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Report

Implementing Learning Technologies at the University of Derby, 1989-2003: *A Case Study*

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Abstract

This report is a case study of the development of learning technologies at the University of Derby in the United Kingdom. Derby is one of the most experienced and active universities in this territory. Over the past decade and more, the University has utilised a range of technologies to enhance on-campus provision, expand its presence in the region, reach new clients and offer fully online programmes internationally. Derby's experience encompasses both third party technology and in-house development, use of e-learning and satellite-driven telepresence. The report gives an account of key drivers and success factors, including staff development, internal and external funding, central and specialist services and institutional culture. The author offers 'lessons learned' that may prove helpful to other institutions embarking on comparable initiatives and confronted with similar issues. While some aspects of Derby's trajectory are historically specific (notably technology choices at particular points in time), the University's gradual transition from local experimentation to institution-wide capacity is relevant to institutions at all stages of learning technology development.

1 Introduction

The University of Derby, based in the East Midlands in the United Kingdom, is a leading further and higher education institution in the application of learning technologies to both on- and off-campus learning. It is a founder member of the Global University Alliance, thought to be the world's first collaborative e-university to offer a wide range of degrees online across four continents. It is the only UK university using satellite-driven telepresence methods to teach students overseas. It is a county hub for Learndirect (the UK government's initiative to promote learning to individuals and small business), and has more than a thousand students using e-learning in fifteen out-centres. The University of Derby Online (UDo) supports thousands of students through its custom portal and virtual learning environment, DEPOT, the Derby Platform for Online Teaching. The Centre for Interactive Assessment Development (CIAD) provides university-wide support for the development of computer-assisted assessment (CAA) using the TRIADS assessment engine, designed and developed in the University and now in use across UK higher education. The University has one of the biggest online collections of privately copyright-cleared articles and book chapters in the UK. From September 2003, Derby will be offering a foundation degree through the new UK e-University (e-U), one of just a few universities invited to help develop the e-U in its first year of activity. On top of these major cross-university projects there are many other, local initiatives within the seven schools.

The University's approach seeks to find synergies and economies between conventional delivery and e-learning, rather than develop a model with campus-based learning on one side and distance learning on the other, with an 'excluded middle'. This is sometimes known as 'clicks and bricks', mixing distant study online (clicks) with a component of attendance (which may be large or quite small) at a campus, out-centre or partner location (bricks). Currently some 1300 students are pursuing further and higher education courses mixing clicks and bricks, with the help of the 15 regional outreach centres. Some 1000 further education distance learners use the UDo platform. Derby is the most active of seven national Learning Through Work centres (with currently 1600 higher education module enrolments) and in 2002 celebrated the first ever graduate in the UK under this scheme, who achieved first class honours. More than 3,500 students in Israel receive 30% of their teaching by live, synchronous telepresence transmissions from Derby that run for up to 14 hours a day, six days a week. At the mainly 'clicks' end of the spectrum, 400 Derby enrolments are expected this academic year on undergraduate and postgraduate courses as various as Business Studies, Psychology, Environmental Management, and Education.

With the help of careful planning, development and investment in technology, Derby has become a distributed university, blending the real and the virtual, creating the kernel of a new kind of university for the 21st century. Rather than imitate old models, Derby is forging something new – modern, accessible, regional and global.

There is always a risk of rationalising after the event, and presenting a study that describes an inexorable trajectory founded on perfect decision-making. Chance and accident play a role, but it is never just that. It is important to be able to recognise a good opportunity, and then to be in a position to be able to capitalise on it. Given that Derby, like some other forward-looking institutions, was entering relatively uncharted territory with its e-learning ambitions, the approach taken to development is probably best described as one of 'praxis' – that is, modifying hypotheses, assumptions and policies in the light of the assessment of ongoing practice, rather than stubbornly sticking to a single approach. Praxis

admits the serendipitous and the opportunistic as elements contributing to the working out of strategy and policy, and their amendment.

This paper seeks to explain the historical development of the University's involvement in technology-assisted learning, the rationales, the strategies, the funding, the successes and the failures, and how more and more staff became committed to the use of technology in teaching and learning. It is hoped that other universities and colleges may glean valuable lessons from Derby's experience.

2 General Background

In 1989 a new Director of the Derbyshire College of Higher Education was appointed. He brought a commitment to three overlapping strategies that were to shape the direction and character of the institution that then emerged out of some seven years of stasis and stagnation – the new University of Derby.

- i) *Modularisation*, following the general approaches already in operation at Oxford Brookes University and Wolverhampton University in the UK. Modularity was necessarily coupled with credit accumulation. The new Director had been co-founder of the SEEC, the Southern England consortium promoting credit-based methods, out of which grew NATCAT and MidCAT, national and midlands-based credit accumulation and transfer groups.
- ii) *Access*, particularly regional and international, to draw in students without a previous family history of higher education, to strengthen the College's position in the midlands, and to build reputation and multicultural links. Derby's new head had also founded TEXT, the Trans European Exchange and Transfer consortium, an organisation working towards degree recognition, equivalence and credit accumulation and transfer, facilitating student movement between institutions across Europe.
- iii) *Innovation*, including rapid expansion of the number and range of degrees on offer through the modular scheme – the College was helped in this by the removal of constraints on higher education expansion by the Conservative government of the day. A first goal was to achieve polytechnic status, but in the end Derby achieved university status in 1992, with the polytechnics, by meeting a set of stringent criteria. Innovation in curriculum was also accompanied by growing innovation in modes of delivery, beginning with increasing use of resource-based methods and open learning. The goal became a new model of a university for the 21st century.

These changes were not universally welcomed, involving as they did considerable effort in designing and validating new programmes, under new academic regulations and a significant influx of new staff. There was also a feeling that the combination of regional and international ambitions was a mission conflict, particularly for the English institution furthest from any port, and with only a minor airport nearby (at the time). If there was indeed such a conflict, it has since been largely resolved by the use of technology and mixed-mode (blended) access to learning, which means the same or similar resources and platforms can be used regionally, nationally and internationally.

- **KEY LESSON: The three key strategies from 1990 – modularity, accessibility and innovation – reached an apogee of complementarity through the University's development of e-learning over the following decade.**

3 Technology: the early days

In 1989 the use of new technologies was not a high priority. The institution had embraced the new desk-top personal computers on a modest scale outside of specialist programmes, largely as a word processing tool, which coupled with photocopiers enabled the production of good quality customised handouts for students. A few of the more aware academics had demanded email access, and were using JANET (Joint Academic Network- the early UK Internet for UK higher education) to talk to colleagues in other institutions. Even fewer staff were thinking of using the computer for teaching and learning – on the contrary there was considerable scepticism at Derby, as in the sector as a whole.

However, two staff, who were to become very influential over the following years in implementing e-learning, were in discussions with a local company which had created a DOS-based software authoring package. This package was ahead of its time and was used with some success to develop computer-based assessments in Earth Sciences that were eventually to lead to the development of much more sophisticated assessment generation software that would become

the TRIADSystem. This isolated pocket of development continued to grow within the discipline but did not start to spread outside until 1992, largely because of the dearth of technical support and the complexity of authoring for what was, in hindsight, a relatively primitive outcome in pedagogical terms.

The true multimedia PC was yet to be marketed. To gain any real audiovisual input required add-on boxes like logic-controlled videorecorders and videodisc players, often coupled with a television monitor in addition to a computer monitor. One of the two early starters mentioned above, the head of educational methods and media (EMM, a central service) cautioned against investment in this mixed technology, urging that the time to take multimedia seriously was when it could be economically delivered from just one 'box'. This led to one or two accusations of foot-dragging or technophobia, but it may ultimately have saved some money for the University. The first round of the Teaching and Learning Technology Programme (TLTP1- a funding scheme administered by the then Universities Funding Council) was launched in 1991 on the cusp of the arrival of the multimedia PC – too late for many of the funded projects, which were to experience rapid obsolescence and thus loss of continuity because they used complex multi-box configurations.

At Derby, however, a member of the earth sciences department, one of the two early enthusiasts mentioned before, had received modest funding, an ad hoc allocation from the pro-vice-chancellor (PVC) (Academic), to refine a computer-aided assessment (CAA) engine he was developing using Authorware. Authorware was one of the most sophisticated multimedia authoring packages available in the early 1990's. At the same time the team from earth sciences at Derby joined the Earth Science Courseware Consortium (University of Manchester) funded under TLTP1 to produce interactive courseware to support core areas of earth science teaching. Two interactive courseware modules incorporating the early CAA engine were produced by the Derby team and are now marketed globally.

The CAA work continued at Derby during this period. It attracted HEFCE (Higher Education Funding Council for England- the successor to the Universities Funding Council in England) support in the 'TRIADS Assessment of Learning Outcomes' project under the Fund for the Development of Teaching and Learning (FDTL) initiative. This was a collaborative project between Earth Science departments at Liverpool, the Open University and Derby, all of whom had gained an 'excellent' rating in their Teaching Quality Assessments which qualified them to bid for funds.

TRIADS has evolved into perhaps the most powerful computer assessment engine in the world today in terms of variety of question types and marking algorithms. It has been evaluated in 45 academic departments and central service units at 27 UK universities in 24 disciplines. Many departments are still using the earlier version and their feedback has been invaluable in directing current developments.

But back in 1992, usage was still largely restricted to geology. However, the national TLTP programme was about to have its second and most profound impact on the University's uptake of new technology and the shape of future ambitions.

- **KEY LESSON: It is important to provide continuing support to early adopters, particularly when they are working with generic systems. It took over ten years to bring TRIADS into general use. External funding was not sufficient on its own to sustain the momentum over this period.**

4 VESOL/TOTAL and Masters Degrees on CD-ROM

The expansion of the institution between 1989 and 1993, from 3,200 FTEs (full-time equivalent students) to over 6,000 FTEs, brought in many new teaching staff, a few of whom had a burgeoning interest in new educational technology. A small group in the newly formed School of Health and Community Studies was centred around psychology, pharmacy and radiography. The new Dean, coming from a background in health service administration (originally a pharmacist) was not constrained by traditional academic values and experience. He was eager to embrace new technology and new modes of study, including distance methods. There were two barriers to rapid development – the cost of creating multimedia learning resources and the necessary development of appropriate expertise. The TLTP programme was to provide the necessary resources to overcome both.

Following a chance conversation between the head of psychology and the head of EMM, a TLTP2 bid was put together in summer of 1993 that brought together two embryonic ideas with a common thread of enabling academics to author learning resources with very little support and without the need for a complex and steep learning curve. VESOL, Video autoproduction and Editing System for Open Learning, had been schematised by the head of EMM following a conversation with the PVC (Academic) about the feasibility of recording lectures to video cheaply and simply. He came

up with a configuration that enabled academics to use a multi-camera system to record their lectures in real time as they lectured. Its technical practicality as a cheap system had been successfully explored by staff in EMM. TOTAL, Tutor-Only Transfer of Authored Learning, was a multimedia authoring package that stripped away the complexity of an authoring programme like Authorware by creating a simple 'shell' into which teachers could transfer more conventional paper-based resources and audio-visual materials. TOTAL helped inspire a belief among a few staff at Derby that authoring e-learning need not be difficult or expensive, contrary to a widespread belief (possibly originating at the Open University) suggesting that 100 hours of staff time were required to create one hour of interactive learning. If such a figure had been accepted by the e-learning protagonists at Derby, the University would not be where it is today. Instead they had faith that ultimately technology would at best reduce costs without reduction in quality, and at the very least substitute for other methods and increase flexibility and variety. Technology had had dramatic impacts on other sectors of the economy and it was unlikely that education would be an exception.

VESOL/TOTAL was a single institution TLTP2 project, attracting £180,000 (US\$285,000) over three years beginning in September 1993. The boldest predicted outcome was that lectures would be readily videorecorded and transmitted to student study-bedrooms. This actually became possible in 1997, one year after the project had officially ended, but, of course, there was no real call for it pedagogically. Such claims – technological possibilities desperately in search of a *raison d'être* – were typical of a lot of TLTP projects, and marred them. Fortunately, this aspect was not central to the Derby project, and the main outcomes were based on the thread of making the creation of learning resources using technology much simpler and cheaper and, most importantly, generic: that is, easily usable by all academics, whatever their discipline.

The take-up of TOTAL was disappointingly small, but this was partly because it was overtaken by the arrival and development of the WorldWideWeb (WWW) in the mid-1990s. Bruce Ingraham from Teesside University has claimed with some justification that the WWW set back the development of e-learning by up to 10 years, because it supplanted multimedia development in most institutions: only recently has the WWW come anywhere near the authoring power of multimedia software like Authorware. But not at Derby. Although TOTAL never really achieved its more ubiquitous aims, it did stimulate a lot of interest among staff in the possibilities offered by computer-assisted learning, and more importantly it pump-primed the formation of a Multimedia Development Unit (MMDU) within the School of Health, with very skilled and imaginative technical staff. The way was free to develop distance learning resources using computer technology. Masters degrees in pharmacy and pharmacology were chosen as the subjects, partly because of the interests of the proactive staff, but also because these disciplines lent themselves to the audiovisual and simulation abilities of multimedia, and pharmacists were almost certain to have access to good quality computers. Five MScs were developed in all and launched in 1996, with students in the UK and overseas, delivered largely on CDROM with increasing WWW support as this improved in usability. In 2001 these programmes received a top mark of 24 following a 'Teaching Quality Assessment' visit from the UK Quality Assurance Agency – quite an achievement for a distance learning programme at postgraduate level using advanced technologies. Around the same time the School of Health also developed more conventional paper-based distance learning packages in subjects allied to medicine, which scored an 'excellent' in teaching quality assessment. The School became a focus and exemplar for distance learning as well as the use of technology, and it developed administrative and quality assurance procedures that were later to inform the whole University as the use of e-learning spread.

The second half of the TLTP2 project, VESOL, was highly successful in achieving its aims, with the diffusion of the outcomes continuing to this day, making it one of the most successful of all the TLTP projects. Several universities use VESOL systems or similar, but the principles that lay behind the development of VESOL have influenced the use of video in the whole sector, through publications, conferences, and currently a series of six workshops across the UK. Within the University, VESOL demonstrated that technology could be generic in application and relatively simple and cost-effective to use. All first year lectures in psychology are recorded. Sociology also makes extensive use. One of the most significant uses in terms of cost-effectiveness has been by the careers department. Staff with very little presentational experience have made videos in a few hours with almost no technical support on topics such as 'writing a curriculum vitae', 'interview techniques' – a suite of six videos in all that has saved staff an enormous amount of repetitive time with individual students. With the growing use of video streaming, the incorporation of video resources into e-learning is increasing, and no doubt VESOL will gain new life from such developments.

At the beginning of the VESOL/TOTAL project, the team conducted a questionnaire survey into attitudes of academics towards educational technology. Over 100 staff responded. The results suggested that the prevalence of technophobia was probably very small, and that the main barriers to adoption of new methods were a lack of time and a lack of staff development opportunities. That staff were not particularly suspicious of senior management motives in promoting the use of e-learning was a surprising result considering the cynicism then widely reported in the sector as a whole.

- **KEY LESSON: Even though external funding can pump-prime developments, there must be a commitment to ongoing internal investment. Three years is generally not long enough to begin to embed innovation.**

5 The Academic Development Fund

In 1993, the head of EMM was responsible for the academic staff development programme. He had argued for some time that event-based staff development was very limited in its impact, particularly with reference to technology-assisted learning. Staff needed to apply what they learned in staff development soon afterwards or the impact was lost. But the opportunity to apply technology-assisted learning methods was not common, because it was not usually in the hands of one individual – it required teamwork, technological resources, technical support, and most of all, time. What was needed was a development fund that could buy staff time for real curriculum-based projects. The results of the questionnaire survey supported this view, but at the time there was just a small amount of money administered by the PVC (Academic) for purchasing equipment in support of projects (which had pump-primed the CAA developments).

In 1994, a reorganisation of responsibilities in the Directorate was to prove very significant. Acknowledging the discussion of the pros and cons of 'convergence', which was very current on the service department side of the sector at the time, a PVC was given responsibility for learning support services, bringing together the library services, computing services and educational methods and media service under a single senior manager, but without merging the services themselves. The new PVC argued for a fund to support development of teaching and learning, just as funds were provided for new research activity. The time was ripe, and in the autumn of 1994 the vice-chancellor allocated £200,000 (US\$320,000) over two years for an academic development fund (ADF). The PVC (Learning Support Services) and the head of EMM set up a representative committee, with a member of staff from each School who had a strong interest in developing teaching and learning methods and quality. Bids were invited from staff, individual and group, academic and support, against a set of criteria that included quantifiable outcomes in terms of efficiency, effectiveness and quality of the student learning experience – plus some financial commitment from the School. Projects did not have to be technology-based, but the interest stimulated by the VESOL/TOTAL project, the growing use of computers, and staff development events on using the Internet and computer-assisted learning, meant that a majority were. A points-based voting process was used to select bids, with about a quarter of the funds reserved to review successful and unsuccessful submissions in terms of balance of outcomes and good cross-university involvement. To some extent the whole process was inspired by the TLTP programme but with more specific criteria, representative selection methods, and tight monitoring.

The ADF was very well-received by staff as it offered opportunities to do something substantial and concrete in terms of teaching and learning development. It was a largely bottom-up process with little bureaucracy – staff just needed their Dean's signature approving the project. Technical support was provided by the MMDU and EMM at no cost to the project. The WWW was still in its infancy, and did not form part of any successful bid.

In 1996 a new Learning Centre to replace the old main library was under construction, with HEFCE library support funds. The specification was advanced, to include 300 open access computers connected to a high-speed ATM network, itself connected to the University's intranet. Thus a second round of the ADF was launched with an overarching criterion – the use of the new networks in the Learning Centre, electronic and human. The aim was to launch the new centre as the hub of the University's learning support systems. The same process was followed as for the first round. The WWW was now beginning to feature in projects. To help support the ADF and other technology-based developments more effectively and efficiently, the MMDU was merged with EMM to form a new central support service, the Centre for Educational Development and Media (CEDM). This became a powerful engine of support for e-learning developments, incorporating all the necessary media in units within metres of each other – video unit, photography unit, graphics unit, multimedia unit, classroom services unit. To strengthen this further, the PVC (Learning Support) obtained the resources to staff a new Internet development unit. The whole complement of staff in CEDM was now around 30, making it one of the largest and most powerful educational development centres in the UK.

The outcomes of the two rounds of the ADF were quite mixed. Relatively few projects were completely successful, but many achieved at least some of their aims. A few failed completely. In some cases careful monitoring ensured that resources were handed back before they were lost and were redistributed to more successful projects or to projects that had missed out in the original selection. The net outcome compared favourably with the national TLTP programme. However, like TLTP, the real long-lasting benefits lay elsewhere than in strict project outcomes - in stimulating curriculum development and a will to change; in spreading expertise and understanding of technology and pedagogy; in in-depth academic and support staff development; and in developing support services and systems.

Unfortunately for the TLTP programme, these other benefits were often dissipated through loss of temporary contract staff and with them the expertise and familiarity with the institution's systems. Or there was a failure to capitalise on the potential long-term benefits through lack of further funding internally to continue to develop skills, and to build support services and systems, letting key staff fall into limbo or do less innovative work. This was possibly exacerbated in the more federally structured institutions where support staff tend to be dispersed. As a more centrally directed institution, it was no doubt easier at Derby to build efficient and effective central services, despite complaints from academics about the top-slicing involved. A large central service like CEDM can offer good career opportunities, good staff development, and shared skills and responsibilities that can protect against the loss of important staff. Efficiency and service-orientation help to maintain the support of academics for the service and with it the funding. It is possible to plan effective retention and succession to maintain the strength and reliability of the department. This is surely a key area where many universities have failed in the past. Some institutions are now trying to rectify this using the recent TQEF funding (Teaching Quality Enhancement Fund, another HEFCE initiative), a lot of which has been spent on establishing central technology support. But when the TQEF ceases in 2005, there is a danger that the same mistakes will be made again.

- **KEY LESSON. Staff development is critical to success. The usual seminars and courses are not enough. Staff need time and resources to engage with innovation in teaching and learning through work-based projects.**

6 Challenges, Problems and Networks

The ADF did not go unchallenged. In particular, the PVC for finance and estates asked difficult questions about the outcomes and cost-effectiveness, given the very tight financial budgets across the institution. These proved awkward to answer with hard data, partly because it was too early to expect any real impact – it was really seed corn funding so far – but also because evaluation methods for technology-assisted learning were generally unrefined at that time, and costly. However, certain answers could be inferred. Firstly, most of the investment in the hardware, such as student workstations and the Intranet, was anyway essential to keep the University attractive and competitive. The additional funds devoted to learning resources and support were comparatively small. By 1998 the University had 11,000 FTEs. Student numbers had almost quadrupled while staff numbers had less than doubled. As well as increased class sizes, there had been substantial reductions in contact time, and a consequent big extension of resource-based and independent learning. This was supported by paper-based resources, as the growth in printing and photocopying clearly showed. But, it was argued, the use of computer technologies was now playing a growing role. The increasing use of resource-based and open learning methods, as well as improving efficiency, helped develop students' independent learning skills within a student-centred framework of support for learning. It also helped free up staff time to work on the growing number of overseas extensions, and to pursue research interests and consultancies, supporting income generation.

There were other problems generating criticisms, and thus queries about the directions being taken. The network in the new hi-tech Learning Centre proved unstable, and it took three years to resolve fully – not helped by a 'flaw' in the main servers the manufacturer omitted to mention, wasting several months of investigation. There had been an early agreement between computing services (CS) and EMM to divide responsibilities; CS would maintain the networks and hardware, while EMM would lead the creation of the resources that were delivered over the networks. The success of the support and promotion of e-learning meant that network development barely kept pace with the volume of activity. Users were driving the agenda. A more measured, joined-up approach might have eased the strains, and reduced the frustrations, but would probably have slowed the pace of development.

However, the VC kept his nerve and faith in those who were leading developments, and continued to argue for ring-fenced funds for e-learning - now with the University's governing body, which was also beginning to seek clarification on the returns expected from the investment. Special meetings of the University Court, chaired by the chancellor, were held to explain the policies and achievements to governors and the outside world, and gain support and advice.

- **KEY LESSON: It can be very difficult to show short term benefits for the investment in technology-assisted learning. The vision needs to be over the medium to long term, not deflected by the inevitable setbacks, but providing continuity of support.**

7 The Operational Plan for the Teaching and Learning Strategy

In 1997 Derby's first Teaching and Learning Strategy was produced, which stressed student-centredness, the quality of the student experience, and the growing importance of new methods and technologies. At the same time there was a discussion of whether to continue with a third round of the ADF in 1998. It was becoming apparent that the bottom-up method had its limitations. It was as if there was a glass ceiling. The teachers who had new skills could see and hear the calls from the senior managers for further developments, but their own managers seemed largely unaware of the new skills their staff had acquired, or were unable to find ways of using them. The Directorate decided to switch to a top-down approach, with an average expenditure of £350,000 (US\$554,000) per annum, which was a massive increase over the old ADF. The increase was possible because of extra funding the University was to receive from HEFCE over a three year period (£1m in total- US\$1.6m), as a part of the funding council's attempts to create a more equal funding regime across UK higher education. The Directorate decided to top-slice this windfall, and use it as an investment opportunity. To get a share of this extra funding, school deans would have to bid for resources for development projects that promised greater efficiency and/or new income streams, particularly involving new modes of delivery. To do this they would have to harness the skills that had been developed under the two rounds of the ADF, and develop new skills. Projects would have to reflect some of the costs in keeping support staff together, with funding to enable CEDM to employ temporary technical support staff. Potential project leaders would have to discuss support needs with CEDM. Projects would have to explicitly connect to the learning and teaching strategy, and the current institutional priorities as expressed in the corporate plan. Together, they would form the annual Operational Plan for the Teaching and Learning Strategy (OP). The head of CEDM was again given oversight of the OP, and he drew up documentation explaining the process, strategic directions and priorities.

In 1997, a decision was also made to develop an online university, inspired by the example of the University of Colorado, (C-U-Online), and thus to capitalise further on all the progress that had been made at Derby. Colorado had created an e-university by simply buying in the whole system from Real Education, a new branch of the Real company that provided video and audio streaming solutions. On investigation this proved too expensive a route for Derby, and it was decided to develop an online university in-house using commercially available software (Lotus Learning Space). The concept of the University of Derby Online (UDo) was developed, not as something separate from the campus university, but as something co-extensive with it; not so much a mirror image as an equivalent virtual university overlaying the real university and blending in with it. Although UDo would support the University's regional access agenda by enabling mixed-mode (blended) and distance education to students off campus, it would also support on-campus students. Only by being this versatile could it be cost-effective.

Derby was almost unique in this 'universal' vision for e-learning. At the time, most institutions saw it as supporting either conventional students, or just niche distance learning. The head of CEDM called the vision "The Cheshire Cat University", a metaphor based around the cat in Alice in Wonderland which would appear and disappear at will, much to Alice's irritation. In the future, in an ideal world, Alice (the student) would 'see' the proportion of real (campus) and invisible (virtual) university that exactly met her domestic/work/leisure needs. Campus-based and distance learning would blend into a continuum, students studying at all points between the extremes, with the middle or mixed-mode part becoming increasingly dominant. This vision may have seemed slightly fanciful to some, but it did influence the way in which e-learning systems and provision developed, because it could embrace and harmonise so many different methods and modes.

Funding to set up UDo was included in the first OP, continuing for three years until finally rolled into the budget of CEDM itself. Thus a key feature of the OP was the development of e-learning resources, preferably complete modules, for delivery through UDo. The Derbyshire Business School was the first school to sign up to this, with a proposal to put the whole of the BA in business studies into e-learning format over three to four years, and the MSc in strategic management. Other schools put forward less ambitious but nonetheless significant proposals.

The OP ran on an annual basis from 1998 to 2002. During that time it funded several complementary projects to support UDo as well as the conversion of courses to e-learning format:

- i) An Instructional Designer. A key position in CEDM. The terminology comes from North America, for someone who works between academics and technical staff to ensure pedagogically sound resource production with a good quality 'feel'. Such a person needs to understand the discourse of both sides of the equation. It proved very difficult to make an appropriate appointment, as this kind of position was virtually unknown in the UK at that time. It took two attempts and about eight months to get someone into post. Since then, one or two other staff in CEDM and the Schools have begun to acquire similar skills through experience and discussion.
- ii) DEPOT. It was clear by 2000 that Lotus Learning Space was not really suitable to support the growing portfolio of online learning at Derby and IBM/Lotus were not going to address the issues raised by educational, as opposed to training, use. Prompted by a discussion paper from CEDM, senior managers decided to authorise the creation of a simple in-house portal, the Derby Platform for Online Teaching (DEPOT) that would unify access to all the University's e-learning provision, and enable the use of Microsoft Explorer HTML pages, with simple add on software, as an in-house Virtual Learning Environment (VLE). It was initially seen as a holding action until a suitable commercial product, or open source software, stood out above the rest. It took the equivalent of about eight developer-weeks (around £4,000- US\$6,3000) to generate the initial launch version, making it very cost effective. The annual pricing policies of the VLEs most used in the sector were /are quite costly for a large institution, and also cause some concern that product 'lock-in' could hamper future flexibility. Consequently DEPOT is still being improved, and is now part of a current project to create a fully operational MLE (managed learning environment), communicating with the University's relational database information system, Genesis. The Global University Alliance uses a custom version of Blackboard, so the e-learning development unit is very familiar with authoring for this platform. The view is that the University should be prepared to use several different VLE platforms, according to the activity, rather than try to standardise on one. DEPOT has been developed as a single point of access to such different platforms, franchises and partnerships.
- iii) The Electronic Library (UDEL). The University library service had introduced a policy of purchasing published materials in e-format where technically and financially possible. To improve access to recommended sources, including both articles and book chapters, the UDEL project was proposed to digitise selected materials in house, following copyright clearance. Staff were appointed and funds provided to pay clearance fees, and the project later began to make use of facilities developed within the HERON scheme, set up as part of the JISC funded eLib programme. The project has now been rolled into the annual Learning Centre funding, and UDEL has been merged with other electronic library resources (including both e-journals and e-books). About £30,000 (US\$47,500) pa is spent on copyright clearance. Derby has one of the biggest privately cleared online libraries in the UK. Materials are cleared for all registered students, globally.

- **KEY LESSONS: The vision must encourage complementary projects, and fund them.**
- **Implementation needs more investment not less.**

8 The Global University Alliance (GUA) and Quality Assurance

In 1997, Derby's chancellor, Sir Christopher Ball, a consultant on higher education matters, was invited to a meeting to discuss proposals for an international online university. The initial proposal came from the Auckland Institute of Technology in New Zealand, and interest was raised in certain universities around the world. Ball suggested that Derby should join, given its advanced position in online methods. It was a bit of a leap in the dark at the time, though by the third consortium meeting a commercial partner, NextEd, had joined, with a lot of experience of delivering e-learning in Australia. NextEd was to provide the infrastructure and 24/7 operations. It took nearly three years to get the GUA up and running, with quite a few changes in membership along the way, but it went 'live' in October 2000. The conversion of UDo modules and programmes for possible distribution through the GUA occupied a very large part of Derby's Operational Plan for 1999-2001, with work still continuing today completing module sets and starting new programmes.

The decision to join the GUA caused a shift in Derby's focus within the University of Derby Online project, which had been developing support for envisaged regional mixed-mode provision using out-centres, towards a programme of 'total'

distance learning degrees, delivered almost entirely online. Membership of the GUA sped up the development process and steepened the learning curve for academics and technical staff.

Substantial pressure was put on the Centre for Educational Development and Media (CEDM) to meet the GUA start deadline, at the same time as UDo was being publicly launched with a completely redesigned 'front end'. There was a crisis of confidence between the senior management team in CEDM and some technical staff in the Internet development unit. On the technical side, staff felt they were being asked to do things that did not follow established WWW technical design principles, while management thought that technocratic preoccupations were undermining the delicate balance between pedagogy/academic needs and technological facilitation. Several technical staff left of their own accord, including the head of the Internet development unit. Though this was a setback at such an important time, the remaining technical staff rallied round, and the opportunity was taken to reorganise. The multimedia development unit and the Internet development unit were merged under a new head of e-learning development, appointed from outside, who had experience of running a commercial e-learning authoring company. This was a timely move, as the distinction between WWW authoring and multimedia authoring was dissolving. New young technical staff were recruited, and the net result of the crisis was a stronger department, better adapted to the challenges ahead. This strength was cemented when the Directorate agreed to give permanent contracts to most of the developers.

The Business School was also under a lot of pressure to deliver converted modules to very tight deadlines. Staff already worked long hours, and buying out their time proved problematic, because it was often difficult to find part-time replacement staff with the necessary combination of expertise. An alternative system was offered as an option, paying staff a set fee to do the work in their own time. Both full-time and part-time staff then volunteered to do e-learning conversion. A standard fee structure was set of £2,000 (US\$3,200) to the school if the module was in a relatively conversion-friendly format already, £3,500 (US\$5,500) if it wasn't. Line managers could use this resource in whole or part to recruit part-time replacement staff or pay regular staff a one-off fee. A further £3,500 per module was used to support added technical staff costs in CEDM. With this approach a relatively speedy 'production line' was set in motion.

Rapid development of the GUA also placed great pressure on quality assurance procedures. Although in most cases modules were converted within the key descriptors of the original validation, and so full revalidation was not required, there were obviously significant differences in the resources used and the way academic support was accessed. However, the experience of developing and running five MScs by distance learning, in the School of Health and Community Studies, offered models and guidelines for GUA courses. In fact, the dean of this school was given the role of directing GUA development at Derby from the start, with the PVC (learning support services) in executive command. They are supported by a business manager and an operations manager for e-learning. This team is now one of the most experienced in the world in starting up and running new online educational initiatives globally.

All online resources are validated for appropriateness and quality by external academics. While this would be very unusual for resources used on conventional courses, it was thought necessary in this case to reassure all stakeholders and external sceptics. CEDM must also 'sign off' new modules in terms of technical quality, ease of use and levels of interaction. The student administration service has developed special administrative systems and also checks that courses are running smoothly with good student support. What Derby is doing with its GUA partners, in scale at the very least, is almost unique in UK higher education. Discussions with the UK Quality Assurance Agency on how provision might be reviewed are ongoing. Most departments in the university have had to adjust the focus of their procedures to ensure a 'total quality student experience' in e-learning – this has included Marketing, Finance, Student Administration, School administrative sections, academic departments, CEDM, CIAD, Library, Computing Services, Quality and Staff development. All this work on new procedures has resulted in the production of Derby's e-Learning Handbook, which is the bible that everyone working on the development of e-learning resources, and not just for the GUA, must follow.

Although student recruitment through the GUA has been slower than expected, it is one of the most successful collaborative partnerships in developing flexible access to international HE opportunities worldwide – and perhaps the most successful in harnessing the power of online distance learning in a global context. However, it was always recognised that projected levels of activity in a largely unknown and unexplored marketplace would make progress following the launch of the GUA somewhat uncertain. In fact, one of the reasons for the creation of the GUA was to help create the marketplace itself and then establish the GUA as a leader. Start-up costs were quite modest in the light of some of the figures being specified by other consortia now proposing to enter the field. These were shared between the ten universities and the commercial partner (excluding resource development costs, which are the responsibility of each individual institution).

The marketplace for online learning seems to be very price-sensitive at this early stage. This may change, but too little attention to initial and ongoing costs has caused major problems for the survival of some well-known international online learning operations. Because of such risks, all activity at Derby had to have other possible uses and outcomes. The high quality output of Derby's e-learning production systems is increasingly acknowledged – by commercial partners NextEd who have a broad knowledge of international offerings (and have invited Derby to join new initiatives); by the UK e-University which will shortly be offering a Derby degree; by other institutions which are commissioning e-learning development services from Derby; by commercial organisations which have commissioned resources of various kinds, such as the Cambridge University Press; and by significant external agencies which have been very impressed by the e-learning infrastructure developed. Interest has been stimulated from several other platform and content providers who view Derby as being at the leading edge of developments in this field (such as Indelta, which operates in and around Australia). The GUA is now creating additional access opportunities through the development of study centres in a range of countries. Provision offered will be GUA branded, introducing qualifications which facilitate collaborative programmes, and ensure progression to awards in the US, UK, Australia and New Zealand.

Most significantly, the University is moving to further capitalise on what has been achieved by offering some complete modules in e-learning 'distance' mode to on-campus students. This will further help develop students' IT and independent learning skills, and add flexibility to the use of staff time. It is a trend already observable in some US universities, many of which already have state-wide 'virtual' provision.

- **KEY LESSONS: Technology and pedagogy must go hand in hand. It is less a question of one leading the other, as of a dynamic or dialectic between them.**
- **Appropriate new quality assurance procedures must be codified, yet integrated within overall institutional systems**
- **Development costs should be amortised flexibly across a range of modalities of use. It is unlikely that lone developments will recover costs, even in the medium term.**
- **It takes time to build a positive identity in the new world of online learning. There is no real evidence that the leading or elite 'brands' in campus-based learning can transfer easily.**

9 University for Industry, Learndirect and Learning Through Work

In 1998, following several years of discussion and preparation, the University merged with a college of further education, High Peak College in Buxton, some 35 miles away in the Peak District. This was another important development of the access mission of the University - the dissolution of the remaining divide in post-16 education in the UK, and heralding the possibility of a credit-based, seamless ladder for working towards a degree.

Given the relative remoteness of some of the region surrounding Buxton, High Peak had already developed distance learning and access through out-centres. With the merger, these were further developed and extended, and technologically enhanced. When the University for Industry (Ufi, a new government initiative to extend training and education provision across the UK using online methods) called in June 1999 for bids to lead local hubs to distribute the newly commissioned portfolio of short unaccredited courses, aimed at under-represented learners and small businesses, the University was ideally positioned to lead the bid for Derbyshire. Since September 1999 the Derbyshire Hub has been located at the University, with the PVC (client services) as chair of the management committee until 2001.

Despite many initial problems with the Ufi e-learning platform, and connectivity difficulties for many of the partners in public, voluntary and private sectors, the Derbyshire Hub has emerged as one of the most successful in the country, having to put the brakes on recruitment because of a lack of government funding to support learners. It now meets the needs of 6000 learners across Derbyshire annually.

Meanwhile Learndirect (the Ufi's operational identity) sought to enter the HE arena. There were some extremely difficult encounters as Learndirect and the HE sector struggled to understand one another's motivations and constraints. When Learndirect suggested the development of a VLE/MLE platform to support negotiated work-based learning, Derby saw an opportunity. The PVC (client services) was already leading such a work-based scheme internally, and successfully bid to be one of five universities to work with Learndirect and the IT company ICL (now a part of Fujitsu) in creating the platform. Although this involved 18 months of often tortuous progress, the involvement of the HE partners helped steer the project towards a highly user-friendly online MLE through which learners negotiate an individual or cohort learning contract for work-based learning towards a higher education qualification – from a Certificate in HE up to a Master's degree.

Derby currently has over 65%, some 321, of all the students enrolled among the ten universities in the scheme, and as the leading site has had to face many challenges while trailblazing. More than 80 companies are involved as workplaces. The first graduate was a Derby student. He was a UK citizen studying from his workplace in Denmark, and gained first class honours. This is a great achievement for him, his company, the University and Learndirect, and is indicative of the validity and robustness of the whole concept, and its implementation.

The approach to e-learning is essentially a blended one. Students make more or less use of online resources according to their circumstances, contract and type of programme. However, the platform offers full online support – negotiation, communication and administration. At Derby, students are beginning to use part or whole modules offered within the GUA, as well as other online resources offered by UDo. This is further evidence of the way Derby resources are crossing over into different operations and modalities, and improving the cost-effectiveness of e-learning development.

- **KEY LESSON: E-learning should be seen as assisting the permeability of education across 'artificial' boundaries, such as between FE and HE, between educational institution, home and workplace, as well as across national frontiers. Making e-learning cost-effective demands such permeability and flexibility.**

10 Telepresence Teaching and Israel

In 1996 the University began its biggest overseas operation with a partner in Israel, Inter College. This had its origins, like the GUA, in the chance conjunction of people and places at an opportune moment. Courses were largely conventionally taught at a number of centres spread across the country. Within three years there were over 6,000 Israeli students registered on Derby undergraduate and postgraduate degrees. However, in 1999 the Council for Higher Education in Israel, which grants licences for overseas higher education providers to work in the country, changed the regulations: from September 1999 overseas institutions would be required to provide 30% of the formal teaching using staff from the home country. This proved too onerous and expensive for many overseas universities with small franchises, and they ceased operations in Israel. The investment in the Israel extension, particularly by the Israeli partners, was enormous – buildings, teaching rooms, libraries, IT centres, right down to University of Derby signage. To close this down would have hit Derby's partners badly, much worse than the University. Yet the scale of the operation meant that the costs of flying lecturers to Israel would be high, and the logistics of scheduling this and moving staff around the centres would be forbidding. A technological solution such as videoconferencing was a possible way forward.

Although videoconferencing was then used for management meetings, exam boards and staff development, it had initially been rejected for teaching purposes within Israel between centres as being no more cost-effective than moving teaching staff around or employing extra staff. Now it was reconsidered for teaching directly from Derby, using multipoint technology so that several centres could receive the same lecture simultaneously. By this time, an innovative new system had been developed by Gilat Communications (now called Mentergy), an Israeli company, for the Open University of Israel. The Head of CEDM at Derby was asked to evaluate various options, make a recommendation to the board of directors of the extension, and lead the chosen project. The decision was made to go ahead with the Gilat system, but with important modifications and additions.

The outcome was the Telepresence Teaching Centre for Interactive Distance Learning at Derby – five studios connected by two-way audiovisual satellite transmission to some 26 classrooms in five centres in Israel. Three years on, in scale and complexity, it is still unique in the world. Lecturers regularly connect to up to five classrooms at once (the record is currently seven), with up to 200 students logged on. In the first ten weeks of operation it delivered some 7,000 classroom hours, representing around 150,000 hours of student learning time. The secrets to the success lie in the interaction management system developed by Gilat (with Arel), which more than replicates conventional classroom interaction, and in the user-friendly studios specified by CEDM at Derby (assisted by the experience of VESOL), which teachers use without the immediate presence of technical support. Most staff have been able to adapt to this mode of teaching, and some have found that the experience is feeding back into the way they teach in more conventional settings. Although the total capital cost of the system was over a million US dollars, largely an investment coming from partners outside the University, running costs are kept economical by the low levels of technical support and the relatively narrow transmission bandwidths. It would not cost as much to set the system up today, given the continuing reduction of computing and communications costs. Indeed, it is proposed to extend the system to Derby's new campus at Buxton in the Peak District. The cost should be recovered within three years by savings in travel expenses.

Like the GUA, the Telepresence Teaching Centre is a pedagogical and a technical success. Both have been operating for nearly three years, though work is continuing on each to further enhance the student learning experience, in response to feedback and action research. There is substantial similarity between the degree programmes offered, but this reflects the international demand for professionally and vocationally orientated courses rather than any overlap in methods, at least at present. However, technological convergence, and work to enrich the student experience on distance learning programmes, is likely to mean some degree of cost-effective integration over the coming years.

- **KEY LESSONS: Staff are much more likely to adapt to complex technology when it is clearly a solution to a problem, rather technology in search of a problem to solve!**
- **Tomorrows distance learning students are increasingly likely to benefit from some form of synchronous classes, provided using telepresence methods, which may help improve motivation and satisfaction levels for distance learners.**

11 Strategies and Strategic Plans

As stated in Section 2, the University's mission and corporate plan has been central to the way in which technological enhancement of teaching and learning has developed, in particular with regard to improving access and increasing participation, and creating a modern, innovative institution that did not seek to emulate closely any of the more traditional models of the university.

In 1997 the first learning and teaching strategy was approved by Academic Board. It included a number of references to the use of technology to enhance efficiency, effectiveness and variety of provision. Some staff thought there was too much reference to technology. This strategy underpinned the new annual Operational Plan.

In 1999, the Higher Education Funding Council for England (HEFCE) required all institutions to submit learning and teaching strategies in order to release Teaching Quality Enhancement Fund (TQEF) resources. The Derby strategy was largely rewritten as the Learning Teaching and Assessment Strategy (LTAS), and because the previous strategy had not been specific enough about outcomes and timescales, it was formulated in two parts – a strategy and a strategic plan. The first was a five-year document, developed through consultation, stating the main aims and general directions; the second was a three-year management document stating outcomes with expected milestones to a set timescale. Together with the one-year operational plan, which specified projects and funding for the coming academic year, a very clear and precise three-tier strategy evolved which could be evaluated year-on-year. Schools were required to develop strategic plans that operationalised the institutional strategy.

There was even more reference to the use of learning technologies in the new LTAS, including the setting-up of a new centre for interactive assessment development (CIAD) to promote computer-aided assessment across the University. Half the TQEF allocation went towards supporting the CIAD for three years, with precise quantitative milestones.

However, there was no parallel strategy for IT development that reflected the growth in e-learning anticipated in the LTAS. Although there was a communications strategy, the thinking was not yet 'joined-up'. Together with the speed of growth created by GUA membership, this pointed to the need for an e-learning strategy itself, underpinned by a technical strategy that went into detail on hardware and software requirements, with milestones etc. An e-learning strategy was first drafted in 2002, and it in turn revealed the need for a pedagogic strategy for e-learning, to create even more joined-up thinking on how technology would work in future in support of learning. This has now been developed around three key aims – the enrichment of the e-learning experience by moving yet further on from pure text, making greater use of multimedia; the development of flexible and reusable 'learning objects' in multimedia formats; and new kinds of team-working to generate more synergy between pedagogy and technology, throughout the development process.

On top of this, the cross-university dean of academic planning was tasked with creating more harmony between all the institutional strategies, including strategies for staff development and access, and ensuring that school development plans properly reflected institutional objectives as well as their own. He devised an annual two stage iteration.

The development of all these strategies, because it has never been simply the ticking of boxes or just an exercise to please a funding body, has greatly aided the rolling out of e-learning. Integrated with strategy and policy development, a set of ad hoc management committees 'emerged' to assist implementation – the e-learning strategy group, the e-learning operational group, and the e-learning technical group.

12 The Role of Support Services

The growth and increasing sophistication of support services were fundamental to the development and scalability of the University's e-learning aims.

i) **The Centre for Educational Development and Media (CEDM).** This was the main engine of change. It began life as just Media Services with six staff in 1985 and a budget of less than £50k (US\$79,000), and at its peak seventeen years later had some 40 staff and a budget of around £1m (US\$1.6m). Throughout that period it had the same head of department (the author), who began his career as a trained teacher and academic with a strong interest in the use of technology, particularly film and video. He brought a belief that technology and pedagogy should go hand in hand. The department should shun technocratic attitudes and serve the teaching staff by making technology more effective and usable, avoiding the 'toys for technicians' approach, and justifying itself through clear value for money. Over the years, performance indicators were developed to demonstrate this value in an annual report to Academic Board. Thus when investment was requested, there was usually some confidence it would be efficiently used.

To help integrate pedagogy and technology, CEDM began offering staff development sessions, eventually working with the human resources department to provide a full programme of events for academic staff, including an annual staff development week in June – on all aspects of teaching and learning, not just the use of technology. Isolated technical staff employed to provide media services in the schools were gradually brought into the central service, which enabled the creation of much better career development prospects for them, with staff development to enhance their abilities. Instructional design skills were brought in and developed. The department gained substantial respect in the University for its helpfulness and non-bureaucratic openness. It gradually became an acknowledged 'centre of excellence' nationally and internationally, for the invention, development and support of technology-enhanced learning methods. It helped win funding for a number of national and international projects, which in turn helped develop the department.

The head of CEDM has visited many institutions, sometimes as a consultant, over the years. He has found educational development and technology development widely separated, often with mutual incomprehension, or at best suspicion. Technical staff are sometimes dispersed among departments where they have little opportunity for career development, and sometimes stagnate in their skills and views. Very often little can be done to change this state of affairs because of the politics and structures that jealously guard staff allocation, and awkward lines of control and command. Yet, the implementation of e-learning, on the Derby experience, demands much greater collaboration than is typical between academics, technicians and managers, with good mutual respect and teamwork. At times Derby staff have worried whether they should be so open about developments in an increasingly competitive environment. These concerns have generally proved unfounded, partly because many other institutions are not structured in ways which facilitate radical changes to support services and funding, or which make it relatively easy to harmonise the pedagogical and the technical, in order to encourage academics to engage with new methods.

ii) **Library Services.** At the time Derby became a university in 1992, its library services were fairly conventional, and barely adequate in terms of accommodation and resourcing. Derby was not alone in failing to upgrade facilities in line with increasing student numbers. The Follett report in 1993 identified serious shortcomings in the sector, and resources were made available on a bidding basis for improvements. Derby succeeded in netting £2m (US\$3.2m) towards a new £7m (US\$11.1m) library/learning centre with 1200 study places. This was an opportunity to embrace learning technology as an integral part of resource provision in the University, and given the ambitions at that time, it was eagerly seized. Two hundred and fifty computers were installed for the opening in 1997, connected to a high-speed network, and the Learning Centre was seen as the main provision for independent student access to IT. The use of the WWW to support on-campus students took off, aided by projects developed under the second phase of the academic development fund.

There were significant computer network problems in the first year, which dampened enthusiasms (among both staff and students) for the speed of change a little. But as the technical problems were worked through, the Learning Centre began to play a key role in developments. An increasing proportion of LC funds were allocated to purchase of materials in e-formats, reaching some 25% of the acquisitions budget in 2001/2, well in excess of the national average. In addition, the Learning Centre began to receive special project funding to assist e-learning implementation through UDEL. This provided online access to exam papers, study and information skills materials, and in particular to one of the biggest locally constructed collections of copyright cleared documents supporting on-line learning in the UK. This now forms part of a more broadly defined electronic library, including subscriptions to e-journals and e-books, which is being more closely linked with DEPOT. Building on the foundation of these collections, the University has recently obtained JISC funding for the EnCoRe project (meta-data tagging of resources for search and access, based on Dublin Core and

SCORM standards.) This will help to progress greater integration with VLE/MLE development and the linking of resources with supporting services.

Provision of online access to resources is further supported by a range of services for off-campus students mirroring those available in the Learning Centre itself. Facilities include an email-based information/enquiry service, a dedicated website tailored to the needs of e-learners, a wide range of links to selected quality cleared websites related to curricular needs, and special provision for postal loans and photocopies from library stock where this is the most effective form of delivery. A Distance Learning Unit has been established, initially with project funding but now operating as a mainstream activity, to coordinate and further develop these services.

The success of the learning centre as a learning hub in both conventional and e-learning terms has put great pressure on space, and planned consolidation of some smaller sites on the main campus will require an extension of the building. This might seem a little ironic in view of the expanding use of the 'virtual' university, but the philosophy has always been one of 'clicks and bricks', distilling the best from conventional and innovative modes of learning.

iii) **Computing Services (CS).** In many respects this has been the toughest service to manage. On the one side, pressure from CEDM and the learning centre for networks capable of handling the online load, and on the other the difficulty of recruiting and retaining staff with the necessary skills, who can often earn significantly more in the commercial sector. Salaries have had to be reviewed and new scales developed for CS, and indeed for all staff in central services deploying IT skills that are in high demand but short supply. Some of the University's own computer studies students have helped fill gaps both here and in CEDM by doing their one year industrial placement in a central service. In a few cases, they have stayed after completing their degrees, and thus provided a source of new talent to 'bring on'.

It has not always been easy to find a balance between the necessary role as 'gatekeeper', ensuring the security, integrity and robustness of systems and networks, and the crucial service role, helping the leaders and innovators. Given that many of the department's staff have a computer science background, there is a natural tendency towards technocracy. This has caused conflict with other departments, academic and central, who would prioritise timely, robust and fit-for-purpose solutions over promises of state-of-the-art 'jam' tomorrow. Like tomorrow, it is often the case that the 'next generation' never comes, at least not as publicised! But given that the e-learning agendas at Derby have generally been set outside of CS, and most of the development work located in separate departments, such attitudes have had relatively little impact.

A new director of IT services was appointed in 2000, from the private sector, and given a place in the corporate management team of the University. He has been working to integrate CS more closely into strategic thinking and developmental activity. The integration of DEPOT with information systems to create a managed learning environment (MLE) is a key project. The new director is leading a team made up of staff from CS, CEDM, the learning centre and the registry/student administration service.

iv) **Convergence of Services.** As was observed earlier, the above three services were partially converged in 1994, by bringing responsibility for them under a single PVC. At the time, this was preferred as less disruptive than a complete merger, at least until the new line management structure had been tested. In fact, it has worked well for eight years while e-learning has been gradually pulled into the mainstream of activity. This might be because the decision to retain the individual services, with their relatively flat structures and consequent less bureaucracy, has encouraged innovative thinking and activity. Regular heads meetings with the PVC have helped communication and co-ordination between services.

However, the departments are now being merged during 2002/03, involving some 200 full-time staff in all. This is partly in search of financial savings at management level, but mainly to inject new momentum for developments from the creation of fresh teams and closer integration of skills and understanding – such as for developing the MLE. There are of course dangers in bringing different cultures so close together. Bigger departments can dominate the smaller; service cultures and regulatory cultures can collide in damaging ways; bureaucracy and technocracy can rear up and may deter academic users. And management literature suggests that reorganisation seldom yields the anticipated savings.

However, this and other service department restructuring is specifically designed to enable the University to become more service driven and customer orientated. Also, there will be new career development opportunities for staff, the possibility to streamline some procedures and speed up projects, the option to seek new models for key aspects of

provision, and a generation of new ideas by sweeping away the old. It is a critical time for e-learning support in the University.

v) **The Centre for Interactive Assessment and Development (CIAD).** The Centre was opened in November 1999 to service the delivery of advanced computer-based assessments on a university-wide basis. Half the funding came from Derby's tranche of the Teaching Quality Enhancement Fund, around £65,000 (US\$103,000), the other half from the University.

The Centre builds on experience in the production and delivery of interactive assessments at the University that goes back to 1989, and the highly experienced initial staff team of three, headed by the originator of the TRIADS system, were all involved in the early developments.

The Centre delivered some 2,000 student-assessments in its first year of operation and will deliver around 9,000 student-assessments this year (2002/03) in a wide variety of disciplines employing a staff team that has recently been enhanced to five. It is anticipated that the initial growth will continue to at least 20,000 student-assessments per year in the coming years. It must be emphasised that many of these assessments involve complex question styles and simulations for both formative and summative use and are not simple multiple-choice tests.

The Centre exclusively uses TRIADS to deliver these highly interactive assessments. It is highly flexible, capable of delivering over thirty different question styles in a wide variety of configurations to facilitate the testing of higher-order learning skills. There are in-built facilities to support randomised selection and sequence in the delivery of questions, groups of questions, and question content in a variety of modes, making it suitable for assessments undertaken in an open environment. Adaptive chaining of formative assessments further enhances its use with student cohorts with wide-ranging backgrounds. Sophisticated scoring algorithms that are capable of grading the answers within questions as well as across the whole test are also incorporated into the system.

The TRIADSystem has been developed in action with students since 1992 and in doing so the development team has adopted the following philosophy: minimum constraint on question design, plus maximum flexibility for examiners and tutors, and maximum ease of production. The principal aim has been to produce a system that fits the questions rather than a strait jacket into which questions must be fitted.

It is the pedagogical potential for in-depth and flexible assessment that separates TRIADS from the proprietary assessment systems currently available. It is perhaps the only system currently suitable for testing honours level and taught postgraduate work. Full question/item performance data is reported for all question-styles thus allowing detailed feedback to examiners and progressive refinements of assessments with repeated use. Whilst TRIADS can be run from a commercial VLE like Blackboard it cannot feed results data directly back. Current development work means that this will change, but it is one factor in the decision to develop an in-house VLE/MLE that can handle multimedia packages like TRIADS as an integral component.

TRIADS is currently being made available to UK higher education under a 'Developers Club' licensing arrangement whereby users receive all updates for the year of subscription and the opportunity to feedback their experience into future developments. This is an interim arrangement whilst full commercialisation of the system is under consideration. In the meantime, there is interest from the commercial sector and a number of income-generating projects are in hand or have been completed. The Centre offers a service for the production of interactive assessments for both educational and industrial clients.

vi) **Registry/Student Administration.** The direct involvement of the Student Administration service in administration relating to e-learning students began in 2000 following the launch of the Global University Alliance and the consequent spur to growth in mixed mode and distance learners using online access. Up to this time, administrative functions had been located in those schools offering distance modes – mainly the School of Health and Community Studies. Initially, centralisation of administration began by seconding a member of staff from the University's International Office, which deals mainly with university extensions overseas and overseas students studying in the UK. However, due to the increase in student recruitment, in May 2002 a central administrative e-learning unit was formed with the appointment of an Operational Manager to harmonise administration of distance learners, learning-through-work students (Learndirect), and further education students based at training clubs (see vii) who all make use of online access. Conventional administration has had to be adapted for these kinds of student, who can be located anywhere in the world. Initially a much higher level of student support has been required as most students are unfamiliar with the methods of e-learning.

Online enrolment and payment of fees are being developed as a part of Derby's MLE. Administration of assessment procedures also raises problems where students cannot access one of the University's study centres. Proctored examinations is one solution, employing reliable and responsible staff in recognised centres overseas. Another is online assessment. The advent of biometric methods of verifying students will greatly help the avoidance of false identity. New methods for detection of plagiarism will also be important, although this is a problem for all modes of study including campus-based.

Administration services need even faster reactions when a student can survey international offerings from their home computer, and put in applications to several universities worldwide. Information and offers must be speedy and precise. Potential global e-learning students will become increasingly demanding in coming years. Derby is building the systems to guarantee high levels of satisfaction, helped by feedback from early adopters. The development of such systems of e-support can also bring efficiency gains, and feed back into provision of support for conventional students.

Market research and marketing are essential in this new field of provision. To some extent the latter is more important than the former, because universities like Derby are actually creating the market – a global market. Nevertheless, important research has been conducted by Derby, by the GUA, and by NextEd. This remains confidential. New approaches to marketing e-learning courses have been developed. The launch and growth of the UK e-University will be important, as the publicity generated will help all other providers market their online offerings as well.

In the end, those who succeed most will be those who can respond best to different student needs and demands. 'Standard' provision will not be enough. The ability to respond to the individual student and the environment in which they are learning (local, national, international), the ability to contextualise and customise, will be crucial to success. Student administration is beginning to play a central role in achieving this.

vii) **Out-centres and training clubs.** Out-centres, or training clubs, have been established across the northern half of Derbyshire to enable better access for the rural communities that largely make up this area. There is resistance in such communities, research has shown, to travelling more than five miles for part-time study.

The first training club was established in a post office in 1995, and there are now 15, with over 1,000 people expected to study in them in the current year. One, the Miners Arms pub in Brassington, was briefly in an international news spotlight for providing learning, including videoconferenced tutorials from the Buxton campus, with a pint of beer!

The University's outcentres are a key part of provision of blended learning to the regional community, because learners have access to computers connected to the main university networks and the Internet. Several e-learning courses have been specifically developed for the training clubs. The profile of learners does indeed reflect the whole community, and a recent survey found that the clubs are rated 'excellent'.

viii) **Student services.** Providing all the kinds of support that a campus-based student can expect face-to-face (counselling, financial advice, careers advice etc.), but in online formats, is the last remaining big challenge. With this the virtual university will become truly co-extensive with the real university. Some progress has been made at Derby – counselling is currently available from the main campus to students on other sites using both videoconferencing and email. Information and advice is available on a website, and further advice is available using email. There are videos on writing CVs and interviews, which could be streamed. Currently, there is a streaming pilot on writing skills for overseas students. But there is some way to go before the full gamut of services is available online to e-learners worldwide.

13 Important Levers and Success Criteria

The aim of this section is to draw together and itemise some of the key elements in the University's successes in implementing e-learning and thus enabling it to become one of the leading UK institutions in this field.

i) **Early adopters:** There were and are early adopters in every institution, and Derby was no different in this. Perhaps what was different was that the early adopters were working on highly generic uses of technology, applicable to just about any discipline. The innovators were also concerned to find cost-effective uses that improved efficiency. It was the generic applicability that attracted external funding.

- ii) **University mission:** This was critical. Early adopters were quickly supported from the highest levels of the institution.
- iii) **Support services:** Highly efficient and effective support services were developed, particularly the Centre for Educational Development and Media, and somewhat later, the Centre for Interactive Assessment Development. These were and to a large extent remain almost unique in the UK in bringing together in close proximity a full spectrum of media and development expertise.
- iv) **Pedagogy and technology:** Technology and pedagogy went hand in hand by bringing educational development staff and technology development staff together, and recruiting staff with educational qualifications, teaching experience and technical knowledge to lead 'instructional design'.
- v) **Staff development:** Rather than just relying on short events and seminars, which have questionable utility beyond consciousness raising (although this is necessary), the main investment was in curriculum-based staff development. This also had the benefit of disseminating expertise.
- vi) **Investment:** E-learning development in higher education has often suffered from the expectation that quite modest investment will have a dramatic effect over a very short timescale. Capital investment in equipment and software seems to be preferred to sustained investment in people and staff development. This parsimonious approach would probably seem rather optimistic to those who direct major changes in the commercial sector. Even at Derby, annual investment has been small as a percentage of turnover – around 2% at the most, discounting the investment in computers and networks which would have had to be made even by a university not pursuing a clear e-learning agenda.
- vii) **Leadership:** There has been clear leadership and commitment from the VC down, through thick and thin. Bringing the learning support services under a single PVC helped cement and direct this leadership. The message from the top has always been clear, even if some staff have questioned it, and still question it.
- viii) **Management infrastructure:** the highly professional approach adopted towards all aspects of distance learning using technology is notable. Derby's work for the GUA is run by a management team that works very closely together, supported by administrators in the registry. The Israel extension likewise has an experienced team of managers and administrators. In both cases detailed operational manuals have been produced to support quality assurance.
- ix) **Strategies and plans:** Planning and the articulation of strategies have been very important. It is not just the direction these provide that is critical, but the vision and understanding that is generated through writing them.
- x) **Opportunity:** The University has tried to seize every relevant opportunity, whether public or private. From the funding council -TLTP, FDTL, JISC, e-University projects – but only where these are directly in line with the University's own development activity and ambitions; from the government and skills councils – Learndirect, Learning Through Work; and privately – GUA, Israel extension, and other franchises and partnerships. Synergies have been and are being sought between these various initiatives. Because of the University's advanced standing, new opportunities are being assessed almost weekly.
- xi) **Programmes and courses:** Modularity and credit accumulation are essential for online learning at a distance. But the kind of qualifications offered is also important. The University has a substantial portfolio of professional and vocational courses, which would seem to be among the most in demand by distance learners. Market research has tended to confirm this.
- xii) **Staff commitment:** This is perhaps the hardest to achieve. Academics are notoriously traditional and sceptical of the benefits of change. It cannot be said that at Derby all the staff are fully behind the e-learning and distance-learning operations. However, some 15 years of sustained commitment to educational technologies, with increasing investment, has won many of them over. The evident success of such high profile innovations as the telepresence teaching centre has silenced many critics. Those who query the University's plans for technology-enhanced learning are no longer sceptical, as they were, of the ability to make the technology work, technically and pedagogically, rather they are sceptical that the initiatives can be brought into the mainstream and made increasingly attractive to the students of tomorrow, justifying all the effort and investment. And that is indeed the challenge.

14 The Balance of Activity, Now and in the Future

About 800 module registrations from 400 students are expected on Derby's courses for the GUA next year. Participation in the UK e-University should substantially increase students on complete online courses. Learning through work numbers are expected to rise significantly as this mode of study gains greater attention nationally and internationally, to 2,600 module enrolments by 2005. New partnerships currently in discussion will increase overseas numbers studying online, and the move of the GUA into blended learning using local study centres will be a logical development that should make Derby's online resources more accessible to potential students. A recent development is Derby's involvement in the establishment of one of 13 regional New Technology Institutes (NTI), funded by HEFCE. This is an advanced Internet exchange for providing education and training into the workplace, particularly for small and medium sized enterprises. Derby is the first university in its NTI to develop a portfolio of courses for use through this new access channel for the business community.

In 2002, approximately 10% of enrolments are on distance learning courses supported by e-learning, and around 20% are with overseas franchises. By 2006, distance learning numbers are projected to rise to 20% of all enrolments, and franchises to 22%, so that almost half Derby's students will be studying off-campus in one mode or another. On-campus, by 2006, many courses will be offering complete modules in e-learning, distance mode, particularly where those courses have developed modules for off-campus learning.

Such diversification is seen as an important strategy for maintaining and developing the viability and standing of the institution. The work of the last 15 years on technology-enhanced methods is yielding other benefits than student fees in terms of income streams. Most importantly, the University's many innovations – and not just in technology – are increasing its reputation worldwide, which may be one of the reasons why application levels remain relatively high for a new university. In an increasingly competitive environment, it will be important to stand out from the crowd. In this regard, Derby's investments are already bearing fruit.

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Useful web addresses for more information:

www.derby.ac.uk

www.derby.co.il (in Hebrew)

www.derby.ac.uk/elearning

www.derby.ac.uk/triads/

www.gua.com

www.learndirect.co.uk

Glossary

ADF- Academic Development Fund
CAA- Computer-aided assessment
CIAD- Centre for Interactive Assessment Development
CS- Computing Services
DEPOT- Derby platform for online teaching
EMM- Centre for Educational Methods & Media
FDTL- Fund for the Development of Teaching & Learning
FE- further education
FTEs- full-time equivalent students
GUA- Global University Alliance
HE- higher education
HEFCE- Higher Education Funding Council for England
JISC- Joint Information Services Committee
LC- Learning Centre
LTAS- Learning Teaching & Assessment Strategy
MLE- Managed Learning Environment
MMDU- Multimedia Development Unit
OP- Operational Plan for the Teaching & Learning Strategy
PVC-pro vice-chancellor
QAA- Quality Assurance Agency (UK)
TLTP- Teaching & Learning with Technology Programme
TOTAL- Tutor-Only Transfer of Authored Learning
TQEF- Teaching Quality Enhancement Fund
UDo- University of Derby Online
Ufi- University for Industry
VESOL- Video autoproduction and Editing System for Open Learning
VLE- Virtual Learning Environment
WWW- WorldWideWeb