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**Supporting E-Learning & Mobility in Higher Education:**

**The Changing Role of the Information Systems Services**

**Department.**

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Working Paper NCIRL- 029-2003

**Supporting E-Learning & Mobility in Higher Education:  
The Changing Role of the Information Systems Services Department**

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**0. Abstract**

E-Learning in conjunction with mobile computing technologies has the potential to be the single most important application to arrive on the higher-education scene in recent years. In common with many new technologies however, if the implementation is not adequately planned and managed the full benefits may never be realised.

This research paper will identify the challenges that the Information Systems Services department at Trinity College Dublin will face as it tries to align itself with the College Board's commitment, to make the campus mobile, and introduce a blended learning approach across the campus by the year 2007. This will involve a considerable shift in how the department currently operates.

While the introduction of these types of technology will have a dramatic effect across the College community, it was deemed appropriate to narrow the focus to just the one department at the university.

The research approach taken will involve a number of different research methods including a detailed literature review, semi-structured interviews with key people inside and outside the organisation. There will also be two questionnaires one aimed at Senior Academic and Senior Administrators to elicit their views on E-Learning readiness and a second questionnaire aimed at a cross-section of the undergraduate population. Observation of the student body at Trinity was also used as a data gathering technique.

As the problem was a real world problem it was felt that the approach called "problem-solving research" should be used. Justification for the approach taken is as follows.

Firstly it offers a "freshness" in approach in dealing with this or any other problem. Secondly, combining methods allows the results from one method to be crossed checked with other methods. This process is known as methodological triangulation. The rationale for triangulation is well known in academic circles and justification for the approach is covered in the paper.

The key findings were; that although the majority of senior people within the organisation are committed to a move towards E-Learning and Mobility, little thought has been given to the planning and design of the IT Infrastructure to support this move. Whilst the student body would fully support the scheme they would not be willing to finance it in any way. On the issue of support, radical changes would be needed in how the Information Systems Services runs its support operation and also the type of hardware and software it

supports. There would also need to be a large increase in the number of IT Staff to support the move to mobility. Staff would have a steep learning curve. All the above findings raises the issue of costs of the technology and in the current climate the lack of funding to proceed to this new paradigm.

An E-Learning and mobility strategy is an immediate requirement as the overall operation is not about introducing a new technology for learning but a new way to think about learning.

## **1. Introduction**

The information age in which we are now living is being accompanied by changes similar to those experienced during the industrial revolution. The changes, which are taking place, are being aided by the significantly improved communications and information processing capabilities of computers and data and telecommunication systems. These capabilities allow people to be provided with increasingly easy access to information. Many industries and services are being forced to restructure totally in an effort to survive in the global market place. Universities and third level institutions are no different.

The information age generally presents information-intensive organisations such as universities with the greatest opportunities for improving the quality and scope of their services. It also presents such organisations with the greatest threats should they fail to take advantage of such opportunities.

The Board Trinity College Dublin in their strategic plan have committed the university to being “ mobile” by the year 2007. Coupled with this move they are also fully committed to the concept of E-learning and in particular the adoption of a blended approach to learning.

### **The Problem**

There are currently 15,000 full-time undergraduate students and a significant number of part-time students attending the university. To service these students, The Information Systems Services currently has 580 open access desktop computers that are linked to a number of different services via the College wide network. The demand for computer resources amongst the student population has increased exponentially during the past five years and is set to increase further over the following five years particularly with the relatively cheap availability of laptop computers and significant increases in the technical functionality of mobile handheld devices. There is also significant evidence to support the concept that students want access to the information they require when they need it. All of these are significant drivers that are revolutionising the way that teaching will be conducted at the university in the future.

The approach taken in many universities and third level institutions, primarily in the US and Asia, has been to introduce “universal access to computing resources” for all students.

During the past three years the Centre for Learning and Technology at the university has actively been encouraging academic departments to put more of their course materials and documentation on-line.

At the same time students are being introduced to the concept of “blended learning”, where some learning takes place in the classroom and some on-line.

This report identifies the managerial and technical challenges facing the Information Systems Services department at Trinity College in supporting the introduction of these technologies and makes a number of recommendations on how the university should proceed.

### **Statement of purpose**

Any new technology strategy, and in particular one such as “universal access” which will have such an impact on the provision of computing services should not be developed or implemented without making strong and substantial reference to the goals of the organisation in question.

‘Trinity College Dublin exists to provide an internationally recognised centre of excellence in higher education wherein a diverse body of students may learn and train in their chosen discipline and scholars may carry out research in order to advance knowledge in their various subjects’.

To allow students to learn and develop, Trinity College must give students access to the information and services they require when they need them.

### **Aims**

The overall aim of the project are to identify the challenges that the Information Systems Service’s department at Trinity College Dublin will face in supporting the widespread use of mobile computing devices and access to an E-Learning platform for its 15,000 undergraduate population, and to make a number of recommendations to the Board of the University.

### **The Objectives are**

- Determine if the university is ready for such a technological transformation.
- Identify the managerial, technical and organisational challenges facing IS Services with the large-scale deployment of mobile computing devices and E-learning.
- Identify the computing and information requirements of the undergraduate population
- Make a number of recommendations to the College Board.

## Approach taken

The research methodology consisted of a combination of different techniques that provided both primary and secondary data and also quantitative and qualitative information. The methodology used the following techniques:

- Literature search
- Survey of Trinity College students using questionnaire
- Survey of key stakeholders to determine E-Readiness
- Semi-structured interviews with key people
- Observation

*Blaxter et al (1996)* looks at research methods by dividing them into families, approaches and technique. From this summary and from discussions with colleagues it was decided that the research family would be primarily quantitative, but backed up by qualitative analysis. As stated earlier the criteria for this paper was an “informed consultancy” approach to researching a real world problem. It was appropriate that the approach called “problem-solving research” suggested by *Phillips and Pugh (1987)* should be used. Justification for the approach taken is as follows.

Firstly it offers a “freshness” in approach in dealing with this or any other problem. Secondly, combining methods allows the results from one method to be cross checked with other methods. This process is known as methodological triangulation. The rationale for triangulation is expressed well by *Kane (1985)*, who represents archival review, questionnaires, interviews, and participant observation as potentially overlapping in scope:

‘If you had to stake your life on which of these is likely to represent the most accurate, complete research information, you would choose the centre {of the overlap} in which you got the information through interviews and questionnaire, reinforced it by observation, and checked it through documentary analysis.’

An important but often overlooked part of a research methodology is talking to colleagues in the organisation. A considerable amount of information was collated by informal conversations with various people within the organisation.

## 2. The Literature Search

To become more informed about the subject matter, a literature search was conducted. The four main functions of this literature review were linked to *Stevens et al (1993)* approach to research:

- To give reasons why the topic is of sufficient importance for it to be researched
- To provide the reader with a brief up-to-date account and discussion of literature on the issues relevant to the topic
- To provide a conceptual and theoretical context in which the topic for research can be situated
- To discuss relevant research carried out on the same topic or similar topics.

The literature search was an extensive and critical summary of some of the existing material available on the subject. Different media were used in the quest for information; the two most frequently used being the Internet and IT and Management Journals from the Trinity Library. Other sources included accessing university databases in the United Kingdom and articles from newspapers such as the Financial Times. A list of sources used for the literature search is included in the references.

The Literature search focused on three quite broad areas. These were areas that were raised from defining the conceptual sub problem. The first of these was the broad area of IT Strategy and different approaches to IT within different industries and institutions. The conceptual sub problem highlighted a need for reviewing IT Strategy at the university and in particular the need for technology planning.

The second focus area of interest was on technology and in particular mobile computing, wireless networks and E-Learning. This was used as the basis for gaining a deep understanding of how the technologies were developing and the management and technical challenges that the adoption of these technologies would bring. It also helped focus on how quickly technology is changing.

The final part of the review focused on the higher education sector and looked at approaches at other universities mainly in the United States. The search covered issues such as User Support for universal access and the demands placed on IT infrastructures if schemes such as this are implemented. There was also some review of financial models at other universities. Although the financial issues were not considered as a research topic it was deemed important to get some perspective on the likely costs of implementing such a scheme as the university is currently working under budgetary constraints.

### 3. Analysis

This section of the report looks at the analysis of the data and reports on the findings.

#### **Literature Analysis**

The documentary analysis involved careful consideration. Documents were and needed to be critically assessed. A comparative analysis of the documents was deemed appropriate to gain an understanding of the ideas, issues and policies with which the individual documents were dealing with. Documentary analysis proceeded therefore; by abstracting from each document those elements that were considered to be important or relevant to the research. These elements were then grouped together to formulate the findings of the literature search. Consideration was given to the author and his/her position and to the biases of the author and the time when the document was produced as particularly with technology timing is of the essence.

## **Student Survey Analysis**

There were a wide variety of techniques available for questionnaire analysis. However, it was decided to keep the questionnaire analysis as simple as possible. The response to the student survey was quite high. There were 39 valid replies from 50 questionnaires. One of the reasons for the high returns can be attributed to the fact that there is a genuine interest amongst students in improving the facilities to a situation more in line with their needs.

The primary attention focused on the issues and hunches that were developed originally as relevant to the topic and this report. The analysis of the data found major trends amongst the respondents and these are summarised in the findings. The analysis approach taken was at a descriptive level. Frequencies were reported on and represented diagrammatically using bar charts. Electronic methods of analysis such as the statistical package SPSS were explored but for a sample size of fifty people and twenty multiple-choice questions it was quicker to do the analysis by hand. The results were fed into an Excel spreadsheet, which was used to produce bar charts. Only some of the questions asked are included in the analysis.

## **Semi-Structured Interviews Analysis**

*Abramson and Mizrahi (1994)* describe the use of a “grounded theory” approach in the analysis of the transcripts of interviews. Grounded theory involves the coding of the interview transcript and/or other data collected in terms of key concepts. The approach used for the analysis did not follow any one particular method in the analysis of data but shows some similarity to the “grounded theory” approach. The analysis involved working on the records of the interviews.

Each record was in fact answers to specific questions coupled with notes that were taken at each of the interviews. There was variance in the quality of response amongst the interviewees. The interview records were spread out and each question analysed one by one. This helped to give the analysis an orderly approach. Common themes were then identified, and each script was again scrutinised noting which themes had come up.

Great care had to be taken so that comments were not lifted or quoted outside of context or sequence. This is to ensure that the findings presented are representative of what was said and also helps ensure the completeness and accuracy of the data.

## **Observation analysis**

The observation research method and analysis were both carried out in parallel with the other research methods and involved studying the behaviour of students in a computer lab environment and in their every day life. The analysis of these students reinforced the issue that students want mobile equipment that is easy to use.

It also helped towards providing a recommended solution to the problem in that it highlighted the number of students who have mobile phones and use them almost exclusively for text messaging. (Email).

### **E-Learning Survey Analysis**

There appears to be, a “willingness” from the people surveyed to commit to adopting E-learning as a strategy, and this is reflected in the uniform answer to question 16. This is in fact the only question that there was complete agreement on.

Whilst the survey reveals that the use of technology is pervasive at the university and that access to technologies such as the Internet are almost universal, there still seems that there is a long way to go to change the culture of the organisation to allow E-Learning to take off. Almost all the respondents in the area of “Training Organisations Must Reinvent Themselves”, are in broad agreement and answered that some progress has been made but maybe not quite enough for the organisation to be ready for E-Learning. This again is probably a reflection of organisational structure and culture and this will involve some detailed discussions with staff and a formal change management plan.

There are a number of issues that need to be considered. The first is the issue of student access to the technology to enable them to learn in this way. If students don't have access to computers then they may be excluded. On campus facilities are reasonable but they are probably not adequate for the adoption of E-Learning campus wide.

The second issue is ICT skills. Both students and staff would need to have good ICT skills to ensure they got the best from E-Learning. This may be difficult to introduce as a number of the academic community still use “traditional methods” of teaching. In addition to ICT skills, teaching staff need to learn how to teach in a different and new way. Students also have a learning curve as they will be learning in a new way. These new approaches may also affect support staff as well as their academic colleagues.

From the survey it can be seen that for some, E-learning is the answer to all our education needs and woes; for others, it is nothing more than the latest in a line of education fads. Reality probably lies somewhere in between. It is neither a passing fad nor the answer to all of Trinity's problems.

In summary for E-Learning to be adopted as a strategic tool at Trinity then the following must be in place.

- Full support of senior management particularly senior academics
- Formal change management plan and communication with staff.
- Identification of the “business” benefits.
- Change in organisational structure and culture.
- Funding
- Evaluation of best of breed technologies and vendors.
- Skills training for staff and students
- Provision of appropriate ICT equipment.



Educational institutions such as Trinity must not be lulled into a sense of complacency by the slow adoption of e-learning technologies at the university. E-Learning will develop and become more widely accepted and Trinity must plan to incorporate E-Learning into its strategic plan. It also needs to budget for technology implementation and training while ensuring that E-Learning initiatives are not diluted by the notion that a university is simply a place where one purchases immediately useful content or instruction.

### **Analysis summary**

The three principle sources of information identified a number of trends. The analysis confirmed that there is a real problem with computing resources for students characterised by long queues of students waiting to use computer resources. It also confirmed that the situation is likely to get worse as more students start to use computers daily, as part of their course, and become more reliant on the Internet as a source of information.

It was clear from the analysis of the literature review, the student survey and the semi-structured interviews that there is widespread support for providing every student with their own computer in third level institutions. The type of technology that students will use is not quite clear but it is likely that it will be a handheld wireless device that will offer a range of features that will include email, Internet connectivity and some form of note taking.

The capital cost of providing a scheme such as this are quite high and there are other factors to be considered such as the on-going maintenance cost and human resource costs associated with the scheme. As more students start to use the Internet the pressure on the IT infrastructure and User Support will increase.

## **4. Conclusions**

- Demand for computer resources amongst students is increasing exponentially.
- Rapid change in hardware and software standards requires significant reallocations of resources and new sources of revenue. The provision of appropriate computing resources for staff needs instant attention.
- Communication over networks is probably the most powerful application of technology
- Funding of the scheme is a key issue with no immediate solution.
- Costs to students – students are worried about a technology fee.
- There will be a significant impact on the IT Infrastructure at the university
- The IT support service will need radical change to meet the new demands. There will be changes in the products supported and the way people work. The current IS Services department would not be able to deliver the level of support and expertise required.
- For the university to remain at the forefront of teaching and learning a new paradigm in the provision of computing for students is needed. The scheme could not proceed without academic support. The issue of

provision of appropriate computer resources for staff needs consideration

- There needs to be an increase in awareness of IT Strategy at the university.
- There are quantifiable risks. (Technological and financial).

**Recommendations:**

**1:** University-wide planning is required in the implementation and development of the university's information systems. In order for these systems to work together in a seamless manner and accommodate an ever-increasing number of users, TCD should implement common interfaces and a common information delivery environment that facilitate their integrated use.

**2:** The University should accelerate planning for a converged telecommunications and data infrastructure. The University must ensure that there is appropriate funding for telecommunications and data services and infrastructure. Specific attention must be given to planning for and deployment of wireless connectivity and mobile computing on campus. This will facilitate the adoption of E-Learning.

**3:** The University should build a solid IT infrastructure that will help and enable TCD to achieve a position of leadership in the global world of education, and to assure that financial planning permits the maintenance of this infrastructure at state-of-the-art levels.

**4:** The University should provide students, faculty and staff with robust and resilient access to computing resources and network services, on campus and in the future off-campus.

**5:** Appropriate incentives and support should be established so that faculty and staff are encouraged in the creative use and application of information technology for teaching and research.

**6:** Trinity College should move now to assume a position of worldwide leadership in the use of information technology to facilitate and enhance teaching and learning and to attract the next generation of students.

**7:** TCD must provide the information technology tools, infrastructure and support services so that students may effectively engage in learning and research. IT support for students should include many technology support centres on campus staffed with highly qualified technical personnel and provide a computing environment that is seamless.

**8:** The University must continue to develop policies and implement procedures that protect the security of Trinity's information technology resources and institutional data, safeguard personal privacy, and respect intellectual property rights.

**9:** Planning for the introduction of a pilot scheme to be implemented in academic year 2003/04 for first year students should commence immediately. The planning committee to have strong student and academic presence.

**10:** Self Assessment of Information Systems Services to be conducted immediately.

**11:** Greater cooperation between the Centre for Learning Technology, the Staff Office and Information Systems Services.

**12:** Standardisation of hardware and software across campus is crucial for success of project and support.

**13:** A new model of IS Support that is "whole-product" focused and based on customer needs with a reliable baseline information infrastructure.

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