account, as do the leadership, staffing structures and decision making with respect to e-learning matters. For this we have adopted the notion of *Maturity of e-Learning Development* from Underwood and Dillon (2004), as developed for the Test Beds Project (Becta, 2006). The integration of e-learning into an institution is of necessity a gradual process of seemingly continual change, since investments have to be made in equipment, technical support, workforce training and development, each timed to make best use of the facilities and fit in with the yearly teaching cycle. Underwood and Dillon (2004) considered ways of comparing how far along the journey to full integration an institution is, by looking at several different aspects of this development. We have taken three of these aspects as most relevant to inform the contextual aspects in the design of this study:-

- leadership maturity
- technical maturity
- workforce maturity

These seek to provide the information as shown in Table 1 overleaf.

**Table 1 : Essential ILT maturity information**

Leadership maturity	What objectives and expectations do the leadership have of the use of e-learning by the tutors? And what measures are they taking to support this?
Technical maturity	What technical facilities and support are available to the tutors for preparation and teaching, and to the students for personal study?
Workforce maturity	What level of e-learning expertise are the tutors bringing with them? And what provisions and opportunities are in place for these to be upgraded?

Other contextual factors we have considered relate to the physical and personnel structure and organisation of the institution, and the communication and linkages between faculties, levels and functions. See Figure 1 overleaf.

**Figure 1 - Contextual factors that impinge on the learning and teaching interface**

Contextual factors	College level issues	Faculty/dept. level issues	Inputs into the Teaching / Learning Interface	
<p><b><i>STRUCTURE AND ORGANISATION</i></b>            Variation:            whole college - to - faculty autonomy approach</p> <p><b><i>COMMUNICATION AND LINKAGE</i></b>            between faculties, levels and functions</p> <p><b><i>MATURITY OF ILT DEVELOPMENT</i></b>            Leadership maturity            Technical maturity            Workforce maturity</p>	<p>power of ILT manager</p> <p>equity across faculties</p> <p>spread of ILT ideas</p> <p>priority and support given to ILT</p>	<p>expectations on tutors to use ILT</p> <p>support for tutors to develop ILT use within subject area</p> <p>availability of ILT for teaching</p> <p>and for student use</p>	<p>tutors' readiness to teach with ILT</p> <p>regular access to IT as a teaching and learning tool</p>	<p>student expectations for ILT use</p> <p>student ILT use for personal study</p>

### *Model of e-learning input*

When considering the actual use of e-learning within a course of study, there are a number of qualitatively different uses for different purposes which may each individually contribute to enhancing the learning experience, and lead to desirable student outcomes. These fall into three main groups of e-learning uses (ELU):

- A. ***e-learning as a Medium*** for facilitating and managing learning. This includes using a virtual learning environment (VLE), such as Blackboard, Moodle or WebCT, or an intranet to access learning materials including video and on-line assessment, submitting assignments electronically, and using email to send feedback and support. This use also includes two-way communication for learning purposes, for example emailing experts and using video links. The learning that this affords depends entirely on the content. The e-learning provides only a conduit for the materials and requires downloading and uploading skills, and general handling of the hardware. It does not contribute directly to the learning any more than a postman, television set, or telephone receiver. It does however have a profound effect on the access to materials and management of learning by both teachers and learners.
  
- B. ***e-learning as a Presentation Tool*** This is used primarily for teaching in face to face sessions, and includes teacher preparation of materials e.g. PowerPoint presentations, worksheets; and presentations on interactive whiteboards. It also includes student use of word processors, desk top publishers, and graph drawing tools for assignments, and student presentations to peers and tutors. This demands technical capabilities of the users, which vary with the software used. A wide range of learning opportunities can be afforded, depending on the pedagogic skills of the teacher which will determine the interactive nature of the presentation and the degree to which the learners are empowered.
  
- C. ***e-learning as a Problem Solving/Learning Tool*** The focus here is the use of technology by the students in supervised or unsupervised sessions, with interactive use of interactive whiteboards (iWBs) or distributed computers using software for: engaging with information (internet and data bases); calculations and predictions (spreadsheets); on-line data collection, design and control (CAD; CAM); and modelling (spreadsheets, data bases and programming) etc.. Much of this ELU may involve small group work as well as individual learning.

These different e-learning uses are not about equipment, but more about the purpose for which new technology is being employed. In addition to these three categories, we have also considered the level of interaction or student control within each use. This is the i factor. A low i factor activity using e-learning as a presentation tool (B1) could be exemplified by a simple PowerPoint lecture, whereas a group of students giving a group presentation on work they have done, would be a high i factor use (B3). Examples of different activities which could fall into each e-learning use (ELU) category are given in the table below.

**Table 2 ELU grid: Examples of e-learning uses at different levels of interaction or student control**

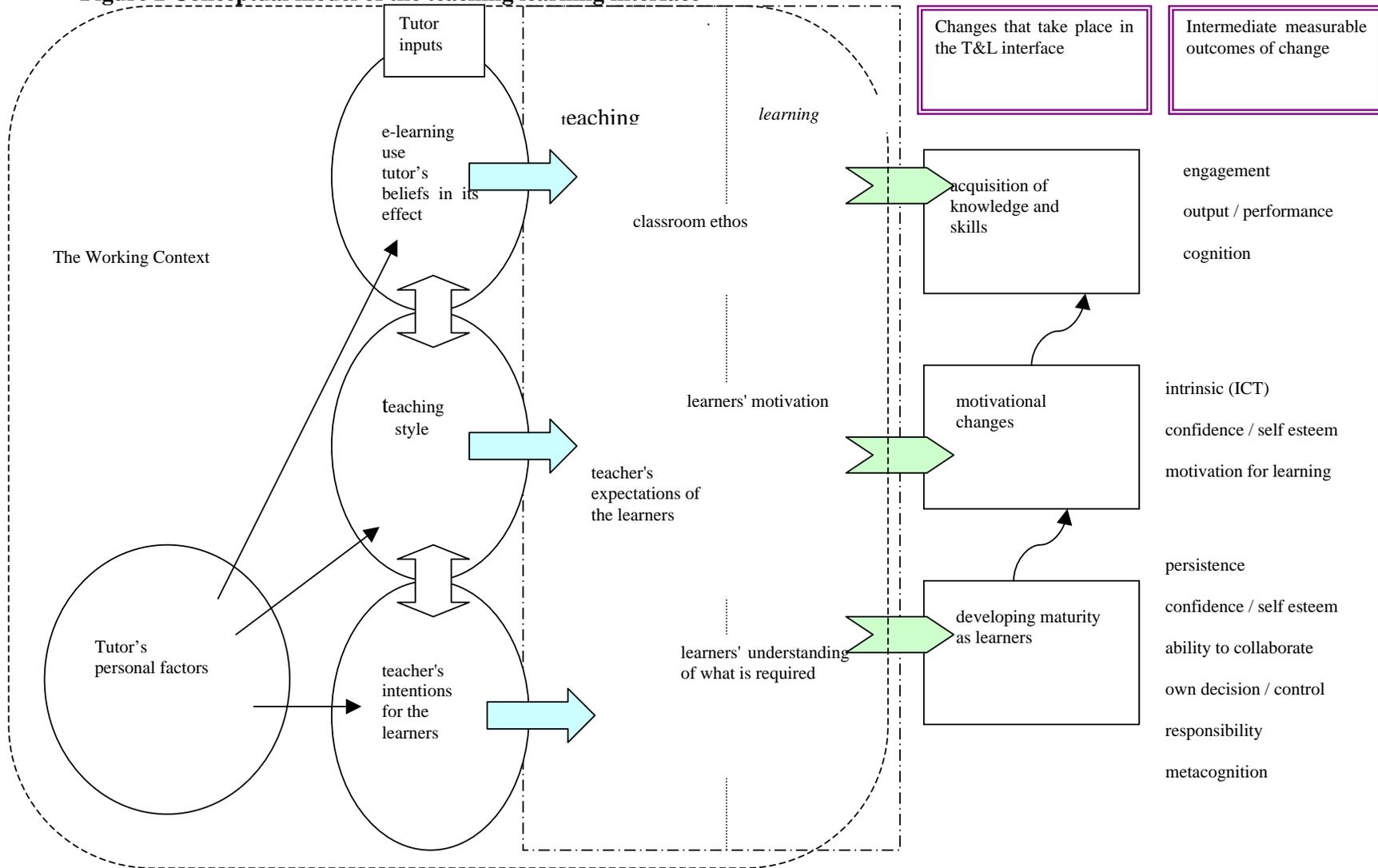
<b>ELU</b>	<b>1. low i factor</b>	<b>2. mid i factor</b>	<b>3. high i factor</b>
A e-learning as a medium	downloading teaching material from a VLE; printing out text and pictures from the internet (given the site or key words)	contacting tutor with individual query; reading discussion board; making own search of internet for a purpose	participation in active group discussion on-line;  creating own web page for a purpose
B e-learning as presentation	tutor uninterrupted presentation of information; student preparation of word processed assignment	tutor presentation with student questioning; student preparation of presentation for peers	tutor presentation with student control, anticipation and explanation; student group presentation for staff and peers
C e-learning as a problem solving / learning tool	completing exercise using a pre-prepared spreadsheet; learning how to use other tool software(CAD/CAM etc)	extending a given spreadsheet to solve new problems playing creatively with software	creating own spreadsheet to solve problems using software purposefully within a particular task / social context

A modification of this model was used throughout the data collection to identify and classify the type of e-learning activity which was going on. In reality these three different uses can overlap and co-exist within many learning environments, but only through the conscious knowing design of the tutor developing that environment. The contextual factors, the technology and support also have to be in place.

*Conceptual model of the teaching learning interface*

Figure 2 shows a conceptual model of the inputs and outcomes of ILT use at the teaching and learning interface. This has been developed from a theoretical stance based on the literature, and refined through an iterative process of developing and testing out mini-hypotheses from interviews and observations as the data collection has continued.

**Figure 2 Conceptual model of the teaching learning interface**



In this model the ELUs and the teacher's beliefs in their effects, the teaching style and the teacher's intentions for the particular learner group, are all embedded in the working context and form the principal teacher input to the teaching learning interface. The learners bring to the interface their own motivations and purposes for being there, and their understanding of what is required and what is expected of them, by the college and by this particular teacher.

The impact of all three categories of e-learning use (see above) both in the classroom and facilitation of out-of-class learning, is mediated through the culture and expectations of the learners and of the learning institution.

The outcomes from the teaching/learning interface are envisaged at three levels. There is the acquisition of knowledge and skills, which is directly related to the students' attainment and output performance. Then at the next level are the motivational changes, which may directly relate to retention of the students, and create favourable conditions for the acquisition of knowledge and skills. At the deepest level there is the developing maturity of the students as learners, characterised by developing confidence, being able to take their own decisions and taking on more responsibility for their own learning.

The three tutor inputs to the teaching and learning interface, their beliefs, teaching style and intentions, can not be easily separated out and separately attributed to particular outcomes. This is because the ELUs cannot operate without the teacher as orchestrator of the way they are used, at least in setting the tasks and expectations, and often taking a far more active role than that. However the ELU *with* a particular teaching style may relate to outcomes not otherwise achieved. Similarly, taking the negative perspective, the maturity of the learners is unlikely to develop unless this is one aspect of the teacher's intentions, but the intentions alone will not bring it about.

The three direct inputs contribute to the general classroom ethos, which is shared with the learners, and the tutor's expectations of the learners. This expectation is communicated to the learners, but not necessarily understood perfectly by them. The learners also bring their own motivations into the teaching and learning interface, and these blend with their understanding of what is required of them within the classroom ethos.

The tutor's choice of ELU for the session will be heavily dependent on their working context, but also related to their preferred teaching style, and the beliefs that underpin their daily work. The intentions of the tutors with respect to their choice of IT use may be constrained by their beliefs in the efficacy of ILT for transforming the learning experience. They are also determined by what they believe to be the main priorities in teaching these students. In particular the tutor's use of ILT to promote the development of independent autonomous learners will only occur if they believe that that is one of their main priorities, and that ILT can help them to accomplish this aim.

Research over a number of years (Twining, 2004) has shown that teachers have a wide range of reasons for including ILT within their teaching, and a similar spread of beliefs in the value of it, and the reasons why it is expected of them. It is therefore necessary to assess these understandings and beliefs, and their intentions for their students, in interpreting their choice of e-learning approaches in the classroom.

## Design of Data Collection

Data was gathered on two visits each lasting several days to each institution. The purpose of the first visit was to collect data on the development of ILT across the whole college, through interviews with senior managers and IT personnel, and to conduct initial interviews with course leaders and tutors in the four subject areas. Documentary evidence was also collected at this time. The second visit was carried out several months later and focused on the teaching and learning interface, drawing detailed evidence from two tutors from each subject area and for each tutor one group of students that they taught. Prior to the second visit tutors were asked to keep a brief diary of ILT use with their selected student group and record any observations on impact. The second visit included classroom observations, and student focus groups as well as in-depth discussions with the tutors about their use of ILT within the observed session and over the preceding few weeks. Student questionnaires were also given out to the selected student groups during this second visit. This approach enabled triangulation of data between the tutors and their students and within their departments.

The data collection instruments included:

- interview schedule for senior managers
- interview schedule for ILT personnel
- interview schedule for course leaders
- first interview schedule for course tutors
- reasons for using ILT questionnaire to be used during interviews with tutors, course leaders and ILT personnel ("reasons" questionnaire)
- tutor e-learning use and impact diary record
- second interview schedule for tutors
- classroom observation proforma
- student focus group outline
- student experience questionnaire

Details of the documentary evidence collected are outlined in appendix 1.

Interview scripts for the first visit were designed in considerable detail to ensure that comparisons could be made across institutions and subject areas, consistent with the conceptual model for contextual factors (Figure 1). Questions relating directly to the maturity model elements, structure and organisation of the college, and communications and linkages were included, as appropriate in all the interview schedules. Similar questions were addressed to staff at different levels to provide triangulation, and to probe the linkage and common understanding of the vision and strategy of e-learning across the college.

The data collection instruments used on the second visit were designed to capture data in line with the conceptual model of the teaching and learning interface (Figure 2). Data relating to the teaching and learning interface was also gathered from the first interviews with tutors. Tutors reasons for using ILT were collected by asking tutors to talk through a "reasons" questionnaire. This questionnaire was also used in interviews with course leaders and ILT personnel.

Table 3 overleaf shows the different data collection instruments that were used to gain information on the specific inputs and outputs at the teaching and learning interface.

**Table 3: Case Study Measurements of Inputs and Outputs at the Teaching and Learning Interface**

<b>Measurement of Inputs</b>	
<b>input</b>	<b>instruments</b>
Amount of use of ILT as media (A); presentation (B) and learning tools (C)	tutor interviews tutor diaries observation of teaching sessions student focus groups student survey
Tutor's belief in the efficacy of ILT to improve different learning outcomes	"reasons" questionnaire and interview, interpreted against the actual ILT use and subject area
Teaching style	classroom observation tutor interviews
Tutor's intentions for the learners	tutor interviews (with "reasons questionnaire") tutor diaries
Personal factors affecting teaching / use of ELUs	tutor interviews
Immediate contextual factors impinging on teaching with ELUs	tutor interviews ILT manager and senior leader interviews student focus groups observation of teaching spaces

<b>Measurement of Outputs</b>	
<b>outcome</b>	<b>instrument</b>
Student acquisition of knowledge and skills	student survey student focus groups observation of teaching session attainment records (tutor interviews)
Students' motivational change	student survey and focus group observation of teaching session (tutor interviews) retention records
Developing maturity of learners	student survey student focus group (tutor interviews) observations of teaching session

## **Selection of Cases**

To allow for meaningful comparison the six colleges selected for the study were all general FE colleges. Only colleges that had gained at least satisfactory Ofsted gradings for leadership and management, and for the subject areas examined, were included in the study. Information on suitable colleges was gathered from Ofsted reports and from key experts in the field of e-learning in the post compulsory sector.

The sample comprised a mixture of colleges which had particularly high ILT use which had been recommended by e-learning experts and an opportunistic sample of colleges with ILT use more typical of average use in the FE sector as a whole. For the purposes of this study this enabled gathering of exemplars of good practice and exploration of the journeys colleges travel along in implementing ILT.

The four subject areas selected for the study were: health and social care; science; maths and vocational courses, including Entry to Employment (E2E) provision. Health and social care, science, maths and E2E provision were all priority subjects within the first two years of Success for All (DfES, 2005), the change programme designed to transform quality and responsiveness across the learning and skills sector. Specific courses within each subject area were chosen to maximise comparability across colleges. Choice of the courses was made to ensure that the range examined spanned different levels and qualification types, different learner profiles, and offered opportunities for significant and varied e-learning use. Courses selected were the National Diploma in Health and Social Care (level 3); science A levels (level 3); GCSE maths (level 2) and level 2 vocational courses, including E2E provision, that attracted 16-19 year olds with few prior qualifications.

## **Analytical approach**

### *Overall Approach*

Data on contextual factors for each college was collated by triangulating evidence from documentary evidence and interviews with senior staff, ILT personnel, course leaders and module tutors. Data on the teaching and learning interface was organised into summaries for each tutor by triangulating data from tutor interviews conducted on the first and second visits, the tutor's diary, the observations of the class conducted by the researchers, the student focus group and student questionnaires.

From these two data sources a series of comparative analyses were made to identify patterns and trends in ILT use and impact, and to seek explanations for similarities and differences observed. At the first stage of analysis this included comparing occurrences of the same subject within a college; comparing different subjects within one college; the same subject across colleges; and key organisational features across the colleges. Hypotheses about the links between e-learning use, processes and intermediate and end-points outputs, and how these are influenced at an organisational level and at the teaching and learning interface, emanating from the series of comparative analyses conducted at

the first stage of analysis were then checked across the whole data set.

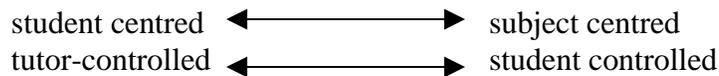
NVivo and Excel were used to analyse case study data.

### *Analysis of tutor inputs*

The conceptual model (Figure 2) shows three tutor related inputs to the learning and teaching interface:

- tutor's beliefs in the effects of different types of e-learning
- teaching style
- tutor's intentions for the learners

The classroom observations were an important source of data on tutor's intentions and teaching style. The teaching style and general pedagogy were analysed on the two dimensions of:



Our judgments on the quality of teaching were based on the key principles implicit within the national standards for teaching and supporting learning in further education (FENTO, 1999) and the common inspection framework (Ofsted, 2005).

Tutors' beliefs in the effects of different types of e-learning were gathered from both interviews. The first tutor interview included a discussion of the most important reasons why the tutor was using e-learning with this particular group, based on a list of possible reasons. The reasons were set out randomly as statements in a questionnaire. The user was asked to tick one of four columns to say if, for them teaching this group, this reason was:

- very important
- quite important
- not important
- not true.

For the purposes of the analysis the reasons have been categorised into 5 different group related to the conceptual model with 5 or 6 statements in each group. The 5 categories are:

Using e-learning:

- makes students more receptive to learning (engagement)
- improves students' outputs or performance (output)
- improves students' learning (cognition)
- enables students to take more responsibility for their own learning (autonomy)
- contributes to the management of learning by both tutors and students

This categorisation is an ad-hoc device based on face validity to make the data more manageable, and to enable comparisons to be made between tutors in different subjects and different colleges. In developing the tutor summaries we have used the reasons that the tutors thought were very important, together with the discussion of their purposes from the two interviews and diary, to characterise their intentions in using e-learning.

### *Students' questionnaire*

The students' questionnaire was designed to give information on the frequency of use of different e-learning uses (ELUs), and the impact this had on the students' learning, using agree / disagree scales. For the purposes of comparison between groups the responses of any one group have been averaged and normalised so that a statement with which all the students strongly agreed would get a score of 100, and if they all agreed would get 50. A score of 0 would indicate equal numbers agreeing and disagreeing with the statement, and strong disagreement would give negative scores.

### **Additional data collection**

As an adjunct to the case studies, involving only 6 institutions, opportunistic national data was collected from participants on NLN training sessions held within colleges throughout the country, during the last 6 weeks of the national NLN mentorship training programme. This data collection was enabled by the helpful co-operation of the NLN Mentorship Team. The research team devised a one-page questionnaire to be included in the standard NLN evaluation form for these sessions, asking about the frequency of use of different e-learning approaches, and what e-learning uses the participants thought worked really well. (see appendix 4).

This data was collected from participants in over 100 different colleges and in a wide range of subject areas, including the four areas of investigation in the case studies. It was analysed by the research team using Excel, SPSS and NVivo.

### **Actual data collected**

#### *Case Study Data*

Prior to the first phase of data collection the main interview schedules were piloted with senior managers and tutors in three different colleges, not included in the subsequent study.

Six colleges took part in the case studies. In all, interviews were carried out with a total of:

- 14 senior and middle managers
- 14 ILT 'champions' and support personnel
- 50 tutors.

In addition:

- 28 classes were observed,
- 30 groups of students took part in discussions and
- 32 student groups completed the student experience questionnaires.

In total over 500 students completed the questionnaire or took part in focus groups.

*Additional data*

Returns were received from 508 participants at NLN training sessions in over 100 different colleges. These gave information on 640 different course groups, as each participant was asked to comment about one or two different courses on which they taught. The courses were categorised into 12 different areas including the 4 subject areas of our inquiry: HSC, vocational, maths (including numeracy and A levels); and Science A level.

### **3. ILT organisation and capacity in the case study colleges**

#### **Implementation of ILT: the organisational journey**

The development of e-learning within colleges as they move towards full integration is very much a dynamic process. Colleges in the study varied in how far they had travelled, but none had reached the stage of full integration. Within each college there was a pattern of high use in some subjects, or on particular sites, or by individual tutors, and lower use by other tutors, or within other subjects or sites. Only in rare and isolated instances was the full potential of ILT harnessed to support learning and teaching. However, it was evident that some colleges had moved some way towards greater integration of ILT in the time between the two visits undertaken in this study. The changes were most evident in the provision of teaching equipment (in one case with the provision of new rooms), but there were also some small changes in approaches to managing ILT. In two colleges seen in two different academic years, many more data projectors or interactive whiteboards (iWBs) were available for teaching by the second visit. However, at the same time, on some of the courses the student intake had more than doubled. This latter occurrence was not a planned development, and on more than one course challenged the incidental use of laptops which had been a feature of the teaching with the smaller groups.

The data presented here then can only be a snapshot of the colleges at the time of the study, recognizing that they are on a journey as learning institutions. They develop and change as their capacity to harness the potential of new technologies builds and in response to external demands and pressures.

#### **Availability of ILT facilities in the case study colleges**

Each college had its own unique combination of ILT facilities, for example in one college the use of the VLE was particularly well developed, but iWBs rarely used. In another most classes had access to iWBs and bookable areas for hands on computer use during class sessions, but less well developed use of the VLE.

Three of the colleges were relatively well equipped with iWBs. One of the other colleges had data projectors and was gradually getting more iWBs whereas the other two colleges had few of either. One of the latter was trying to fill the gaps in facilities for teaching by getting data projectors as a cheaper alternative. These were only just available at the time of the second visit in some of the subject areas, and tutors were very new to using them. In two of the three colleges with relatively good facilities there were iWBs available for at least half the teaching rooms. In these colleges they were being used across all subject areas. In the third college with relatively good facilities, the iWBs were all high quality mobile units available for use in a wide range of teaching areas, but requiring to be set up before each session. They remained largely unused in any area.

Five of the six colleges had VLEs up and running. The sixth college was developing an in-house portal which it was gradually rolling out throughout the college. This was being

used by one of the vocational tutors, to make materials available to their students. In this college tutors in other subject areas in our sample were based on different sites, and did not yet have access to the portal. Three of the colleges were firmly supporting the use of the VLE. In one case preparation for inspection had led to a college-wide drive to ensure that all session learning plans and linked resources were in place, and in another case performance related pay was used to stimulate VLE use. Several colleges also put up individual student learning plans, to be shared with the students, and with other tutors.

In subject areas which had established the use of computers in classes, such as media studies, teaching sessions were either routinely timetabled into rooms with fixed computer facilities or tutors were easily able to book computer rooms or open access areas that were allocated for their department's use. In areas where the use of computers for teaching sessions was less well established tutors often found it very difficult to book a computer room for teaching. Most colleges were moving away from the use of computer labs, to establish either multi-purpose teaching areas equipped with fixed computers, flexible open computer areas, or providing small sets of laptops within each teaching room. In one college the area which included the teaching of maths and science had had the computer rooms removed, but as yet without any replacement laptops.

In all colleges computers were available to students in open access rooms or learning centres, and in most cases these were of a high specification. Students were generally able to access these computers to use out of class time, although in some colleges a 10-15 minute wait was necessary at busy times. Some students preferred to use their own computer at home rather than use college computers.

### **Individual college profiles: ILT organisation and capacity**

#### ***College A***

College A was a large multi-site college. One of the vice-principals held the brief for ILT development, and both the network manager and the director with a brief for ILT reported directly to them. This meant that ILT development was well represented in the senior leadership team and has enabled a co-ordinated approach to the embedding of ILT within learning and teaching across college sites. iWBs were available in 50% of teaching rooms across all subject departments, and open access computers for student use were organised in subject areas supported by ILT support staff. These support staff also supported teaching sessions with ILT and assisted in resource development. There have been problems in using the VLE so it was not much in use at the time of the visits. There were plans in progress to modify the VLE. Some staff were making extensive use of the internet and intranet for teaching purposes.

#### ***College B***

This was a large college housed mainly on a single site. ILT development and development of the IT infrastructure were the responsibility of one Director on the senior leadership team. The team reporting to this director were primarily charged with

ensuring that the IT infrastructure met the needs of teaching staff, and the development of ILT use within learning and teaching was mainly seen to be the responsibility of teaching teams. Providing high specification computer equipment has been a priority, although the emphasis was changing towards a greater focus on the impact of ILT use on student outcomes. Overall the college was well equipped with computer areas for use in teaching and for use by students outside class time. However, department heads had considerable control over ILT deployment, and there were wide differences in computer availability between departments, with some subject areas having very low regular access. All full time staff were provided with wireless networked laptops, and part-time staff could book out wireless laptops or use the fixed computers in staff work areas. The VLE has been designed in house, was very easy to use and had just become accessible from outside the college network. Staff were expected to put their learning session plans, learning materials and links to other e-resources on the VLE. There was little use of iWBs or data projectors. Both were only available as mobile devices. Technical difficulties in setting up mobile iWBs were in the process of being resolved.

### *College C*

This was a large multi-site city college. Because of historical differences and building security problems, there was considerable inequity in the ILT provision across sites with a severe lack of ILT teaching resources on some sites, and in some subject areas. Other sites were better equipped with iWBs and laptops available. The control of IT equipment and room booking was managed by different individuals on each site. Decisions were also taken for the deployment of resources across each site by the site manager. Across the college IT and ILT have been under the same technical leadership. There was no single person who held a strategic overview of ILT across the college. Students on some sites could get good access to computers, and overall numbers of computers for students was approaching the national benchmark ratio. However the lack of facilities for teaching with, and for staff use was a concern for the last Ofsted visit. A new internet portal was being developed in house as the VLE for the college. It was in the early test phase at the time of the last visit.

### *College D*

This was a medium sized college with several large buildings on one main site. The director with responsibility for ILT was at the third level of the institution, and was supported by a small technical team who gave staff development sessions. Area directors controlled rooms and deployment of ILT within areas. Different subject departments were very differently equipped for teaching with new technology, depending on historical circumstances. There was some attempt by the ILT team to ensure that no areas were completely missing out, and to facilitate the spread of good ILT use. Overall they were above the national benchmark ratio for computers. The VLE was chosen by interested tutors from across the college, and its introduction in the last year was supported by staff training, to enable all staff to put their teaching materials up on it. This was expected of all tutors, and supported by performance related pay.

### ***College E***

This was a very large multi-site college which at the time of the last visit was undergoing a major organisational restructuring. The overall responsibility for the College's IT infrastructure and learning technology fell mainly on a middle manager working with a predominantly technical support team reporting to the Deputy Principal. Computers for students use were located in the main resources centre and subject resource centres. Students could also access unused computers in some teaching rooms. The college was slightly under the national benchmark ratio for computers. Fixed iWBs were spread across the college. In some locations the IT infrastructure was constrained by the physical building structure and there was some uneven distribution of equipment due to historical factors. The college had a VLE and a staff and student intranet. The VLE in place at the first visit was not well used as tutors were unable to post materials directly and there had been system reliability problems. A new VLE was being introduced by the time of the second visit to the college.

### ***College F***

This was a small college with two main sites some distance apart, in a fairly under-privileged area. One of the two vice principals had overall responsibility for the college IT infrastructure and ILT development. Beneath this vice principal decision making at a practical level was shared between the Head of IT and the Head of the Learning Resources Centre (LRC), neither of them having any significant curriculum experience. Two of the junior support personnel in the learning resources centre had a particular brief for ILT and, together with the head of the LRC, were responsible for giving ICT training courses to the curriculum staff. The college was below the national bench mark for computers but was working towards improving this. It had a new learning centre on one of the sites which could be used for both open access use and for tutors to bring their student groups. It was also installing 7 new iWBs in teaching rooms in the same building. The VLE was installed 3 years ago, and its use supported by the staff training, but it has been increasingly temperamental in action. It may be changed in the future.

## 4. The impact of contextual factors on ILT use

The conceptual model of contextual factors that impinge on the learning and teaching interface (Figure 1) indicates that ILT use is likely to be affected by:

- the maturity of ILT development in the college which encompasses leadership maturity, technical maturity and workforce maturity;
- the structure and organisation of ILT within the college and
- the communications and linkages across the college and within work areas.

The findings on the impact of each of these contextual factors on the use of ILT in the case study colleges are presented in this chapter. The chapter concludes by summarising the colleges overall approaches to raising retention and achievement, and the role ILT plays in their retention and achievement strategies.

### Maturity of ILT development

#### *Leadership maturity*

##### *The ILT Vision*

In the case study colleges three different vision strands were in evidence. Some colleges focused on one or two of these, whilst the more mature ones took all three into account. These strands are:

- **ILT for the management of learning** - enabling flexible learning, supported through access to materials and electronic support.
- **ILT in teaching to provide variety and interest** - improving student motivation and attendance.
- **ILT within learning and teaching** - improving student understanding and involvement in learning, and learning how to learn.

A progression in maturity was generally evident starting with a focus on the management of learning, moving to greater emphasis on variety and interest and then to a predominant concern with ILT within learning and teaching. Colleges with greater ILT maturity have moved away from stipulating specific uses of ILT, or targets for creating particular resources, to focus on the development of ILT appropriate to the learning being supported. In less mature ILT contexts the focus tended to be on weaker uses of ILT. For example, it was considered important to put materials on the VLE, but there was little concern for whether or how they were used, or their quality. Similarly ILT was seen as a way of providing variety in teaching, when attention to pedagogy may have been a more powerful strategy. The college priorities for VLE and internet use in less mature ILT contexts, which are dominated by management of learning rather than enhancement of learning, acted as a turn off for tutors in curriculum areas where this was not a particularly useful model, for example in maths and science.

### *Leadership Priorities for ILT*

The priorities for the support of ILT within a college followed from the type of vision which was predominant at its current level of maturity. Where the management of learning was the main vision, then the priorities were for good student access to high specification computers, and for an intranet or VLE provision on which teaching and self-study materials and course information could be made available. As the vision developed, priorities switched to the provision of teaching equipment in classrooms: data projectors, iWBs and laptop computers. This may make greater demands on the overall college budget which may conflict with non-ILT priorities.

Figure 3 summarizes the priorities, actions and the weaknesses associated with the each leadership vision strand.

**Figure 3 How leadership focus influences ILT use and development in colleges**

<b>Leadership focus</b>	<b>Management of learning</b>	<b>ILT in teaching to provide variety and interest</b>	<b>ILT within learning and teaching</b>
<b>vision</b>	enabling flexible learning, supported through access to materials and email support	improving student motivation and attendance and encouraging their independent work through VLE links	improving student understanding and involvement in learning – and learning how to learn.
<b>priorities</b>	student access to computers of high specification, and to the VLE	interesting and varied teaching - in rooms equipped with projectors and internet access	interactive use of relevant ILT to make the subject more accessible to the students (using iWB, sets of laptops, tablet PC etc)
<b>action</b>	staff put materials on VLE for students to access and/or give information on internet sites Students use for coursework, assignments and revision; Sharing materials between staff.	staff provide varied sessions including web demonstrations, PowerPoint presentations, quizzes	class and group use of iWB and laptops to investigate; solve problems and use visualisation, simulations, role play etc of direct relevance to the subject being taught. VLE used to store and give access to learning processes and outcomes
 increasing maturity (earlier uses are subsumed within later uses)			
<b>weakness</b>	neglects pedagogy; problem with staff access to computers if priority is given to the students unless specifically included in the course, students rarely access VLE materials	teaching can become repetitive because onus on staff to come up with new presentations ILT can be overused or used where it is not the most appropriate tool	some staff are unaware of the uses within their subject area, and also need time to prepare materials; heavy demand for equipment in teaching rooms

### *Who holds and promotes the ILT vision?*

There was variation in the case study colleges in the level at which the ILT vision was held and promoted. It was evident that a senior manager (first or second tier) with an interest in pushing for the embedding of ILT was a necessary, but not sufficient, condition for effective ILT development across the college. This person required an overview of ILT across the college, in order to be able to take strategic decisions, whilst being supported by both curriculum managers and those with technical expertise. In some colleges where responsibility for ILT strategy was devolved to departmental or site heads, no single person had this overview. In these instances some individual departments or sites developed and achieved their own vision through the efforts of their Head of Department and external funding, for example CoVE (Centre of Vocational Excellence) funding. However, there was no evidence that one good department was instrumental in bringing on others with unlike characteristics.

### ***Technical Maturity***

#### *Access to equipment*

The shortage of quality equipment in teaching rooms was the main reason for a low level of ILT use within teaching. Where fixed, reliable, up-to-date equipment was available in teaching rooms, then most tutors were using it, and, within the time constraints imposed on them by their workloads, they were generally willing to develop their skills to improve their use of ILT. Conversely, staff were generally unwilling to use mobile whiteboard facilities, and in many cases mobile projectors, which they found time-consuming to set up and unreliable. In one college iWBs were all high quality mobile units available for use in a wide range of teaching areas, but requiring to be set up before each session. In this college the main focus was on IT for the management of learning, and there was no pressure on staff to use IT within the classroom if they did not think it appropriate. Few of the tutors felt that it an appropriate use of time to spend 10 minutes setting up the mobile facilities before each class.

Where there were system reliability problems, such as problems with the college VLE that meant electronic materials had been lost, teachers had not used ILT facilities for a much longer period than the actual period of unreliability.

Tutors were only prepared to plan the use of ILT into their schemes of work where they had access to ILT facilities for all groups that they taught using the scheme, as they did not have the time or the willingness to prepare additional sets of plans and materials for cohorts that were timetabled in rooms without ILT facilities. This also applied where there were parallel classes in subject areas taught by different staff using the same scheme of work. Tutors were only prepared to use ILT when they were guaranteed the equipment each week.

In one college staff were required to incorporate ILT into schemes of work prior to ILT equipment being allocated to them. This acted as a disincentive to using ILT.

National data collected via the NLN training participants' survey also highlighted tutors' lack of access to iWBs and other facilities for teaching purposes.

Lack of easy access to a computer of a suitable specification for tutors to prepare materials also led to low ILT use. In one college the low specification of computers provided for some

staff prevented them from preparing ILT materials. In another college the physical environment meant that only selected tutors had a computer on their desk, which acted as barrier to other staff preparing materials, accessing the VLE or sending or responding to emails from students. In contrast one college supplied all full-time staff with a laptop with wireless connectivity which promoted greater ILT use.

#### *Ease of use of software*

There was considerable variation across the colleges in the ease of use of their VLE. In one college the VLE had been designed in house specifically to be easy to use for both staff and students. Staff were able to use the system effectively after an initial 15 minute induction. Across this college learning activity plans for most teaching sessions were posted on the VLE, and many subject areas also had well developed resource repositories for students. Posting of learning activity plans on the VLE had the added benefit of ensuring that the impact of staff absence was reduced as other staff used the plans to support sessions for absent colleagues. The VLE also supported the induction of new staff who had easy access to the schemes of work, session plans and resources created by colleagues who had left the college. Conversely in one college the complexity of the VLE software meant that only technical staff were able to prepare materials in the required format for the VLE. In this instance use across the college was limited, although a few enthusiastic tutors were able to draw heavily on technical support to create innovative resources for their courses.

#### *Technical support*

Most colleges had made significant strides towards ensuring that there is sufficient technical assistance available to help with non-functioning equipment. In the case study colleges where there was a speedy technical response and a clear system for requesting help tutors were more willing to use ILT equipment. Conversely, where the speed of response was slow or tutors were unaware of how to request this support, this acted as a strong disincentive to ILT use.

In most colleges with complex VLE software effective technical support systems had been put in place to upload materials. Technical support was also deployed to assist teaching staff to make software available to students. The time taken for this to be undertaken varied, in some cases taking several months and delaying the use of subject specific software.

Teaching staff who had weak ICT/ILT skills or who were sceptical about using ILT did begin to use the medium when there was both access to equipment and technical help for them in using the equipment.

#### *Workforce maturity*

##### *Tutors' general and subject pedagogical knowledge and understanding*

Within each college there was variation in tutors' pedagogical knowledge and understanding. We saw some excellent teachers who used their understanding of learning and teaching, and a well developed repertoire of approaches, appropriately to meet the needs of all learners within their group. However, there were some teachers who had less awareness of the processes of learning and teaching and had not fully developed the skills needed for effective teaching. Tutors whose approach to teaching was underpinned by sound pedagogic

principles were able to make good use of the ILT facilities available to them to enhance learning. Teachers with weak pedagogic practices, even where they had access to high quality ILT resources, often did not use the full potential of those resources to aid learning and sometimes made inappropriate use the resources. For example, when students were asked to carry out internet searches and the purpose has not been made clear to them, or sufficient guidance on useful websites was not given, students found the activity a waste of time.

### *ILT Training for Tutors*

All the case study colleges provided training to develop tutors' ICT skills and generic ILT training which supported their particular priorities e.g. for using a VLE, using an iWB, or completing student records for administrative purposes. While a variety of different workforce development models were evident in the case study colleges, they primarily focused on short training events planned into the annual cycle of staff development activity. Most colleges also had provision for one to one training support to respond to the specific needs of tutors.

Training programmes tended to concentrate on technical skills development and lacked a focus on how to use ILT to improve learning. Tutors found that the generic nature of most training sessions did not give them sufficient insight into how to use ILT within their own subject area. Where generic training was supplemented by subject specific training this had a stronger impact on changing practices. In one instance a Health and Social Care Head of Department supplemented generic training sessions held across the college, with a session by an outside subject-specialist speaker and workshop time for staff to produce materials and approaches.

A significant number of tutors from the case study colleges were unaware of the pedagogical possibilities of ILT use and the range of materials that they could access to support learning. For many of the participants on the NLN subject training sessions delivered by NLN mentors, this was the first and only training in ILT related to their subject area that they had received. In the case study colleges too, the NLN mentors were generally the only source of pedagogic ideas that tutors had encountered.

In some case study colleges there was a clear match between the timing of training programmes and the implementation of new or upgraded software. This eased the transition to new software. However, the transition to new software was not managed effectively in all the colleges. In some instances this led to staff abandoning effective ILT practices. For example lack of training on upgraded iWB software led one tutor to stop using the iWB in a creative way because they were unable to locate key functions that they had previously used.

Some tutors who have been recruited from industries that do not make significant use of information technology found college ILT training programmes were pitched at too high a level in relation to their IT skills. In one instance innovative use of ILT by a small group of tutors within a vocational area could not be spread among the team because of the low level of other team members' IT skills. The training provided by the college had not enabled them to progress.

Some of the tutors involved in the case study were undertaking initial teacher education programmes or higher level courses. For these tutors participation in their training course

acted as a source of ideas for ILT use and engaged them in reflecting on how they could make best use of ILT in supporting learning and teaching.

### *Development Time*

For the majority of tutors in the case study colleges workloads prevented them from developing the necessary ILT knowledge, skills and resources which are required for effective ILT use. Following short training events staff were rarely given the time to work out how to apply the training to their own subject and teaching context, or to gain the level of proficiency necessary to feel confident in using ILT in front of students. In many cases insufficient time was allocated for team work for searching for and looking at available resources, sharing what individuals were doing with others, and deciding what should be included. This inhibited e-learning development. Tutors also identified the need for time to personalise resources for different student groups. In the one instance where time had been allocated to a subject team to work together on producing materials this had resulted in increased use of ILT.

This need for development time was reinforced by national data obtained from participants in NLN training. There were a substantial number of comments from tutors to the effect that they would be making a lot more use of ILT if they had the time to familiarise themselves with the existing materials and prepare to incorporate them in the teaching.

## **College organization and structure**

### *Structural location of ILT manager and support team*

Where the ILT manager and their support team were located within a curriculum function rather than a primarily technical one the impact on embedding ILT within learning and teaching was most effective. This had a surprisingly strong influence on strategic and operational priorities, workforce development strategies, resource allocation priorities and the perceptions of staff about ILT use and support. In two colleges location of ILT management primarily within a technical function had led to decisions that failed to take sufficient account of teaching and learning needs, for example the purchase of unsuitable equipment, an emphasis on ICT skills rather than support for using ILT within teaching; and unrealistic expectations of teaching staff. In colleges that had made greater progress towards embedding ILT within the curriculum the ILT vision and decision making process was shared with and supported by technical staff, but not solely owned by them.

### *Role of ILT support staff*

The effectiveness of ILT support staff in maximizing ILT use varied between and within colleges. In one college students' timetables were organized so that they had regular sessions managed by ILT support staff. A particularly effective example of this way of working occurred where the course tutor had developed a detailed scheme of work for the supported session that used ILT to extend and reinforce the content of subject lessons, and supported assignment work. All students were given individual learning plans (ILPs) at the start of the support session and the learning outcomes achieved in the session were reported back to the course tutor. The ILT support facilitator also helped the course tutor by sourcing up to date resources. In this college there were also examples of ILT support staff working with tutors in subject sessions to support their use of ILT.

However, unless ILT support staff had curriculum knowledge problems arose where they were given the role of sourcing and creating ILT materials. In some of the case study colleges support staff were expected to alert teaching staff to available materials. This worked effectively where support staff had subject and pedagogical knowledge but was of limited use when they did not. Two colleges have in place teams of resource developers based on the role of systems analysts in early IT commercial development. The quality of resources produced in some case was low because the resource developers lacked knowledge about pedagogy and the subject, and the tutors lacked the time to work with developers on what was required. In some cases there was no educational quality control over what was produced.

### *Resource allocation processes and ILT decision-making*

Different models of resource allocation operated within case study colleges, with varying degrees of central control over departmental decisions on ILT investment. In colleges where resource decision making lacked transparency, or where departmental heads were able to decide whether or not to prioritise spending on ILT, there was inequity in ILT investment in some curriculum areas that impeded ILT use in those areas. There were also examples where purchasing decisions were made by senior managers or technical personnel without consulting teaching staff, which resulted in purchases that did not meet the needs of learners or teachers. For example in one college iWBs were purchased with no additional software licences for staff to use in preparing their teaching.

Where colleges were able to engage teaching staff in decisions on equipment purchase they were more willing to adopt the technology within their teaching. For example, in one of the colleges the teaching staff had been involved in the choice of VLE, and had been provided with both formal and informal training opportunities to learn how to use it. Most of these staff were happy to use it, and were putting course materials and web sites links up for students to use. Ensuring that teaching staff had a sense of ownership of the process of ILT implementation was an important factor in determining use.

### *Distributed leadership*

Distributed leadership in ILT was evident at site, department and course level. In some colleges staff, usually in higher middle management roles, played a key role in supporting ILT within a limited area for example a site, or more often a department (this may be supported by funding from a CoVE). They were in a position of authority over the tutors within that area, and were also able to work easily with ILT mentors, setting their own agenda for ILT development in the area. They effectively spread ideas and ILT usage within the area, but rarely had any effect outside the department, unless good cross-college sharing structures were in place.

Department heads were influential in securing resources and creating expectations on staff of ILT use. Where department heads were not convinced of the value of ILT their departments were less well equipped and tutors did not perceive any strong expectations of ILT use.

At a course level some course leaders supported team ILT development through sharing their expertise and materials. However ILT development within curriculum areas was often led by other team members, who had interest and expertise in ILT use and encouraged others to participate, for example by creating shared resource repositories.

## **Communication and linkage**

### *Strength of external linkages*

Links at all levels with other external organizations were crucial in developing ideas and expertise in ILT use and implementation.

At one college a curriculum manager organized for the whole department to visit staff in another college to discuss how they were using ILT. These ideas were then put into practice in their home college. In another college, which was one of the most developed for e-learning use, the Principal and senior leaders had regular meetings with leaders from other colleges in the local area to discuss common issues, including ILT.

Nearly all the tutors who were at the forefront of effective e-learning implementation had gained some of their knowledge and insights on how to use ILT from external sources. Several were participating in higher level training themselves in another institution, and through that regularly talking to and sharing ideas with others with similar interests in other educational institutions. Some other staff had brought skills with them from industries such as the media industry that use ICT as an integral part of their operations. Others had come from a school teaching background where they had received some ICT training, or maintained links with subject teaching associations, such as the Association of Science Educators.

### *Strength of linkages within a college*

The strength of linkages at all levels within a college, and between different levels, were very influential in the development of an ILT culture.

- Multi-site colleges had a built in geographical disadvantage. In some colleges this was overcome by a college-wide approach to IT deployment and support, in which one senior person had a clear overview across all sites, and day to day technical provision was essentially duplicated on each site. A strong ILT culture existed in these colleges. In contrast in multi-site colleges where there was no strategic overview, and technical provision that varied between sites, the development of ILT use was very uneven.
- An ILT culture was effectively developed and supported in some colleges through a whole college approach to staff development which involved providing set-aside staff development days where colleagues could share training and ideas for ILT use with others from across the college.
- Examples were found where individual staff in positions of responsibility, who were unconvinced of the value of ILT use, blocked vertical communication channels, undermining the best efforts of ILT personnel and enthusiastic tutors or teams.

### *Linkage between ILT support personnel and teaching teams*

All colleges had ILT support personnel in one form or another who worked with teaching staff to encourage and support their use of ILT, but there was significant variation in their access to, and influence over teaching staff. When the status of the lead ILT development

personnel was at least of the level of a middle manager they were able to wield considerably more influence. Nevertheless, some “ILT champions” achieved more than might be expected through the force of their personality and history within the college. The status of the person and their team determined whether or not they managed to gain access to the fora needed to influence curriculum design across the college. Often ILT support team members had low status within the college. Where the status of the person leading the implementation of ILT or the team status was low development of ILT tended to be patchy, with enthusiasts making good use of the support offered, but those unconvinced of the value of ILT remaining disengaged. ILT use was stimulated where formal structures were in place to give ILT personnel entry to departmental meetings, both to make known what assistance and materials were available, and to spread ideas between departments.

#### *Linkage and communication within teaching teams*

In instances where teams had a strong tradition of working together and supporting each other this facilitated developments in the use of ILT and the sharing of resources. Conversely, where there were less well developed teams, sharing of materials was restricted and the use of e-learning less developed. In some instances ILT use was stimulated where there was a seed person/or group of people with a sound pedagogic understanding of how to use ILT within a subject area, who also scanned the external environment for good ideas and materials. However, this was not a sufficient factor to promote use as in other instances where a seed person was clearly identifiable other contextual factors such as lack of appropriate staff training or lack of time meant that developments were not shared. Where sharing of ideas did take place this was often through chance conversations, and involved passing on ‘tips’ rather than engaging in any discussion that linked enhancing pedagogy to ILT use.

In areas where there was only one subject expert in the college, or on one college site, their isolation often meant that they were unable to share ideas or resources. In one instance a tutor isolated from the influence of subject colleagues, directed students to web sites that were much too difficult for the students and convinced them that ILT was unsuitable for their subject area.

#### *Sharing resources and resource repositories*

All the tutors agreed that a very important reason for using technology was for the sharing and re-use of materials, although this did not always involve using the VLE. Most tutors as a minimum shared materials with their immediate team, usually through a shared drive. Most case study colleges used their VLE as a main repository for ILT materials for sharing with students and between staff across curriculum areas. This enabled materials to be easily shared with students within a particular course and subject area. However, effective sharing with staff in related teaching teams or subject areas was achieved much less frequently. In most instances there was no easy to use search facility, or a dedicated web manager to manage the facility. Some middle managers were hoping to address such issues, or to appoint subject specialists who could fulfil such a role.

#### *Sharing innovative practice*

While some of the tutors with expertise in ILT had cross-college roles, for example as advanced practitioners and used this to support the development of other staff, often colleges were struggling to share expertise.

Incentives were being tried in some colleges to encourage tutors to develop innovative practice in teaching with ILT. For example, in one college tutors who registered an interesting application were rewarded with a small grant for the purchase of new software, and their innovation was written up briefly in a booklet for circulation to all staff. Others could then read about it and contact them for further information or assistance in doing something similar in their own area. In another college examples of good practice were posted on the VLE and a monthly prize awarded. Whilst these approaches have stimulated some uptake of ILT they have had only limited success as a means of sharing good practice; few of the tutors interviewed in the study had made use of ideas and materials shared in this way.

Some colleges have tried systems of peer advisors with exemplary ILT usage, who have been given a small amount of time to help others to get started and improve their teaching with ILT. This appeared to work well within subject areas, where the materials were particularly pertinent to that subject, and where sufficient time was allocated to the activity.

#### *Staff feedback / Evaluation of ILT use and materials*

Procedures for evaluating the use and effectiveness of ILT were generally not well developed. Although technical, ILT and quality managers carried out various audits on the use of facilities, these rarely went into any detail on the quality or appropriateness of use. For instance, several colleges insisted that tutors should put their teaching materials onto the VLE, but did not check whether the students or any other staff members ever logged on to look at them. Similarly most colleges did not monitor the use made of facilities in teaching rooms. This sometimes led to incorrect assumptions being made, poor quality materials being put on VLEs and policy being developed that did not take account of the realities at the teaching and learning interface.

### **Retention and Achievement Strategies and the relationship with ILT strategies**

Retention and achievement was a key priority in all the case study colleges. All colleges had comprehensive retention and achievement strategies at whole college level which were carefully monitored through college planning and quality management systems. Course teams and individual staff were very aware of their responsibility to improve retention and achievement, and reviewing success rates and taking actions to maximise retention and achievement in their teaching groups was an integral part of their work.

#### *Range of strategies deployed to improve retention and achievement*

The wide range of strategies to improve retention and achievement adopted by the case study colleges included:

- careful selection and placement of students;
- comprehensive induction processes;
- early identification and support of problems;
- personal tutoring systems that focused on retention and achievement;
- high tutor expectations;
- mentoring;
- support services;

- monitoring and early follow up of absences;
- changes to programme design and approaches to learning and teaching;
- behaviour management strategies;
- teaching students how to be autonomous learners;
- changing lesson timings;
- segregating 16-18 year olds from adult learners;
- incentives for attendance;
- changing qualification aims and
- raising entry requirements.

*Role of ILT in retention and achievement strategies*

In most colleges the institutional ILT strategy was not related to their retention and achievement strategies. Although the ILT strategy was seen as a tool for managing and enhancing teaching and learning, there were no explicit links to, or targets set for, raising retention and achievement. Given the range of other strategies in place in their institution for improving retention and achievement raising, senior leaders generally perceived e-learning to make only a minor contribution to this aim.

Given the lack of direct connection in institutional thinking between the use of e-learning and end-point outcomes, and the comprehensive range of strategies in place to improve retention and achievement it is difficult in this study to isolate the contribution of e-learning at the institutional level. The perceived effects of ILT on retention and achievement at the teaching/learning interface are discussed in the next section.

## **5. Use of ILT at the teaching and learning interface**

As shown in the conceptual model of factors that impinge on the teaching and learning interface (Figure 1) what happens at the teaching and learning interface is very strongly determined by all the contextual factors within the college. But in particular, the provision or absence of IT equipment in the classroom has an immediate limiting impact.

As outlined in Chapter 3, ILT Organisation and Capacity, in some colleges the equipment available changed between one visit and the next. As the availability of technology was increasing, so too, the skills of the tutors to incorporate the technology into their teaching was also developing. Some were getting used to new equipment they had not had access to before, others were finding new web sites to make available to their students, or to use in their teaching. The finding of the amount of e-learning being used, and the impact it is having is therefore limited by the immediate context at the time of the visit, but also indicates the potential for future development.

Following the conceptual model of the teaching and learning interface (Figure 2) this chapter considers the frequency of use of different forms of e-learning within the learning experience of the students in that subject area, the intentions of the tutors, the strength of their beliefs in its efficacy and their teaching style.

In reporting the findings below we have used the analysis of the tutor summaries, with particular emphasis on the courses where the type of e-learning was regularly used. Each tutor summary (as outlined in the analytical approach in Chapter 2) has taken into account the two tutor interviews, the tutor's diary, the student focus group, student questionnaires, and observation of a teaching session. The tutors' intentions and beliefs were taken from the discussion during the first tutor interview and from their responses to the reasons for ILT use questionnaire. Data on tutors' teaching styles was taken from the observations, interviews and tutor diary.

### **Frequency of use of different forms of e-learning - and tutors intentions in using it**

#### ***Overview***

Variation in the availability of equipment across case study colleges was outlined earlier in Chapter 3, ILT organisation and capability. In examining the use of this equipment at the learning and teaching interface it was found that the pattern of use of computers during class time by students was determined by the subject areas for which they were being used. In contrast the pattern of use of data projectors and iWBs, which in most cases tended to be used by tutors, were much the same across different subjects within individual colleges, but varied widely between colleges.

In the most well equipped case study colleges tutors used a range of e-learning approaches to support learning and teaching. In the case study colleges with poorer facilities tutors were generally using whatever was available to them to provide a visual stimulus alongside their more verbally weighted teaching. In these cases this was often limited to just a single computer with a data projector, or even an OHP! Even in the most ILT mature colleges there was no evidence of the use of more recent technologies such as SMS (short message services), blogs or wikis.

The reporting of different forms of e-learning use has been split into the practical and vocational courses on one hand, and the more academic courses on the other, because different patterns of use seem to occur in these two areas. There may be a number of reasons for this, but the mode of assessment is clearly an important one. Hand-written final examinations are still the dominant mode of assessment in GCSE mathematics and AS and A2 science courses, whereas assignments and portfolios, which require information gathering and are generally prepared on computers are used to assess the more vocational courses.

### ***ILT use on Vocational and Health and Social Care (HSC) Courses***

#### *Hands-on computers during class sessions*

Both the vocational courses examined and HSC courses are applied college courses, with strong practical elements and assessments based primarily on course work. In such courses computer use during lessons figured quite highly in the student experience. All vocational and Entry to Employment (E2E) courses included an element of hands-on computer use by students on at least a weekly basis. ICT and communication key skills were sometimes integrated into the subject teaching as well, so students would not be entirely sure if the exercise they were carrying out on the computer was for the subject or for key skills. Most of the HSC courses also had the hands-on use of computers by students element, but not all student groups were able to get a regular weekly session because of the competition for facilities in their colleges.

On both the level 2 and level 3 courses by far the most common e-learning uses for hands-on computer use were:

- A2 – e-learning as a medium: searching the internet for fairly simple factual information, for their in-class work, or their assignments;
- B2 and B3 – e-learning as a presentation tool: for students word processing their own assignments, and also for preparing occasional class presentations. Preparing presentations often included some interaction or group work.

On most of these courses student internet searches and word processing, or preparing PowerPoint presentations, or desk top publishing, took place regularly, at least once a week, as part of supervised teaching sessions. These activities would take place in normal teaching rooms equipped with laptops, or in regularly timetabled rooms with computers, or open access areas supported by the tutor. In one college timetabled sessions for hands-on computer work were led by ILT support personnel. Students also worked on computers, usually in learning centres, open access areas or at home, during their own time, generally to complete assignments or course work. In the cases where level 3 students had limited access to computers during class time, they were generally expected to be carrying out this internet searching and writing in their own time.

National data from the NLN mentor training programme (table 4) showed that the ELU A2 was the most common e-learning use across all courses, with 42% of the student groups often carrying out internet searches (A2). On HSC and vocational courses this rose to 63% and 46% respectively. In one third of HSC student groups the students were often expected to give peer presentations themselves. This supports our findings of frequent hand-on computer use by students studying in these applied areas.

**Table 4: NLN training participants data: student use of computers for internet searches (ELU: A2) and to prepare and give presentations (ELU: B3)**

<b>NLN data from training participants</b>	<b>All student groups n=640</b>	<b>HSC student groups n=19</b>	<b>Vocational groups n=35</b>
<b>Student Use</b>			
often use internet searches (A2)	42%	63%	46%
often prepare and give peer presentation (B3) (sometimes or often)	9% (43%)	32% (58%)	11% (48%)

*Other ILT uses: PowerPoint and iWB presentations in the classroom*

Teaching sessions were also often supported by the tutor's use of PowerPoint on a data projector, or an iWB, but sometimes just a normal whiteboard was used. Not all colleges had fully functioning VLEs, but even where these were available they were often not used with the level 2 students. Some of the most effective teaching was seen when all three elements, computers, iWB and intranet or VLE were being used, as discussed in Chapter 6: Impact of ILT at the Teaching and Learning interface.

The NLN data (Table 5) showed the use of PowerPoint by tutors to be frequent on a third of courses overall, but used often in over one half of vocational courses. The iWB was used (often) with less than 1/5 of student vocational groups. Use of PowerPoint and iWBs were both significantly lower for HSC courses than for courses overall.

**Table 5: NLN training participants data: tutor use of Powerpoint presentations (ELU B1) and iWB (ELU B2)**

<b>NLN data from training participants</b>	<b>All student groups n=640</b>	<b>HSC student groups n=19</b>	<b>Vocational groups n=35</b>
<b>Tutor Use</b>			
often use PowerPoint presentation (B1)	34%	16%	51%
often use iWB presentation (B2)	33%	5%	17%

The frequency of use of e-learning as a presentation tool ELU: (B1 and B2) on vocational course is roughly in line with the usage within the case study colleges, however there was greater use of iWB in the case study colleges on HSC courses than in the NLN survey. This, may be accounted for as CoVE funding for HSC provision in two of the colleges had provided additional ILT equipment.

*Tutors' reasons for use of ILT*

When looking at tutors' reasons for using e-learning, overall the most common reasons selected as being very important by the tutors, for **any** e-learning use related to the management of learning, in particular giving the students flexible conditions in which to

work, and sharing and reusing learning and teaching resources. As well as for managing the learning, tutors' reasons and intentions in using internet searches (ELU: A2) as part of their teaching with level 2 students, were strongly based on the idea of providing interest and variety in their sessions, to motivate the students, as well as because the students expected it. With level 3 students, the reasons for use also focused on giving them more control and autonomy, and in some cases deliberately encouraging group work.

Improving students' understanding featured in the reasoning of two tutors setting tasks involving internet searching. One, using a very simple factual search with level 2 students said "I could have just told them - but they are more likely to remember it if they have found it themselves." The other tutor, working with level 3 HSC students gave clear guidance on sites to look at, to enable them to see other sources and get a more rounded picture of the issue.

The additional comments written by the participants on the NLN national training showed that, across all courses, they were positive about the impact of directing students to particular web sites that were of direct relevance to their course requirements. They were also particularly enthusiastic about the impact of peer presentations (ELU: B3) on students' motivation and learning, as were some of the case study tutors.

#### *Teaching style and pedagogy*

Teaching in the vocational and HSC subject areas was generally student focused, though the control and orchestration of the classes was firmly in the hands of the tutor, and the expectations that the tutors had of their students varied considerably between tutors, irrespective of the level of the course. Some tutors suggested that their students could not be expected to download course materials and other information from the VLE, whilst others (using the same VLE) regarded this as an important first step for the students in developing autonomy as learners.

There was some evidence that as tutors became more familiar with the facilities of the iWB, VLE etc. so they became more prepared to release the control and allow the students to take a more interactive and controlling role in its use.

#### ***ILT Use in A level Science and Mathematics GCSE***

##### *Hands on computers during class sessions*

In A level science and GCSE mathematics hands-on computers were rarely used in class. This low level of use seemed to arise due to both limitations on equipment availability and/or the views of tutors held about the appropriate pedagogic approach to teaching their subject. In several instances hands-on computers had been used to a greater extent in the recent past, but due to organisational changes had become more difficult to access during class time. Most courses had been running for a number of years and were closely based on pre-prepared students' booklets, or standard textbooks that made no reference to ILT. Non-trivial use of ILT therefore was seen as requiring a considerable team development and re-writing effort.

**Table 6: NLN training participants data: student use of computers for internet searches (ELU: A2) and to prepare and give presentations (ELU: B3)**

<b>NLN data from training participants</b>	<b>All student groups n=640</b>	<b>mathematics groups n=53</b>	<b>science groups n=76</b>
<b>Student Use</b>			
often use internet searches (A2)	42%	9%	33%
often prepare and give peer presentation (B3) (sometimes or often)	9% (43%)	0% (13%)	3% (32%)

The national data from the NLN mentor training participants (Table 6) showed that student presentations were not common in maths and science, reflecting the findings from the case studies. Preparation for presentations was one of the main reasons for the use of computers within the classroom in the vocational and HSC courses, and formed an essential part of the assessment. This is not the case for science and mathematics.

In the national data 1/3 of science course students were expected to carry out web searches, though these were most likely carried out away from the classroom. This figure of internet use was somewhat higher than that found in the case study colleges, but could be accounted for by the type of science course. Our case study data was particularly biased towards the traditional physical sciences, whereas the biological sciences or less traditional forensic sciences may tend to involve more discussion of current issues for which web searches are seen as appropriate approaches.

*Use of presentation tools: data projectors, iWB and tablet PC in the classroom*

About 1/3 of science course tutors from the national data were using PowerPoint presentations B1 (as in our findings). This figure was somewhat less for mathematics classes, again reflecting the findings from the case study courses.

**Table 7: NLN training participants data: tutor use of Powerpoint presentations (ELU: B1) and iWB (ELU: B2)**

<b>NLN data from training participants</b>	<b>All student groups n=640</b>	<b>mathematics groups n=53</b>	<b>science groups n=76</b>
<b>Tutor Use</b>			
often use PowerPoint presentation (B1)	34%	13%	34%
often use iWB presentation (B2)	19%	25%	12%

The national data also showed that iWB were used more by tutors in mathematics courses than in other subject areas, with the tutors in 1/4 of all mathematics student groups from the national sample using iWB often. In the case study colleges mathematics tutors frequently did not have access to iWB, and others chose not to use them. Less than 1/4 of case study maths tutors seen were using the iWB often.

Across maths and science, in half the case study colleges, iWBs or tablet PCs were regularly used by some tutors in these subjects. However, other tutors taught in less well equipped rooms, less than half of which were provided with data projectors. A few tutors made excellent interactive use of the iWB and/or a tablet PC (ELU: B2) in which the students were involved in discussing the meaning of diagrams and relationships and giving predictions or explanations before the outcome was revealed. But the data projectors tended to be used only for introductory presentations and summing up at the end of the lesson, with little or no interaction (ELU: B1).

All the presentation facilities, data projectors, iWBs, and tablets, were used well with diagrams and graphs, but often also supplemented by ordinary whiteboard use. Science tutors talked about demonstrating simulation material (ELU: C1, C2) but this was only occasionally used within particular topics. Tutors' reasons for using e-learning as a presentation tool were to help the learners to focus on the material and aid their understanding.

The national NLN data showed that specific subject related applications were often demonstrated in mathematics, but less often in science. Students' hands-on use of these was also infrequent. The case study tutors often talked about using additional mathematics software with their A level classes, but most used none with the GCSE groups that were our focus. The NLN data has both sets of data together which may account for the relatively high figure for mathematics software demonstrations.

**Table 8: NLN training participants data: tutor and student use of particular subject related software (ELU C1, C2)**

<b>NLN data from training participants</b>	<b>All student groups n=640</b>	<b>mathematics groups n=53</b>	<b>science groups n=76</b>
<b>Tutor Use</b>			
often demonstrate specific subject software (C1)	19%	21%	8%
often give students exercises using subject software (C2)	15%	9%	4%
(sometimes or often)	(38%)	(22%)	(20%)

*Use outside the classroom*

Some tutors encouraged students to use computers in their own time, (ELU: A1 A2) and suggested web sites or put materials on the VLE, but only one or two science tutors tried to incorporate this fully within their teaching programme, and follow up on the students' use. Some science tutors directed student to access exam board web-sites to download past exam papers and model answers, but did not direct them to web-sites to help build students' knowledge.

### *Reasons for the low take up of ELUs within science and mathematics teaching*

The traditional examination methods in these subjects may account for some of the lack of ILT use. This restricted ILT use in two main ways.

- Some science tutors actively discouraged students from accessing websites that gave information that was not on the awarding body syllabus. They very specifically taught to the test, and spent most of the year practising examination questions and explaining where marks could be gained or lost within each one. Material on science not actually on the syllabus was then seen as a dangerous distraction from the exam focus, not a widening of their science appreciation and understanding.
- Some tutors, particularly GCSE mathematics tutors, considered that ILT use was not feasible given the content they had to cover in preparation for the exam.

However, there was also evidence of many tutors having a limited understanding of what possibilities there were for using ILT within their subject. Where the tutors understood e-learning to be about internet searches and word processing, or managing the learning, they clearly had difficulty in seeing its relevance to Euclidean geometry or chemical bonding.

Overall, in both the national NLN and case study data, the identified use of subject specific software, designed to enable students to investigate and develop their understanding within their subject area, was low.

### **Tutors' reasons for use of ILT that cross subject boundaries**

There was also some evidence of instances where tutors' reasons for use impacted strongly on patterns of use that crossed subject areas, particularly in relation to iWB and projector use. For example in one college all tutors in their interviews reflected the college vision and gave the main reason for using any form of e-learning as managing learning. Several of the tutors suggested that the possible reasons for using ILT relating to cognition and engagement (making students more receptive to learning) were simply not true. In this college tutors were unwilling to commit the time needed to use mobile equipment.

## **6. Impact of ILT at the teaching and learning interface**

This chapter presents the findings from the case study colleges on the impact of e-learning uses on intermediate and end-point outcomes. It concludes by drawing together the factors that influence the effectiveness of ILT use at the teaching and learning interface.

### **Measuring the impact**

The measure of impact has been taken mainly from the student focus groups and questionnaires, but also informed by the tutors' interviews and the researchers' observations of teaching. A note of caution has to be made about the conditions under which the questionnaires were completed. Where possible the questionnaires were given out to, and collected from, the students by the researcher in the absence of the tutor. However, when this was not possible, the questionnaires were left with the tutor to give out at a suitable time. Despite the anonymity, the students would then be aware that the tutor may be able to check their responses. The focus groups generally gave a useful triangulation to the questionnaires, and were not effected by tutor presence.

The student questionnaires and focus groups, and the classroom observations also gave an indication of the amount of time which was devoted to e-learning applications. Some applications, such as use of simulations in science, were often mentioned in the tutor interviews, but in practice happened only rarely, when teaching particular topics. These may have had an impact at the time, but would not have been at the forefront of the students' minds six months later when they filled in the questionnaires.

Where the amount of time spent on e-learning had been quite low, the students' questionnaires showed little impact. This was particularly the case with some mathematics and science classes. The impact findings in this section are *only drawn from courses where there has been a significant amount of e-learning included in the course.*

### **Nature and scale of the impacts of ILT uses on intermediate student outcomes**

The conceptual model in Figure 2 (shown earlier) suggests that the intermediate outcomes from the use of e-learning within the teaching and learning interface could be clustered into three overlapping effects:-

- effects directly relating to acquisition of knowledge and skill,
- motivational effects, which would then help students complete the tasks, that then enabled them to gain more knowledge and skills, or
- developing maturity as autonomous learners, who developed the knowledge and skills to know how to learn

We will consider each of these effects in turn, and look at the ELUs which have impacted on each one, and the conditions under which the most positive effects are likely to be achieved.

#### ***Impact of e-learning use on the acquisition of knowledge and skill***

In the conceptual model the acquisition of knowledge and skills is considered in three parts

as:

- engagement factors - which make the student more receptive to learning, such as attention, concentration and remembering
- cognitive factors – making the learning materials more accessible and aiding understanding
- performance factors – producing better outputs and developing skills

*Engagement factors – attention, concentration, remembering*

In classroom situations the use of e-learning as a presentation tool (ELU: B1 B2), particularly the use of the iWB, had a strong impact on the engagement factors. Students focused on the learning through watching the tutor and seeing what other students were doing, and interacting with it.

This was shown to be very effective with highly visual materials – such as diagrams, pictures, animations and graphs. However it was also effective with a visually unpredictable tutor style which used the iWB software to highlight and move objects around with a purpose. Students had to be alert to follow what was happening in such teaching, in contrast to the presentation of regular written PowerPoint slides, which tended to lead to students losing concentration. This style of e-learning use both attracted students' attention, and held their concentration, particularly when the students expect to be asked to take part. This could be through direct verbal questions or being asked to write on the board, or using voting software where all students have to show what they understand.

In schools the powerful effect of iWB use has also been recognised, though it has sometimes been put down as being a novelty effect. This is not a novelty issue - we found that students maintained their enthusiasm over an entire year of study. However, good student-focussed pedagogy and an understanding of how the iWB software can be used within the subject area were essential to its success.

*Cognition factors – understanding, make the material more accessible to the students*

e-learning uses which facilitate cognition are:

- interactive presentations (ELU:B2),
- students' own individual or group presentations (ELU: B3), and
- using problem solving/learning tools provided through the VLE or web sites (ELU: C2, C3) – and using revision sites

Understanding can be helped by different ELUs in different ways. In the classroom situation interactive presentations (ELU: B2) with PowerPoint or iWB software, such as simulations or role play which involve anticipation, and discussion of 'what if?' scenarios, and reasoning about likely outcomes were very helpful in developing understanding. Interactive presentation (most often using iWB software) allowed objects to be hidden and revealed, simulations allow different variables to be changed and the effects noted, and there was a

built in ability to go back and forth over teaching material. Crucial to this approach is the anticipation and discussion as an interactive whole class activity. It also required good student-focussed pedagogy.

Peer group presentations (ELU: B3), where the preparation has been guided by the tutor, but developed by a small group of students similarly developed deeper understanding. The national data from the NLN training programme also showed that a significant number of tutors thought this was a very effective ELU. In most cases peer group presentations were prepared and delivered in face to face situations, however they also worked well when students used on-line conferencing facilities, also using ELU A3, to prepare a joint response to a question.

Students also developed their understanding through individual work on VLE materials suggested in sessions involving ELUs A2, A3, C2, and C3, by going over diagrams or simulations again, testing and developing their own understanding, aided by the availability of materials outside the session. This form of independent study was widely available, but not often taken up by students. It was taken up and effective when the tutor had had time to develop the materials on the VLE specifically for this use, and where the work was expected of the students and followed up by the tutor, perhaps with short quizzes, or as a homework activity.

#### *Performance factors – develop new skills, better output*

Students on lower level courses were often strongly focused on the appearance of their coursework. They were also involved with developing ICT skills and tended to see the use of new technology in the preparation of their coursework (B2) as a means to both, improving their skills and achieving better outputs. It also helped build the self esteem of the less confident students. Students on level 3 courses appeared to have a broader understanding of the range of potential outputs of ILT use and placed less importance on performance outcomes.

On one vocational course the case study students learned new practical skills through the use of video materials available on-line (ELU: A1). They could use them when they need to, and revisited them at any time. They appreciated their use as directly assisting in their practical work. But on other more academic courses performance factors were among the weaker uses of ILT.

#### *Impact of e-learning use on student motivation*

In looking at the actual impact of ILT on students it became clear that the motivational changes were actually part of the wider picture of developing maturity as learners. Through e-learning many students first experience success, as for instance, when they see a beautifully printed out piece of their own work, which then boosts their self-esteem and confidence as learners, so they are motivated to keep trying to do well.

Most ELUs can be used with the intention of raising motivation. Some tutors used ILT in order to introduce more variety into their sessions, to motivate the students to attend and get involved. Some students did find ILT use more fun, and more interesting, but it is such a common part of their educational experience now it was taken for granted by the majority of students. They did enjoy specific ILT use such as in-session internet searches (ELU: A2)

combined with preparing outputs or presentations (ELU: B2) **when** it had a clear purpose and tight timing, and also when it involved working in groups. Very few enjoyed using IT for its own sake.

Students were motivated when they were more involved in doing their own presentations (ELUs: B2 and B3), and also developed more self-esteem, through producing quality outputs. They also enjoy rewards and honours, such as having their own work ‘published’ on a shared web-site (ELU: A3).

Some case study students developed more self-esteem through the differentiation and support the tutor provided on-line, in private via e-mail, which enabled them to stay on the course. Others developed feelings of self-worth through group work, in both supporting and being supported by other students in their IT engagement.

### ***Impact of e-learning use on students developing maturity as autonomous learners***

We found that a few tutors deliberately set out to develop autonomous learners, negotiating their learning programmes with them, supporting them with basic information handling skills, and setting challenges for them to meet, both individually and in groups. Much of this initial teaching was done in face to face sessions, but e-learning underpinned most of their learning activities and personal course organisation and management. The courses gave specific guidance on how students could use ILT to support their learning.

A wide variety of different ELUs were involved over the duration of the course with growing reliance on student directed use of ILT as the course progressed. Students were expected to retrieve materials and on-line activities from the VLE or web sites (ELUs: A1 and A2), use email regularly with their tutors and fellow students and contribute to discussion boards (ELU: A3). Some student groups worked with and shared their ideas electronically with others on another college site or in another institution. Students regularly used the iWB interactively during class sessions with subject-specific software (ELU: B2, B3 and C2).

These particular courses were successful in changing the attitudes of the students and empowering them as learners. They developed persistence, self-esteem, the ability to make own decisions on how to work, and also learned how to collaborate. They were also beginning to recognise how they could learn best, and choose realistic planning to get work done.

The tutors put in a great deal of time for background preparations and support. They all had good general student focused pedagogy, and built the amount of student control they encouraged over the course.

The attainment levels on these courses were beyond those which would have been predicted from the students’ entry scores.

### **Impact of e-learning use on end point outcomes of retention and achievement**

#### ***Nature and scale of impact***

The case studies revealed very few examples of e-learning use leading to improved retention or achievement rates. Even in these cases it is difficult to separate the impact of e-learning

use from other confounding factors that also impact on success rates. In the few cases where the end-point outcomes were better than predicted, the type of e-learning use was also having a strong impact on intermediate outcomes:

- In two courses a wide range of ELUs (A's – as a medium, B's – as a presentation tool and Cs – as a problem-solving learning tool), all involving student interaction, were deployed in a careful planned manner throughout the course as part of a comprehensive pedagogic strategy with the purpose of improving learning and building learner autonomy. Learners were also taught how to use ILT to support their learning. Both tutors regularly used electronic voting systems and other electronic quizzes for formative assessment purposes. The mode of assessment for one of these courses was examination, and here a discussion board (ELU A3) was also used to help students develop exam question answers. The use of e-learning in these courses led to strong intermediate impacts on cognitive gains and the development of learner autonomy. The attainment rates on these two courses also substantially exceeded predicted grades on entry. While this would seem to indicate that this type of e-learning use produces intermediate effects which then in turn lead to higher achievement, there is a need to be cautious. These courses were taught by two tutors with exceptionally good understanding of how learners learn and how they could improve their students' ability to learn. Their level of understanding and skill may well also mean that they could achieve high attainment rates without the use of ILT. We did also see a number of highly skilled tutors who made little use of ILT, yet managed to achieve success rates above national benchmarks.
- Using ILT to manage students learning programmes on one vocational course led to increases in retention and achievement rates. On this course students' individual learning plans (ILPs) were managed through the VLE. The electronic ILPs were also used by the tutor team as the basis for planning the teaching programme. Students also had access to electronic video material (ELU: C1) to teach them practical skills at times that fitted in with their ILP, although the course workbooks were still in a paper-based format. Using ILPs has enabled some students to achieve their end qualification substantially quicker than the normal time-scale of two years. Enabling students to work at their own pace has also improved attendance and retention. This flexible way of working helped students to see their attendance at college as purposeful rather than time serving.
- Some tutors pointed to ways in which some specific e-learning uses aided retention and/or achievement. Data from students generally backed up these claims, but due to confounding variables, it was not possible from the data collected to identify objectively if measurable increases in retention or attainment rates emanated from these specific e-learning uses.
  - Placing materials on the VLE, including iWB materials created in class, so that students who miss one of two sessions can catch up rather than get into a vicious circle which eventually leads to them leaving the course (ELU: A1, A2).
  - Using ILT to contribute to variety in teaching sessions and provide interactive activities which maintain students' interest and therefore attendance, which ultimately retains students. (ELU: B1, B2, B3, C2)

- Directing students to online exam questions and model answers to help student focus on how to meet exam requirements, and raise exam marks. (ELU: A1, A2)
- There was also evidence that some uses of ICT for administrative purposes, which cannot be categorised as e-learning uses contributed to improving retention. These uses focused around student record keeping activities that enabled tutors and administrative staff to manage attendance and learning progress. Tutors felt that the use of electronic registers backed up with prompt follow up of absences, was particularly helpful in retaining students.

***Possible reasons for the study findings of low impact of e-learning on end-point outcomes***

Since the case-study colleges were relatively well-developed in terms of e-learning in the FE sector, the lack of impact in the case study colleges would seem to indicate that the use of e-learning in rest of the sector is unlikely to show any significant impact on end-point outcomes. In contrast research in the schools sector (Cox, 2004) has indicated that e-learning use leads to small rises in attainment, which indicates that similar gains could be achieved in FE colleges. There may be number of reasons why this study found only a few cases where there were indications of a positive impact on end-point outcomes:

- It was recognised from the outset that for FE colleges raising retention and achievement is a high priority and a wide range and variety of measures have put in place to achieve this aim. Isolating the impact of e-learning from this plethora of other measures is very difficult, and was beyond the scope of this study which did not look at the relative impacts of other retention and achievement strategies.
- The maturity of e-learning within FE colleges is still relatively undeveloped, even in the case colleges, which are towards the upper end of the FE e-learning spectrum. This factor together with the finding from this study that the impact of e-learning was related to the purpose for which it is used may help to explain the lack of evidence of impact. Within colleges, the focus of ILT use was related to the ILT maturity of the leadership as shown in Figure 3. Several colleges were at the least mature stage of emphasising the management of learning, some using IT mainly for administration, for keeping student records, electronic registers, and the use of on-line ICT courses. Even the emphasis on the VLE was mainly for the staff to share resources, as an efficiency saving. In colleges at this level of ILT maturity, IT may be contributing to retention of students, through better registration and record keeping if this is followed up, and may focus students on attainment goals. However, it can make no significant contribution to attainment if it is not used in and around the classroom, for the purpose of improving learning and learner autonomy.
- The greatest impact of ILT was when it was used with a given intention. In the most ILT mature of the case study colleges the emphasis of the senior leadership was more on using appropriate ILT to support learning and teaching, though this message was not understood in all areas and departments. However here, in some cases, the tutors' intentions may go above and beyond the simple numerical measures of retention and achievement to real world gains. For instance, when students on vocational apprenticeships are offered jobs, the tutors would generally recognise this as a

success, despite the reduction in the retention figures. Similarly, how to get students to maximise their grades in particular examinations is well known and understood, and ILT was in some colleges being used only to this end. But more imaginative teaching, taking a wider perspective for the future beyond the test may use ILT with the intention of encouraging more students to develop a real interest in the subject which they could keep for the rest of their lives. The curse of target setting is that the targets become ends in themselves, rather than measures of real world attainments. Many of the intermediate outcomes of the use of ILT, particularly related to the development of autonomy and maturity as learners may be of far greater value to the students and their future careers than short term examination grades.

### **Factors that influence the effectiveness of ILT use at the teaching and learning interface**

In the case study colleges there was no evidence that e-learning is of itself a distinctive form of learning that changes the ways in which students learn. ILT is a tool. When these tools were used by a skilled tutor they became incorporated into that tutor's overall approach to meeting the learning needs of their students and enhanced intermediate student outcomes. However, the quality of ILT use, and its consequent impact on student outcomes varied considerably across the courses examined. By examining the conditions under which e-learning had the strongest impact on student outcomes a number of factors present at the teaching and learning interface were identified as crucial in determining the effectiveness of e-learning:

- ***The level of the tutors' general pedagogic knowledge and skill***  
ILT was only deployed effectively where the tutors possessed a sound understanding of generic and subject specific pedagogy. In these cases tutors chose appropriate e-learning uses to meet their pedagogic aims, and integrated these e-learning uses into their overall repertoire of teaching approaches to maximise student outcomes.
- ***Tutors' needs to know about e-learning appropriate to their own subjects***  
Tutors who lacked awareness of the how to use ILT within their subject made only limited use of e-learning, or made inappropriate uses of ILT. For example tutors using a VLE need to know, not just how to put materials up onto it, and to track learners access, but also how to design the materials and the accompanying student tasks to support the learners in developing both their understanding and their autonomy. This is a serious pedagogic issue which has not been helped by technical training. All too often tutors were putting materials onto the VLE, but these were rarely used by the students.
- ***The type of ILT equipment***  
Some of the ILT tools work better than others. Generally the data projector had less impact on intermediate outcomes than the iWB. This was partly because some of the tutors in the study were fairly new to using data projectors, but also because of the availability of interactive software on the iWB made exciting interactive teaching easier to achieve.
- ***Combining e-learning uses and an overall high use of ILT***  
Effects on intermediate outcomes were greater when ILT was used frequently. It also had more impact when a variety of ELUs were used, so that students had an expectation that the work in the classroom, perhaps using presentation tools or demonstrations (ELU: B1 B2, C1) would need to be followed up by their own computer based study (ELU: A2 or

C2). This approach was used successfully by a number of tutors, using the data projector for demonstrations from the internet, or CD Rom software to whet the appetite, when hands-on work could not be accommodated during class time.

- ***Alignment of e-learning uses to specific purposes***

As with any other activity in which students are asked to participate, the e-learning also had to have a purpose, which was made evident to the students, so that they could see the necessity for doing it. The sharing of the teaching aims and negotiation of learning with the students was also beneficial in helping them to gain ownership of their own learning. The integration of key skills into subject teaching sometimes caused tensions here, as students recognised the ICT use as an add-on for its own sake.

- ***The need to teach students how to use ILT to support learning***

Students needed to know how best to use ILT to learn how to learn. The two most successful tutors both ensured that their students understood how to make effective internet searches and be selective about the sites that they used. Tutors whose use of ILT had little impact tended to assume that student already knew how to carry out these activities.

## 7. Examples of Good Practice

This chapter presents vignettes of good practice and the evidence from student questionnaires and focus groups that demonstrate the impact that these approaches have on student intermediate outcomes. The vignettes illustrate that while the strongest impacts on student outcomes were gained where tutors made effective use of a range of learning technologies, even tutors who only have access to a fairly limited range of technologies, could, if they used these with a specific purpose in mind, still improve students outcomes. The chapter closes by presenting students perspective on what they consider is good practice in ILT use.

### Exceptionally good use of all ILT facilities (ELUs A, B and C)

Quite a number of tutors used both computers in classrooms and the iWB for presentations and made some use of the internet or VLE, but two tutors in different teaching areas were outstanding in their integrated use of all facilities. They both used a lot of subject specific e-based activities, and had several other approaches in common

#### *ELU A – e-learning as a medium A1/A2*

- At the beginning of the courses they gave some help to students on *how to make effective searches and be selective*.
- They both used VLEs and web sites as a repository of useful information related to the course, *to which the students themselves contributed*.
- They regularly used email for contact with students. Discussion fora and on-line collaborative work was also an integral part of one of the courses.

#### *ELU B – e-learning as a presentation tool B2/B3*

- These tutors made extensive use of the iWB in a variety of interactive ways, with the students using it both in the whole class setting and in smaller groups. Some student creations on the iWB were saved with other resources.
- The iWB was used to demonstrate subject specific software and talk through web sites (C1/C2). Some of the use was very engaging.
- They also used active-voting software or quizzes to check that the students had done their homework, and also as formative assessment, so that the students knew what they still had to do.

#### *ELU- e-learning as a problem-solving learning tool C1/C2/C3*

- Much of the use of the iWB included demonstrating and using subject specific software as problem-solving/learning tools.

#### *Tutors' reasons for use and the impact of the e-learning*

Both tutors were very positive about the value of e-learning for achieving their objectives. One tutor was firmly focused on teaching learners to become autonomous and take responsibility for their own work. She used a very structured approach to do this, with both face to face teaching and also using discovery learning tasks and peer collaboration. The students in this group were very positive about the impact of computer use within their learning, and their confidence as learners and in the group.

The other tutor on the more practical course had cognition and management of learning as very important reasons for using IT with her students, as well as developing collaborative

work. The students were very positive about the work on the iWB, explaining how moving things on it themselves helped them to learn, especially with the discussion and group work that accompanied it. It also helped with their engagement and cognition, the iWB captured their attention, helped to make the topic clearer, and helped by breaking down complicated ideas into simple steps. They were also very positive about the internet as a source of information, and enjoyed using the voting software because it gave them feedback of exactly where they were.

Both these tutors sought to give the students some ownership in the course, through taking part in decision making and incorporating the students' work within other resources being made available to a wider audience. The e-learning, in its various guises gave them the opportunity to do this, and to raise the confidence and aspirations of the students. The web sites also displayed the students' work outside the college, and were instrumental in raising the profile of the courses in the local area, which assisted in their recruitment.

### **Specific uses of e-learning**

Many tutors did not have access to as much ILT equipment as they would have liked, but some, nevertheless, developed particular e-learning styles which were very effective in their own teaching context.

#### ***a) e-learning for interactive presentation (ELU: B2)***

##### *ai) iWB use*

One maths teacher used only the iWB for all his teaching, with considerable positive impact on his students. He was a very experienced teacher who appreciated that most of his students were re-taking GCSE maths because they had to, having already failed to achieve the grade they wanted. The tutor treated them all with courtesy and respect, and set out to entertain and cajole them into giving him their full attention, so that they could better understand and remember the points he was making.

The tutor used the embedded software from the iWB, occasionally using graph paper backgrounds and particular geometric shapes, but drew and wrote on the board throughout his teaching, saving annotated screens to go back to in response to students' questions, or to reinforce a point. He used colour, highlighting and drawing in very well thought out ways, such as introducing unknown variables in algebra as coloured blobs. He got a lot of student participation, with some coming out to write on the board, and others discussing what should be done.

Both the student focus group and questionnaires showed the impact that this form of teaching was having. The students were enthusiastic about the contribution made by the use of the iWB particularly related to engagement and cognition factors. On the questionnaires students highlighted that:

- it helps me to concentrate for longer
- it captures my attention
- it makes the sessions more fun
- multimedia presentation helps me understand better
- it enables me to see things in a different way

### *aii) Tablet PC use*

One of the science tutors in another college used a wireless connected tablet PC with the overhead projector for all his teaching sessions. This was permanently set up in his lab, used only by this tutor and one other colleague who taught the same subject. The tutor used fairly simple note-making software on the tablet, but also had writing recognition software on it, and got it to link up to data logging apparatus. In teaching sessions the tutor wandered round the room with the tablet and gave it to different students to make some input on it, such as diagrams or graphs. The students could all participate in this way, and would help each other if the student with the tablet was having difficulties, providing a sharing interactive ethos. The screens were also saved and could be printed out if necessary.

In discussion the students were positive about the use of the tablet and would have liked the other science tutors also to be using them. On the questionnaires they agreed it had impact, particularly on cognition

- multimedia presentation helps me understand better
- I can watch other people and see how to do things
- it helps to make the topic clearer
- it breaks complicated ideas into simple steps

### ***b) e-learning for managing the learning (ELUs: A1 and A2)***

#### *bi) flexible learning systems*

In one college e-learning was being used as the basis for a vocational course in the construction industry. The two-year course was set up with theoretical and practical modules that needed to be completed over a certain period of time. Originally students were given paper-based individual work plans and workbooks which had to be completed and signed off as they went along. Since it was a skills-based course, involving a lot of equipment and materials, the practical workshops were set up on a carousel to accommodate all the students. E-learning was introduced to the course, first for the record keeping of the students' individual learning plans. It was also brought in for the theoretical sessions, so that students could use internet searches, and VLE materials to complete their theoretical assignments, when a new drop-in IT centre was opened. In order to support the practical sessions, on-line video training materials had also been bought in, covering all the skills needed in clear detail. Students working on a particular practical task could spend a short time on the computer beforehand, to check exactly how to do it.

Once the students had been inducted into the course they followed a given timetable of theory and practical sessions for the first few weeks, but could then attend either as they pleased. Tutors were available to support the students in either venue, but did not work specifically with their own groups. There was a need to ensure that the practical workshops were completed on time, so that other students were not held up, but there was no reason why the student could not work at a faster rate if they chose to do so.

This approach to managing the learning is still being developed. At the time of the last visit too few of the tutor team were confident with the ILT system themselves to feel happy about supporting the learners, or develop more on-line practice and assessment materials to take them further. This was putting a lot of pressure on their more IT literate colleagues. However

the approach was enabling the students to complete the two-year course at a faster rate, if it suited them to do so, and some have successfully completed it in little over a year.

The students themselves were very positive about their hands-on use of computers for the course strongly agreeing with a range of different statements

- it helps me to put my ideas together better
- when I do things myself it helps me to remember better
- it makes the sessions more interesting
- it makes it easy to work at my own pace
- it improves my computer skills for the future.

*bii) using the VLE for student support and monitoring*

In several of the colleges the science tutors had only data projectors set up in the labs for teaching, with no hands-on facilities for the students. VLEs were in operation in two of the colleges, so some of these tutors chose to use these to make the hands-on learning experience available to the students to access in their own time. In another college, bought-in science support software was installed on the machines in the learning centre for the students to use. However a common problem for all these tutors was how to get the students to use the materials.

In one college the tutor designed a virtual science learning experience, with all their lesson materials available with links to activities, simulations, quizzes and revision sites. This was well appreciated by some of the students in the focus group, but not used by all.

In other colleges tutors set the students homework to do from the virtual materials, using various ways to check that they had done it. One tutor asked the students to produce printouts of the quizzes they had done, related to the homework learning, but also checked on the VLE to see the length of time that it had taken them. The tutor's objective was to get the students involved in the learning, in the belief that as they developed their understanding they would become more interested and autonomous learners. His colleague used similar activities principally to monitor the students' understanding, particularly to know if he needed to go over some difficult areas again in his teaching. This tutor also used email to personalise the learning for individual students. His intention was to provide a private, non-threatening learning experience for the less-confident students, through setting differentiated tasks and providing the personal support.

The students of these tutors were positive about developing autonomy when using computers in their own time:

- I can work where and when I like
- it makes it easy for me to work at my own pace
- I can decide how to go about doing the work myself
- email helps me to get quick answers from my tutor
- it helps me to monitor my own progress

### *c) e-learning to engage learners with low motivation and few prior qualifications*

In one college creative use of ILT was used to engage hard to reach learners on some modules of an E2E programme. For example, an arrangement with the regional BBC studio provided access to high specification equipment to create and edit short radio broadcasts, which were subsequently to be put on the BBC's regional website. Students participating in this activity were on-task throughout, maintained high levels of concentration and worked collaboratively on planning and producing the broadcast. The task also engaged students in thinking about local issues as they either searched for local information on the internet or prepared interview questions for local people.

It is important to note that the session was delivered by a very experienced tutor who made the purposes of the task very clear, had high expectations of students, and maintained a good pace to ensure that the work was completed in the studio time available. The novelty of gaining access to the BBC studios, and the demands this made on finishing on time added to students' motivation. Other E2E modules that made creative use of ILT included keeping video diaries and entering the MTV music video competition. Students felt that participation in this type of modules helped develop their self-esteem, but did not think it enhanced their employability.

### **Student perspectives on good practice**

Discussions were carried out with several groups of students in all subject areas. Some of the more articulate students, particularly on level 3 courses, had some concerns with the way that e-learning was being used within their colleges, which they expressed without ever criticising their own tutors.

They had general concerns that

- they, as students, should have the essential ILT experience and develop the necessary skills to equip them for higher education, for example experience of: on-line data collection and analysis software in sciences; and design and editing software in media studies and the arts.
- the IT use should enhance their subject learning, not be an additional unnecessary burden on their time. For example internet searches should be for current up-to-date or local information, not for material that is readily available in their textbook.
- they should not be expected to use websites or individual learning programmes to learn a topic for the first time. Most would prefer to be taught with the teacher there to answer questions that they had, rather than be expected to work through materials on-line.

What they found particularly useful were

- e-learning uses which were tailored to reinforce the teaching input they had just had, such as being set problem based tasks which made them clarify their understanding;
- being able to go back to previous slides and iWB 'pages', particularly involving diagrams or tables to make more sense of them after having been through a teaching

sequence;

- having back-up materials available (on the VLE or web) that were particularly relevant to their courses.

They were aware that:

- some of their tutors needed specific training on how to use ILT within their subject area, so that they did not use the iWB or internet searches just for the sake of it, or overuse boring Powerpoint slide shows.

## 8. Enablers and Barriers

This chapter draws from, and builds on, the findings presented in the previous chapters to present the critical conditions found necessary to support effective ILT use. The research also uncovered a set of, sometimes interrelated, enablers and barriers which underpin these critical conditions. Enablers and barriers identified relate to the contextual inputs that impinge on teaching and learning interface (Figure 1), and the tutor, teaching and learning inputs within the teaching and learning interface model (Figure 2).

### **Critical conditions for effective ILT use**

There was overwhelming evidence from the case studies that showed that ILT use can only be effective when:

- There is adequate ILT equipment available.
- Tutors are aware of how to use ILT effectively to support learning and teaching in their subject, and the range of resources that are available to support this.
- Tutors are allocated time to individually and collaboratively develop their ILT practices and resources.
- Tutors' general pedagogical understanding and practices are sound.

Weaknesses in, or absence of, any one of these factors limits the impact of ILT.

### **Enablers and barriers at organisational and course level that affect the uptake and effective use of ILT in colleges**

#### ***Policy, leadership and decision making***

In the case study colleges, the college's ILT vision was pivotal in determining the college's approach to leading, managing and supporting ILT development, the deployment of resources, the type of equipment and facilities provided, ILT workforce development and expectations placed on staff. Effective use of ILT on a whole college basis required a college vision that focuses most strongly on the use of ILT within learning and teaching, and saw the main purpose of ILT use to be improving students' understanding and involvement in learning, and in helping learners become more autonomous.

#### ***Key enabler***

- A whole college vision that incorporates a strong focus on ILT within learning and teaching where the aim is to improve students' understanding and involvement in learning, and in learning how to learn.

#### ***Secondary enablers***

These enablers are more likely to be in place if the key enabler is in place.

- A senior leader with responsibility for oversight of the whole college ILT vision and

strategy, and bringing together ILT for learning and teaching and the technical infrastructure.

- An ILT manager that is appointed at a grade that enables them to influence other managers and to participate in curriculum decision making at departmental or faculty level.
- Transparent ILT decision making processes that involve teaching staff as well as technical staff and senior leaders. This ensures equipment is purchased and deployed effectively, and establishes staff 'buy-in' to ILT use.
- Conduct of regular evaluations of ILT use and effectiveness, and using this information to inform decision-making.

#### *Key Barrier*

- A college vision that focuses too heavily on the management of learning, with insufficient emphasis on the embedded use of ILT to improve students learning.

#### *Secondary Barriers*

These barriers are more likely to be evident when the college's vision pays insufficient regard to the use of embedded ILT to improve students learning:

- Fragmented senior ILT leadership.
- Individual department or course leaders who are unaware of, or lack commitment to, the use of ILT to support learning and teaching.
- ILT decision-making that primarily focuses on technical considerations without due account being given to needs at the learning and teaching interface.

#### ***ILT Equipment, Deployment and Support***

Lack of provision of ILT equipment was the most direct barrier at organisational level that affects ILT use. Enabling ILT use required attention to patterns of access, the quality and type of equipment, and technical support, as well as to the total number of units available.

#### *Key Enabler*

- Regular guaranteed access to good quality, reliable, up to date ILT equipment for teaching and preparation. This includes provision for all parallel classes and, when appropriate, access for students to computers in one designated location during class time to ensure that tutor support is effectively deployed.

#### *Secondary Enablers*

- VLEs designed so tutors are easily able to upload and edit materials themselves.
- Fixed iWBs or data projectors, located in a position in the classroom that supports learning and teaching.

### *Key Barrier*

- Equipment that is unreliable, insufficient units for the group size, or equipment such as mobile iWBs and data projectors that take time to set up.

### *Secondary Barriers*

- Timetabling systems that do not take account of the need for groups using the same scheme of work to have access to the same ILT equipment.
- Slow response times to technical problems and unclear procedures for accessing technical support, which are then amplified as a barrier as tutors then lack the confidence to plan on the basis that equipment will work.

### *Developing capacity*

The type of training provided for tutors and the allocation of time to tutors were crucial in determining the levels of use of ILT and the effectiveness of that use.

### *Key Enablers*

- Training that focuses on how to use ILT to support learning and teaching, and incorporates subject specific training, including information on the range of resources available for the subject, and training in ILT uses appropriate to the subject.
- Allocating time to individual tutors, and to tutor teams, to develop their ILT knowledge and skills, to work collaboratively to create, source and adapt ILT resources, and to develop, implement and review approaches to ILT use appropriate to their subject and their learner groups.

### *Secondary Enablers*

- Pro-actively drawing on knowledge from external sources at both senior leadership and tutor levels to build capacity within the college for ILT use. Regular meetings of senior leaders with leaders from other colleges, and tutor participation in higher level courses or participation in subject organisations or networks enable ILT capacity building.
- Ease of use of software. Where software is easy to use, tutors are more inclined to adopt and adapt others' ideas.

### *Key Barrier*

- Training that primarily focuses on the development of ICT skills, or that is limited only to generic ILT knowledge and skills.

### *Secondary Barrier*

- Lack of support for tutors who work in isolation. For example where the tutor is the only subject expert in the college, they have no-one to gain ideas from, or share ideas

with, and may develop inappropriate ILT practices, or remain unaware of how ILT may be used in their subject area. Part-time tutors are particularly disadvantaged in not been given time for the development of ILT knowledge, skills and resources.

### **Enablers and barriers at the teaching and learning interface that affect the impact of ILT on students' intermediate learning outcomes**

#### *Tutor characteristics, capability and reasons for ILT use*

Tutors who have good general pedagogic knowledge and skills, and who are aware of how ILT may be used in their subject area are able to use ILT to improve students learning outcomes. Where tutors' general pedagogic knowledge and skills are weak and/or they lack awareness of how ILT may be used within their subject they are unable to realise the potential of ILT.

#### *Key Enablers*

- Tutors who possess a sound general understanding of the processes of learning and teaching, adopt a student-focused approach and have range of effective teaching skills.
- Tutor who know how good practice with ILT works in their subject area and believe in its efficacy for enhancing learning and teaching.

#### *Key Barrier*

- Tutors lack of awareness of resources and approaches to ILT use in their subject

#### *Secondary Barrier*

This barrier tends to be in place when tutors lack awareness of potential uses.

- Tutors who perceive ILT to only be useful for managing learning

#### *Tutors' use of ILT*

The impact of ILT on student outcomes was maximised when ILT use supported the overall pedagogic aims of the session, and when the teacher pro-actively set out to build learner autonomy, including teaching students how to use ILT to support their learning.

#### *Key Enablers*

- A teaching approach that actively seeks to build learner autonomy, including teaching students how to use ILT to support their learning, for example teaching them how to make specific searches and be selective.
- A well planned integrated approach to using ILT within learning and teaching, including use for preparation and consolidation activities, drawing on a range of e-learning uses which supports the overall pedagogic aims and objectives of the session.

### *Secondary Enablers*

- Specific uses of ILT within a pedagogically sound integrated approach that enhance intermediate outcomes are:
  - Use of subject specific e-based problem solving software and activities by individuals or small groups.
  - Use of interactive features of iWBs, including student participation in using the iWB.
  - Use of e-learning features that enable learning to be re-visited such as saving iWB 'pages' and posting them onto the VLE.
  - Use of the VLE as a repository for resources, including resources created by students.
  - Use of good quality e-quizzes to aid formative feedback and revision.
  - Regular use of email to answer student queries about learning.
  - Use of e-discussion boards to develop collaborative work.
  - e-enabled flexible approaches that allow students to follow individualised learning programmes.

### *Barriers*

- Use of ILT activities where the students are not give a clear sense of purpose. This is particularly a barrier where web searches are given to students with no purpose or direction.
- Over-use of PowerPoint for tutor presentation of information.
- Introducing new subject areas through independent computer work. Students found introductions to new topics and concepts more effective in face to face sessions with tutors.

## 9. Conclusions

This chapter draws together the main conclusions on:

- the impact of e-learning on intermediate and end-point outcomes
- the aspects of e-learning input and other factors at the teaching and learning interface that have an important impact on the intermediate and end point outcomes
- the critical contextual factors within institutions which facilitate effective use of e-learning

Recommendations for government and its' partner organisations, and for FE colleges are then made based on the research findings.

### **The impact of e-learning on intermediate and end-point outcomes**

#### *Impact on intermediate outcomes*

From our observations and interviews with 50 different tutors, discussions with their students, and a student survey we have found that effective use of e-learning has a positive impact on students' intermediate learning outcomes. The impacts are clustered into two overlapping areas:

1. Effects directly relating to the acquisition of **knowledge and skill**, which in turn divide into:
  - **engagement factors** - which make the student more receptive to learning, such as attention, concentration and remembering
  - **cognitive factors** – making the learning materials more accessible and aiding understanding
  - **performance factors** – producing better outputs and developing skills
2. Effects relating to developing **maturity as autonomous learners**, incorporating the development of:
  - **self esteem** - particularly for students who have had little success in the past
  - **motivation to learn** - as they begin to engage in their role as students
  - **autonomy** - taking more responsibility for their own learning and learning how to learn.

#### *Impact of ILT on the end-point outcomes of retention and achievement*

The best practice examples of ILT use which had the strongest impact on intermediate outcomes, also showed higher than predicted attainment levels. Since there is clear evidence of impact of e-learning use on intermediate outcomes, and other studies (for example Martinez, 2000) have demonstrated a link between some of the intermediate outcomes, such as enhanced motivation, on retention and achievement this appears to indicate a positive link between e-learning input and end-point outcomes. However, because of the problematic

nature of disaggregating the overall impact of good teaching on retention and achievement from the impact of ILT use, together with the presence of other confounding factors, particularly the wide range of other strategies deployed by the colleges to raise retention and achievement, robust claims for the impact of e-learning on end point outcomes could not be made from this study.

### **Aspects of e-learning input and other factors at the teaching and learning interface that have an important impact on the intermediate and end point outcomes**

#### *Conceptual model*

In our conceptual model for the research (Figure 2) we considered the different inputs to the teaching and learning interface to relate primarily to three tutor factors:-

- the teaching style and general pedagogy
- the tutor's intentions for the learners
- the type of e-learning use (ELU) chosen and the tutor's beliefs in its effect

Within the conceptual model the ELUs were divided up into three main categories:

ELU A	e-learning as a medium
ELU B	e-learning as a presentation tool
ELU C	e-learning as a problem -solving/ learning tool.

Each ELU was further differentiated by the amount of interactivity or student control. An interactivity factor of 1 indicates a low level of student interactivity; 2 a medium level and 3 a high level. For example ELU B3 indicates the use of e-learning as a presentation tool with a high level of student interactivity, as may be exemplified by students giving presentations to peers or tutors. (See Table 2).

It was expected that the different ELUs would have different impacts on the students' intermediate outcomes, and that the impact would also be determined by the tutor's intentions in choosing to use that ELU with the amount of interaction used.

#### ***The impact of different e-learning uses (ELUs) on intermediate outcomes***

##### *ELUs with impact on acquisition of knowledge and skill*

E-learning as a presentation tool (ELU B), particularly the use of the iWB was effective in improving engagement in learning. This effect was greatest when the session was highly interactive (ELU: B2, B3) and students were expected to participate physically and verbally.

ELU B was also important in improving students' understanding, both when the tutor was giving an interactive presentation (ELU: B2), and when students had to prepare and give their own presentations to their peers (ELU: B3). In the latter case the preparation, possibly using other ELUs such as internet searches (ELU: A2) and the group collaboration and discussion involved was probably more effective than actually giving the presentation.

The use of problem solving/learning tools (ELU: C2) and class materials made available on the VLE (ELU: A1, A2) also helped students to develop their understanding, but this was

only generally effective when the students felt that they had to do it, as a homework activity, or because they would be tested on it. Sometimes the activities involved integral on-line quizzes.

Students developed better outputs and new skills through e-learning uses B2 e-learning as a presentation tool for student's coursework with word processors, and A2 and A3 e-learning as a medium, researching information for their work. Students on lower level courses saw performance outcomes as the most significant outcomes of ILT use and this tended to boost their self esteem and give them a feeling of success. For some students this was an important first stage towards taking more responsibility for their own learning.

#### *ELUs with impact on developing maturity as autonomous learners*

Tutors who succeeded in developing learner autonomy used e-learning to underpin most of their learning activities (ELUs: B, C), as well as for course organisation and management (ELU: A). They used a wide variety of ELUs, although initially they relied heavily on working directly with students in face to face sessions.

Any type of ELU can be deployed to raise motivation. However, students were too familiar with ICT to be motivated by using ICT, unless they could see a clear purpose for the activity. The social context of the learning through ICT was however important, and students gained confidence in their own abilities through being able to help others and working as part of a group.

Where students gained greater confidence and took more responsibility for their own learning this appeared to have a 'knock-on' effect on other positive impacts, most noticeably students who reported gains in autonomy also reported cognition gains.

#### ***Other factors at the teaching and learning interface that impact on intermediate and end-point outcomes***

##### *Tutor beliefs, intentions and teaching style*

The tutors' belief in the efficacy of e-learning to promote student learning and understanding, and their intentions to do this were essential in contributing to the success. To be effective ILT tools need to be used purposefully to achieve specific learning and teaching aims and outcomes.

In addition, the teaching style needed to be highly interactive and student focused, giving students the opportunity to do some things for themselves. Tutors who expressed beliefs in the value of using e-learning to promote students' understanding, yet taught in a didactic teacher-centred manner generally produced little impact.

To maximise the impact of e-learning use on student outcomes tutors need to actively structure the development of learner autonomy. Many tutors expressed a belief in the use of e-learning to allow students to work flexibly, when and where they liked, and made teaching materials available to the students on the VLE, but did not recognise the commitment in training and initial support that they needed to make to help the students to develop sufficient maturity to be able to make use of them.

### *Tutors pedagogic knowledge and skills and their awareness of the potential of e-learning in their subject*

As the previous section illustrates tutors were only able to make effective use of e-learning to support learning when their general approach to teaching was based on sound pedagogic principles.

The amount and effectiveness of ILT use is also dependent on the tutors' knowledge of, and skills in, using ILT to support learning **within their subject**. Tutors use of e-learning depends on their awareness of possibilities for use. Therefore a tutor who is aware of how to deploy ILT for different purposes in their subject such as to teach particular concepts in their subject or to raise learner autonomy will make more extensive and effective use of e-learning, than a tutor who only sees e-learning as a means of managing learning.

### *Availability of Equipment*

The availability of equipment is the most immediate influence on the use of ILT at the teaching and learning interface. Where up to date reliable equipment is available on a regular basis even tutors with little previous experience of using ILT are generally willing to try to incorporate it into their teaching, providing they have been shown examples of how it can be used well.

### **Contextual factors that affect the use of ILT**

There are a range of factors operating at institutional and departmental level which impact strongly on ILT use and effectiveness at the teaching and learning interface, and which can be addressed by senior leaders in colleges:

- Maturity of e-learning leadership is crucial in determining the levels and effectiveness of ILT use within colleges. The ILT vision in a more mature college focuses strongly on embedding ILT within learning and teaching. In the least ILT mature colleges the vision emphasises the use of ILT to manage learning. The vision in turn impacts on the structural organisation of ILT, the deployment of resources, staff training and the expectations of type of use which are placed on staff.
- The most effective ILT organisational structures draw together technical and ILT teaching and learning personnel, give sufficient status to ILT managers, have a co-ordinated approach to ILT management across sites, and transparent processes for resource allocations. Department and course leaders who are unconvinced of the value of ILT may act as a block to ILT implementation.
- Workforce development is crucial in both increasing e-learning use and in enabling tutors to use ILT in ways that have positive impacts on student outcomes. Existing training has focused on ICT skills and generic ILT uses. This has only limited impact. Tutors are willing and able to make effective use of ILT where they are provided with subject specific ILT training in addition to generic training, and they are given the time needed to work with their colleagues to source, develop and evaluate ILT resources and practices relevant to their subject.

- External linkages at senior leadership and subject level are necessary to developing e-learning practices, leadership, and resources within individual colleges. Colleges with strong internal linkages at cross-college and team levels are best able to develop an effective e-learning culture.
- All tutors in the case study colleges shared and re-used resources and saw this as an important reason for using ILT. However, sharing tended to be limited to individual subject teams.
- Evaluation of ILT use and effectiveness was underdeveloped in all the case study colleges. More focused evaluations would help avoid practical and policy mistakes.

In addition to contextual factors that can be addressed by senior leaders in colleges, the wider learning and skills policy environment and resultant level of overall funding to the FE sector impinges on the ability of colleges to deploy and effectively use e-learning. Colleges are responsible for prioritising ILT expenditure within their own budgets. However, it was evident to the research team, which also has experience of e-learning development in the HE and schools sectors, that even when colleges placed a high priority on e-learning, the investment they were able to make in equipment, staff training and time for staff to develop ILT enabled practices was inequitable with other educational sectors. Despite this we encountered many enthusiastic tutors, leaders, managers and support staff who have managed to achieve much in very challenging conditions.

## 10. Recommendations

In the light of our findings and conclusions above we make the following recommendations to government and its partner organisations and to college leaders:

### *For Government and Partner Organisations*

- In making decisions on overall funding for FE, consider whether the total resource is sufficient, if managed and deployed effectively at individual college level, to enable colleges to provide sufficient and appropriate ILT equipment, and resource the time required by tutors to develop e-learning practices.
- Promote and support national and/or regional networks or schemes that promote the sharing of ideas on effective implementation of ILT to colleges, at senior level and at subject area level.
- Ensure that initial teacher education and continuing professional development standards for FE teaching staff incorporate the requirement to gain awareness of how ILT can be used within their subject area and incorporate ILT skills development.

### *For college leaders*

- Identify ways of providing support and time for subject teams to develop their knowledge of the potential for using e-learning within their subject.
- Ensure workforce development activities give sufficient emphasis to how to use ILT **within** learning and teaching.
- Review the college ILT vision to ensure that sufficient prominence is given to embedding ILT within learning and teaching.
- Review the organisational structure for ILT within the college to ensure that ILT personnel have the status to influence curriculum decision making and that ILT decision-making is informed by teaching staff.
- Engage in opportunities for leaders and teaching staff to share ideas, successes and difficulties in ILT implementation with other colleges, and other educational institutions.
- Further develop mechanisms for monitoring ILT use and effectiveness to inform ILT decision making
- Further enhance the general pedagogic knowledge and competence of teaching staff.

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## **Appendix 1: Documentary evidence collected from colleges**

1. College organisational structure: outline chart.
2. College policy documents relating to ICT policy e.g. ICT strategy/policy and any developmental or operational plans.
3. Summary data on technical infrastructure e.g. distribution of computers, student: computers ratio, staff: computers ratio, proportion of classroom with interactive whiteboards etc.
4. Summary data of any monitoring or any evaluation reports of ICT use across the college e.g. student use of open access facilities, student and staff use of VLE's (if appropriate).
5. College staff development policy and any operational plans in respect of development of staff ICT skills and use of ICT to support learning.
6. Any monitoring or evaluation of staff uptake of training related to ICT skills / use of ICT to support learning.
7. College retention and achievement policy documents and plans.
8. Retention and achievement data for the last three years for case study courses.
9. College prospectus.

## Appendix 2: Questionnaire for Participants in NLN training events

### Section A

#### About your current teaching

1. Please tell us about your 2 main teaching groups.

Group	Subject you teach	Qualification (and level)	No. of hours you teach / group
1			
2			

2. Below are some examples of ways of using *ILT*. If you use something *similar* to this please tick in the box to say how often you do it with each of your two student groups.

Code	<i>ILT use as a medium</i> How often do you .....	Group	Often, maybe once a fortnight	Sometimes, more than once a term	Rarely / once or twice a year	I don't do this with this group
A1	put course materials and worksheets on intranet / VLE/ college website?	1				
		2				
A2	expect students to research information from web sites or submit work by email?	1				
		2				
A3	expect students to collaborate using an on-line discussion forum, email etc?	1				
		2				
Code	<i>ILT use for presentation</i> How often do you .....	Group	Often, maybe once a fortnight	Sometimes, more than once a term	Rarely / once or twice a year	I don't do this with this group
B1	give PowerPoint presentations?	1				
		2				
B2	use the interactive whiteboard with interactive software eg annotation; drag & drop; voting software etc	1				
		2				
B3	expect students to prepare and give presentations, (using any facilities).	1				
		2				
Code	<i>ILT use as a learning tool</i> How often do you .....	Group	Often, maybe once a fortnight	Sometimes, more than once a term	Rarely / once or twice a year	I don't do this with this group
C1	demonstrate how to use specific software (eg for calculations or graph drawing)?	1				
		2				
C2	give students exercises using specific software (eg diet analysis, menu costs)?	1				
		2				
C3	expect students to solve problems, develop concepts using specific software?	1				
		2				
Code	<i>Other ILT uses</i> How often do you ....	Group	Often, maybe once a fortnight	Sometimes, more than once a term	Rarely / once or twice a year	I don't do this with this group
E1	expect students to use integrated learning system (ILT)/ or quizzes?	1				
		2				
E2	expect students to use revision sites with self assessment?	1				
		2				
E3	other - please specify .....	1				
		2				

3. Looking at the ILT uses in question 2 above (coded A1 to E3) please identify any which have worked particularly well for your students, and comment on why you think this is the case

Code (eg B1)	
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Do you have any other comments on your current ILT use?

**Section B**  
About the NLN Mentor session

1. What for you was the most useful part of the session?

2. What impact will the NLN Materials have on your students' learning and how might you implement this?

3. What was the benefit to you to have a subject focus for this session?

4. What one thing will you do as a result of what you've seen and heard today?

5. Would you like to join a subject specific on-line support/discussion forum?

**YES**

**NO**

We assure you that any information given will be used confidentially and anonymously.	
Your Name	
Your College	
E-mail address	Telephone

### Appendix 3 : Analysis of the additional data from the NLN training programme

#### The survey

The NLN mentor training programme was a government funded initiative in FE colleges to make tutors more aware of the specialist subject materials for ILT available to colleges through the National Learning Network. A team of 16 mentors from a variety of different subject specialisms, visited a large number colleges over an 18 month period, to give training sessions to the staff teaching in that area.

Over the last few weeks of the initiative the mentor trainers gave out evaluation sheets to the participants at each college they visited, with additional questions on the participants' current use of ILT, prepared by the research team. The questions asked about current use of different ELUs, and also to comment on any ILT use that they thought worked really well for their students. The results were analysed for all responses, and for responses by subject area. The questionnaire is given in Appendix 2.

508 participants from over 100 colleges completed the questionnaires, each writing about one or two of the courses that they regularly teach, so this related to 640 different student groups. The data has been grouped into 12 subject areas, including a 'vocational' one with matching courses to the case study samples. The data included some courses with relatively high essential IT content, such as computing, business studies and media studies, so it was felt important to look at the usage in as close a matching group of courses to the case studies as possible.

#### The use of e-learning

In the tables that follow the percentage of participants using each of these ELUs for much of the time (ticked the 'often' box) is summarised.

#### *e-learning as a medium*

**Table 9: Percentage of tutors using e-learning as medium**

	e-learning as a medium	ALL n=640	HSC n=19	Voc n=35	Sci n=76	Maths n=53
A1	put course materials on the VLE / intranet	19	5	14	13	11
A2	expect students to research from web sites	42	63	46	33	9
A3	expect students to use on-line discussion, email	4	0	6	0	0

Overall the highest use of e-learning was for A2, expecting students to research information from web sites. This was high for all participants and for all subject areas, except for maths. This is generally in agreement with data from the case studies, with internet searches less common for science than for the more practical subjects, but still one of the main ILT activities.

The expectation that students would use email contact with each other and with the tutor was apparently very low. This was also a finding from the case study student questionnaires. Within the case study colleges very few students used email with their friends - though they

would sometimes use MSN messenger and chat rooms. Also very few tutors set up emailing contacts with their students. Even when they did set these up at induction, unless they were required to do so, many students were reluctant to take them up.

*e-learning as a presentation tool*

**Table 10 Percentage of tutors using e-learning as a presentation tool**

	<b>ELU as a presentation tool</b>	<b>ALL</b>	<b>HSC</b>	<b>Voc</b>	<b>Sci</b>	<b>Maths</b>
B1	give powerpoint presentations	34	16	51	34	13
B2	use iWB with software, drag & drop, etc	19	5	17	12	25
B3	expect students to prepare and give presentations	9	32	11	3	0

PowerPoint presentations were the second most common use given by the participants overall, and very high for the vocational subjects. iWB were less commonly used than powerpoint, but a quarter of the maths tutors said they were using them a lot. In the case study colleges, HSC and Vocational courses were generally making more use of iWB than maths or science, but this was due to differential access to ILT equipment. Three of the colleges had been fortunate to get recent CoVE funding for HSC or vocational courses which enabled them to purchase new equipment. iWBs were being used in 2 of the 6 colleges for maths, and in most instances if the iWB was available in this subject area, it was being used all the time. Student presentations did take place in the HSC courses in the case study colleges. For some awards this is a required part of the course.

*e-learning as problem-solving/ learning tool*

**Table 11 Percentage of tutors using e-learning as a problem solving/ learning tool**

	<b>ELU a problem solving/ learning tool</b>	<b>ALL</b>	<b>HSC</b>	<b>Voc</b>	<b>Sci</b>	<b>Maths</b>
C1	demonstrate specific software	19	0	3	8	21
C2	give exercises using specific software	15	0	6	4	9
C3	expect students to solve problems using software	14	0	0	4	9

Specific software was used in maths, but not significantly in other subject areas. In the case study colleges where the mathematics tutors were able to get access to ILT equipment some maths software, such as Autograph was mentioned, but generally used for the A level classes, rather than the GCSE one. The mentor data includes both GCSE and A level maths groups, as well as numeracy courses, which may account for the differences between use in GCSE maths in case study colleges and the mentor participant data.

The low use of specific software for science was also found in the case study colleges, but is quite surprising, given that there is a lot of specific software available to support students' understanding in this area.

The relatively high levels of ELUs: C1/2/3 for all participants were particularly effected by the tutors teaching computing which registered over 70% for each of these e-learning uses.

### *e-learning used for formative assessment and revision*

**Table 12. Percentage of tutors using e-learning for formative assessment and revision**

	<b>ELU for formative assessment and revision</b>	<b>ALL</b>	<b>HSC</b>	<b>Voc</b>	<b>Sci</b>	<b>Maths</b>
E1	expect students to use ILS or quizzes	12	5	9	5	6
E2	expect students to use revision sites with self assessment	12	11	3	18	9

A high proportion of science tutors were expecting students to use revision sites with self assessment. This also resonates with our findings. Some exam boards put past papers and mark schemes on the web which students are encouraged to use. Other science schemes provide on-line backup materials to which colleges can subscribe. These materials are all of direct relevance to the syllabus and are set by some tutors in the case study colleges as homework activities.

Overall this data shows how little specific subject-related software, other than revision sites, is being used, and how much the students are being asked to search the internet.

### **Impact of ILT**

When mentor participants were asked to comment on what worked well for their students, this clearly had to relate to the specific uses they made of ILT in their own teaching. Not all participants wrote comments, but for reporting purposes the number who commented on particular areas have been taken as a percentage of the total number of just over 500 participants. This data has been corrected for overlap and double counting, for instance when one participant mentioned both powerpoint (ELU: B1) and iWB (ELU: B2) this was counted as one positive comment on the impact of ELU B, so the percentages below represent different participants. Participants rarely identified that more than one different category of ELU was working really well for their students.

### *ELU as a medium*

About 20% (102) of all participants thought that use of the internet or VLE worked very well with their students. The features related to internet or VLE use that they thought worked well equally divided into three areas:

- the use of the VLE to make materials accessible to students
- the use of the internet for searching
- discussion on particularly good internet sites: this: often referred to specific subject materials, but usually in the nature of information, rather than challenges or activities

The percentage of tutors who thought that use of the VLE or internet was effective was roughly in line with the indicated amount of use of these features

### *ELU for presentation*

A further 20% (102) of participants thought that using e-learning as a presentation tool worked very well with their students. One third of these felt that students' own presentations worked very well. This represents a strong view on the positive impact of students' own

### ***ELU as a problem solving/learning tool***

Only 8% (41) of participants' commented that e-learning uses C1, C2 or C3 worked really well for their students.

A further 16% of participants said that revision sites and quizzes were effective with students.

### **Why ILT works well**

Some of the comments made by participants gave their views on how and why use of ILT works. A rather smaller percentages of the total respondents gave explanations of why things worked in comparison to the numbers commenting on what worked, so table 13 below presents the actual numbers of comments made.

**Table 13. Tutors reasons for why using ILT worked well with their students**

<i>Nature of the comment</i>	<i>Number of participants making this response</i>
on increasing collaboration and group work	15
on the visual facility (of ppt and iWB)	15
improving cognition (from ELU C only)	12
variety and enjoyment	10
interactivity and engagement in learning	9
on student autonomy	8

Although the comments on ILT use and impact are not from all participants, and we have no data on how representative the participants were of their colleges, they do give a clear indication of the area and sophistication of ILT use in which they are currently engaged.

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